GIPPING/STOUR CATCHMENT MANAGEMENT PLAN

CONSULTATION REPORT

NATIONAL RIVERS AUTHORITY

ANGLIAN REGION

GIPPING / STOUR CATCHMENT MANAGEMENT PLAN

JANUARY 1993

NRA

National Rivers Authority
Anglian Region

Gipping / Stour Catchment Management Plan

FOREWORD

January 1993

Established in 1989 the National Rivers Authority has as it's role the "Guardians of the Water Environment". As such it is committed to protecting and improving the water environment in its broadest sense. Establishing a sound planning base for the development of river catchments is essential to our future management.

Catchment management plans are a vehicle to achieve improvements in the water environment. By using public consultation they will allow input from others and provide commitment from all parties to achieving action on important issues.

This is the third such Plan produced in the Anglian Region. I look forward to receiving comments from those interested to produce a final Plan balancing the conflicting demands placed upon an integral feature of the Nation's Heritage.

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GIPPING/STOUR CATCHMENT MANAGEMENT PLAN

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1.0 CONCEPT

The National Rivers Authority (NRA) is the major environmental protection agency responsible for safeguarding and improving the natural water environment in England and Wales. The nature of its responsibilities are wide reaching and include:-

- Control of pollution and improving the quality of rivers, groundwaters and coastal waters.
- Flood defence, including the protection of people and property.
- Flood warning.
- Effective management of water resources.
- Maintenance, development and improvement of fisheries.
- Conservation of the natural water environment.
- Promotion of water based recreation including navigation.

To achieve success in all these areas the NRA works with industry, commerce, farming, local authorities, other statutory and non statutory agencies and the general public, to promote environmental awareness and to enforce appropriate environmental standards.

Catchment management assists the NRA to use its authority and work with others to ensure that the rivers, lakes, coastal and underground waters are protected and where possible improved for the benefit of present and future generations.

River catchments are subject to increasing use by a variety of activities. Many of these interact and some conflicts arise. The competing requirements and interests of users and beneficiaries must be balanced.

The NRA will use its resources to:-

i) Respond promptly to all reported pollution incidents.

ii) Control pollution by working with dischargers to achieve improvement and monitor effluent compliance with appropriate standards.

iii) Monitor, survey and investigate the existing quality of controlled waters to determine short and long term changes.

iv) Maintain existing and invest in new assets to provide flood protection, develop water resources and provide other NRA services.

v) Determine, police, enforce and review the conditions in water abstraction licences, discharge consents and land drainage consents to achieve operational objectives.

vi) Maintain, develop and improve fisheries, promote recreation, navigation and conservation.

vii) Influence planning authorities to control development so as to avoid conflict with NRA objectives and initiatives through Town and Country planning liaison.

viii) To assess, manage, plan and conserve water resources.

This draft catchment plan consolidates the policies, objectives and options for the Gipping/Stour catchment for the overall improvement of the water environment. It must be emphasised that the Catchment Management Plan is not an end in itself. Its aim is to provide a comprehensive guide to the present status and future of the Catchment. It is the essential first step in providing the basis for drawing up a plan of action. The timetable for the planning process is given in Table 1 below. The plan is drawn up as follows:-

1. Uses of the Catchment

   For the identified uses of the water environment up to three pages of text is produced, supported by a map indicating where in the catchment each use occurs. Objectives for the use are identified and targets set, (where applicable), for Water Quality, Water Quantity and Physical Features.

2. Catchment Targets

   By taking the targets for individual uses, overall targets for Water Quality, Water Quantity and Physical Features are set for the catchment.

3. Current Shortfalls of the Catchment

   Having set targets it is now possible to view the current state of the catchment and identify issues that need addressing to meet the future catchment targets.

4. Issues and Options

   It is now possible to identify individual issues and suggest options to resolve these problems. These options identify responsible bodies and also suggest advantages and disadvantages.

The Plan is now released for public consultation in draft form. Comments on the objectives/targets and Issues/Options are invited before the plan is finalised to produce an Action Plan for the Catchment.

The issues and options as presented are the initial thoughts of the NRA Anglian Region and do not constitute policy statements. Following the consultation period all comments will be drawn together and considered in drawing up the Action Plan.

Table 1

The Catchment Management Planning (CMP) Process

Timescale	Steps
0 months	1. Set up an NRA CMP Group.
	2. Identify and describe catchment uses.
	3. Identify catchment targets for the catchment.
	4. Compare current status with catchment targets for the catchment.
	5. Identify catchment issues and options.
	6. NRA Internal Consultation
6 months	7. External Consultation.
9 months	8. Draw up Action Plan version of the CMP.
12 months Periodic Review	9. Monitor and review the CMP.

The Gipping /Stour Catchment

Map No. 1

November 1992

NRA

National Rivers Authority

Anglian Region

560 70 80 90 600 10 20 630

260 50 40 30 220

Key

- Catchment boundary
- Main river
- Coastline

kms 0 5

R. Gipping

R. Stour

R. Orwell

Ramsey River

Walton Backwaters

Glem

Chad Brook

Belstead Brook

IPSWICH

COLCHESTER

BRAINTREE

HADLEIGH

WOODBRIDGE

2.0 OVERVIEW

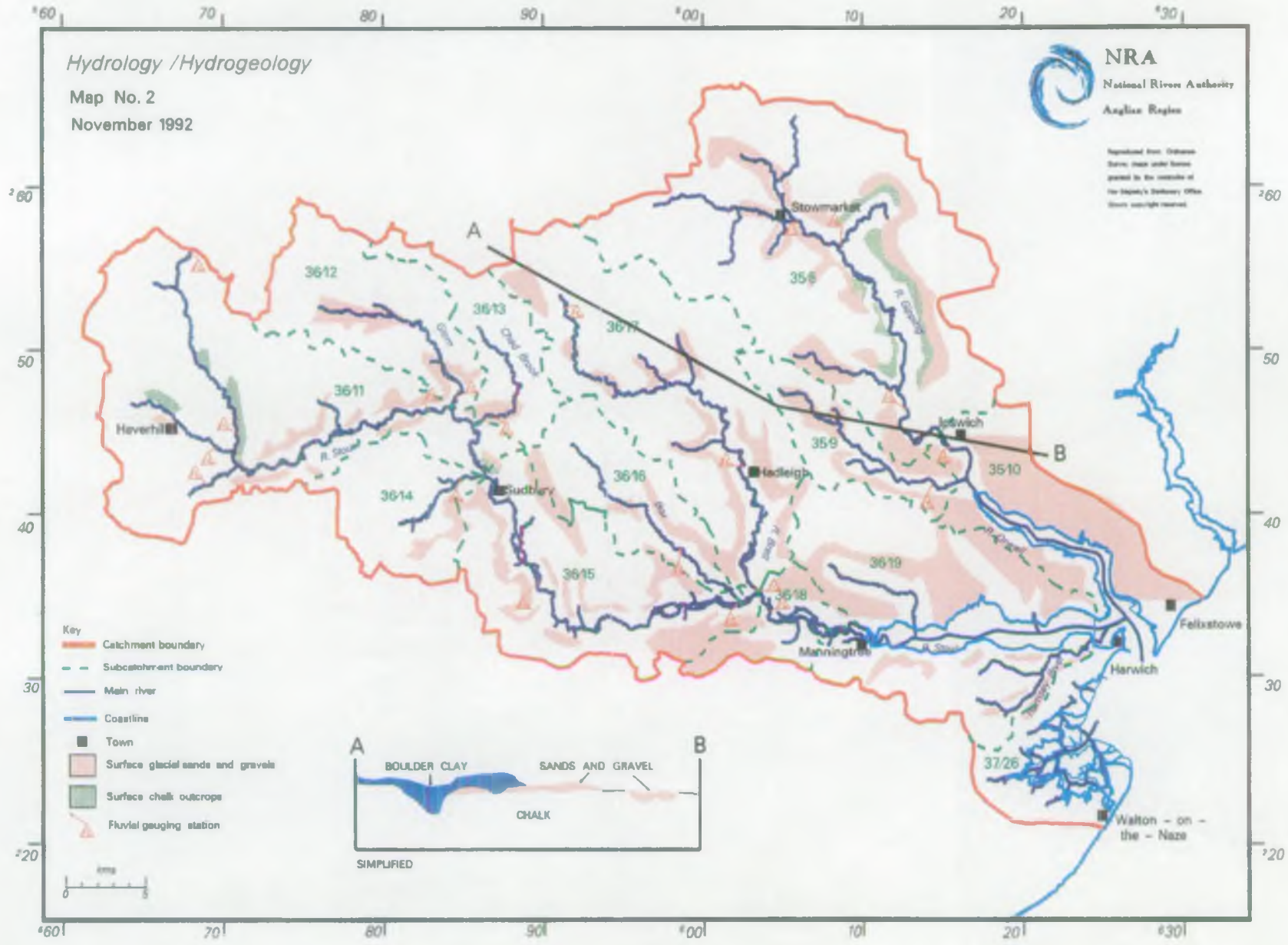
2.1 Introduction

The area covered by this plan includes the whole freshwater catchments of the Rivers Stour and Gipping, together with the Orwell/Stour Estuary complex, Walton Backwaters, and the adjacent coastal zone. All tributaries of both rivers are included, as are the small streams draining directly to the sea. Much of the plan area is within the county of Suffolk, but a substantial part of Essex is included within the catchment of the Stour, a small part of Cambridgeshire is also encompassed.

Land use is primarily agricultural, but some industry is associated with the main towns. The largest of these is Ipswich but the towns of Stowmarket, Needham Market, Haverhill, Sudbury, Harwich and Felixstowe are also important catchment features. The last two of these are both major ports, handling very large scale international trade. Some further port facilities exist in Ipswich and Mistley. All of these towns, as well as many lesser ones and large areas of agricultural land, are potentially vulnerable to either fluvial or tidal flooding. The rivers and estuaries support a wide range of uses, which give rise to a host of potential conflicts. There are major abstractions for public water supply on both the principal rivers. In the Stour, natural flows are not always adequate to support this need, and a major water transfer scheme is operated regularly to augment the river. Large sewage effluent discharges to either river or sea are associated with all the principal towns, whilst the rural areas are served by a very large number of smaller works. There is some industrial use of water, together with a range of industrial discharges to both freshwater and tidal reaches. Agricultural interests make significant abstractions for spray irrigation in the summer months, as well as exerting a major influence on the management of water quality. Some commercial fishing takes place in the estuaries and coastal waters, with a well established oysterage in Walton Backwaters.

Large parts of the catchment enjoy the protection afforded by special conservation or landscape designations. Much of the Walton Backwaters area and the Stour Estuary are RAMSAR and Special Protection Areas (SPA). There are a number of Sites of Special Scientific Interest, Nature Reserves and County Wildlife Sites throughout the area. Much of the Stour Valley, famous for its association with the painter John Constable, is designated as an Area of Outstanding Natural Beauty. New agricultural policies leading to grants for "set aside" land and to the existance of Environmentally Sensitive Areas (ESA), are exerting an ever increasing influence on future land use planning.

Major recreational and amenity uses are further characteristics of the area. Most of the principal freshwater river lengths have good fish populations, which support widespread angling interests. The estuaries provide sheltered waters allowing a variety of boating activities. Both the Stour and the Gipping


Hydrology /Hydrogeology
Map No. 2
November 1992
NRA
National Rivers Authority
Anglian Region
A
B
Stowmarket
Ipswich
Haverhill
Sudbury
Hadleigh
Manningtree
Harwich
Felixstowe
Walton - on - the - Naze
3612
3613
3611
3614
3615
3616
3617
3618
3619
3510
359
358
37/26
Key
Catchment boundary
Subcatchment boundary
Main river
Coastline
Town
Surface glacial sands and gravels
Surface chalk outcrops
Fluvial gauging station
BOULDER CLAY
SANDS AND GRAVEL
CHALK
SIMPLIFIED

have been navigable in the past, with a public right of navigation still existing on the Stour between Brundon and Cattawade. Dedham Vale, the centre of "Constable Country", attracts many visitors.

This plan shows how the NRA proposes to discharge its responsibilities throughout this complex and interesting catchment. In doing so, it seeks to both recognise all legitimate interests, and to reconcile potentially conflicting uses.

2.2 Hydrology
(Refer to Map No 2)

The Stour catchment is divided into 9 subcatchments: Upper Stour, Glem, Chad brook, Belchamp Brook, Lower Stour, Box, Brett, Stratford and Flatford, and Stour Estuary. The Gipping catchment comprises three subcatchments, the Gipping, Belstead Brook and the Orwell Estuary.

The varied surface geology results in a complex hydrology.

The surface geology is dominated by Boulder Clay, generally with the underlying Sands and Gravels exposed on the valley slopes. The Sands and Gravels are absent on some of the western tributaries of the Stour and Gipping, but become increasingly important towards the east, and are the main surface deposit of the Orwell Estuary and the north bank of the Stour Estuary. London Clay is exposed in the lower reaches of the Stour and the Orwell and is the dominant feature of Walton Backwaters. There are some isolated outcrops of Chalk in the valley bottom of the Stour catchment and a large outcrop in the Gipping Valley between Needham Market and Ipswich. Valley deposits of alluvium and river gravels occur in the flood plain.

The Boulder Clay cover limits the base flow contribution to the Stour and Gipping, particularly in the upper reaches. Spring fed tributaries from the Sands and Gravels contribute to the flow in the middle and lower reaches of both catchments. The interaction between the watercourses and the Valley Deposits and Chalk outcrops is complex.

Annual average rainfall is around 595 mm and the yearly evaporation and transpiration losses are around 475 mm, but as these losses are largely concentrated in the summer months, effective rainfall is very much higher in winter than in summer. This combined with the geological influences means that there is a marked difference between average summer flows and average winter flows.

The Boulder Clay cover can result in rapid run off producing flash floods.

Flow in the River Stour is frequently supplemented by water water from the Ely Ouse to Essex Transfer Scheme and the Stour Augmentation Groundwater Scheme.

2.3 Hydrogeology

Groundwater reserves in the Gipping and Stour catchment occur mainly within the Chalk, the Glacial Sands and Gravels, and the Lower London Tertiaries.

The water level in the Chalk lies at approximately 70m AODN in the north west of the Stour catchment descending to around sea level at the western end of the Stour Estuary. In the Upper Gipping valley the water level is approximately 30 m AODN. The Chalk aquifer is hydraulically confined in the upper catchments but becomes increasingly semi-confined particularly along the lower river valley towards the south east. Groundwater flow is broadly in a south easterly direction.

Investigations have demonstrated that groundwater recharge to the Chalk aquifer occurs mainly along the river valleys with the distribution of drift deposits imposing an important control. Zones of high transmissivity, greater than 400 m^2/day, are concentrated along the valleys and are generally coincident with the presence of deep buried valley features. In the upper catchment areas where extensive coverage of boulder clay occurs, recharge is reduced and groundwater yields from the chalk aquifer decline. Transmissivities here are generally less than 100 m^2/day.

2.4 Hydrometric Network

There is an extensive network of hydrometric monitoring stations within the catchment covering rainfall, riverflows (primary gauging stations), groundwater levels, tide levels and wind speed.

For flood warning and forecasting purposes a number of rainfall, riverflow, river and tide level and wind speed parameters are connected to the Authority's telemetry system.

Daily records of rainfall are also derived from measurements taken by numerous private observers. Data is available one month in arrears. At Wixoe the full suite of climatological data is monitored.

2.5 Water Resources

Water resources within the catchment are derived from both surface and groundwater. Overall available resources are assessed by reference to the long term average recharge to the aquifer and available surface flows. Groundwater resources are essentially fully committed and additional surface water is only available during winter periods. Current demands for water are heavily dependent on water imported into the catchment. This is provided by the Ely Ouse to Essex transfer and Stour Augmentation groundwater scheme. Future demands for water are likely to be met by enhancements to these schemes.

Abstraction is controlled by licences issued by the NRA under the Water Resources Acts 1963 and 1991. Sources developed before 1963 were granted licences of right under the Water Resources Act 1963. An abstraction licence is only issued if there is sufficient water available, the need for the water is justified, all rights of existing users are protected and the water environment, eg. rivers, springs and wetland sites, is not unacceptably affected. As water resources continue to be developed it is becoming common practice to include conditions in licences to safeguard these interests, eg. derogation agreements, control levels and minimum flow requirements.

2.6 Water Quality

In this catchment, which contains significant areas of industry, a major commercial dock complex and has major agricultural use, it is essential that the pollution risks are minimised in order to allow the harmonious use of the rivers, estuaries and coastal water by the many activities which require water of a high quality.

Within the catchment the protection of public drinking water supply abstractions is of prime importance. Abstraction for this purpose takes place on the River Gipping to Alton Water Reservoir and on the River Stour to Abberton Reservoir. There are also a number of groundwater abstractions for public drinking supply within the catchment. It is essential that the quality of these public supply sources is protected.

Agriculture plays a major role in the catchment and it is essential that adequate pollution prevention measures are enforced to ensure that pollution from agricultural activities is kept to a minimum.

Tourism and high amenity usage is a feature of the waters within the catchment, particularly in the Stour valley. The River Orwell, Stour Estuary and Walton Backwaters are much used for pleasure activities particularly boating, and these activities must be catered for. Similarly the coastal beaches are highly popular and it is necessary that the EC designated bathing waters of Walton, Dovercourt and Felixstowe maintain compliance with the quality limits imposed by the EC Directive.

In order to protect these uses and interests, a comprehensive sampling and monitoring programme is undertaken throughout the catchment.

2.7 Land Use

2.7.1 Agriculture

Agriculture is the most widespread and important land use in the catchment area.

The quality of land is predominantly good, rated as within Grades 2 and

3 under the MAFF classification system with quantities split approximately evenly. In addition the area contains small parcels of Grades 1 and 4 quality land; with a large area of Grade 1 (high quality) situated in and around the catchment of the River Stour within the Tendring Peninsular.

The catchment is mainly in arable production, with increasing reversion to grazing in the river valleys.

2.7.2 Urbanisation

The total population in the catchment is approximately 402,000 with 218,000 being located in the main towns and the remainder in villages, hamlets and isolated farm settlements.

Much of the industry is related to agriculture. The area contains numerous industrial and commercial business parks and other significant industries such as chemical and cement works. Tourism and commercial transport is catered for at Felixstowe and Harwich Ports with daily sailings to Continental Europe.

Tourism also brings many visitors into the area both for holidays and day trips to explore the Stour Valley and Dedham Vale, known affectionately as "Constable Country".

Growth is identified within the Structure Plans covering the catchment but is generally limited to the towns and main villages.

2.8 Infrastructure

The catchment is served by a network of trunk and main A roads, which serve the main towns and villages, with by-roads serving and linking the rural settlements.

Major commercial/lorry routes through the catchment service the commercial and tourism ferry ports of Felixstowe and Harwich. The importance of maintaining efficient links between these ports and major routes to London, the Midlands and the north help to ensure that the catchment areas roads are kept in good condition; and an ongoing maintenance/improvement programme reflects this need.

There are no major road construction projects planned for the catchment, expenditure being limited to system maintenance as described above and a number of by-passes planned for the future.

The catchment is served by a rail network catering for passengers and commercial transport.

The infrastructure network conflicts little with the river systems, the only interference being at channel crossings which are well established.

Notable crossings are that of the road bridge over the River Orwell Estuary, which spans 1 mile and rail crossings over the River Stour Estuary.

The infrastructure network provides adequately for the identified catchment uses, although road congestion can be experienced during peak holiday periods.

KEY DETAILS

Area	1485 km^2		
Population	1990	Projected to year 2001	
	402,000	423,000	

Main Towns and Populations

Ipswich	116,956	Harwich	16,736
Felixstowe	23,180	Stowmarket	13,410
Sudbury	21,000	Hadleigh	6,600
Haverhill	20,000		

Administrative Details

County Councils	:	Suffolk Essex Cambridgeshire	
District Councils (See Map 3 for Council Areas)	:	Babergh Braintree Colchester East Cambridgeshire Ipswich	Mid Suffolk South Cambridgeshire St Edmundsbury Suffolk Coastal Uttlesford
NRA	:	Anglian Region - Eastern Area	
Water Companies	:	Anglian Water Services (AWS) Essex Water Company Tendring Hundred Water Company	
Significant Sewage Treatment Works:			131
PWS abstraction sites:		32 groundwater 4 surface water	
Internal Drainage Boards:		Gipping	
Flood Defence Committees	:	Essex Local Flood Defence Committee Norfolk and Suffolk Local Flood Defence Committee	

Topography

Ground Levels	Min level 2m OD(N)
	Max level 126m OD(N)
Sea Levels	Mean high water springs 6.2 AOD(N)
	Mean low water springs 3.3 AOD(N)

Surface Geology

River Gipping Catchment - Boulder clay with chalk outcrops
River Stour Catchment - Boulder clay, sand and gravel

Solid Geology

Chalk

Water Resources

Gipping Catchment

Availability:-	Chalk aquifer - none
	Gravel - none
	Surface water - Winter only, in minor quantities

Stour Catchment

Availability:-	Chalk aquifer - minor quantities
	Sands and gravels - minor quantities where abstraction will not affect low summer flows
	Surface water - winter, in minor quantities
	- summer when supported by Ely Ouse to Essex River Support Scheme.

Water Quality

Length of river in National Water Council Class - 1991 Survey.

River Gipping

Class 1A (very good)	0 km	Class 3 (poor)	9.5 km
Class 1B (good)	25.8 km	Class 4 (bad)	0 km
Class 2 (fair)	20.1 km		

River Stour

Class 1A (very good)	0 km	Class 3 (poor)	6.4 km
Class 1B (good)	78.7 km	Class 4 (bad)	0 km
Class 2 (fair)	87.3 km		

N.B. Minor main river tributaries not included in the above.

Length of Estuary in Coastal and Estuarine Working Party Classification - 1991 Survey

Tidal Orwell

Class A (good)	9.5 km	Class C (poor)	2.0 km
Class B (fair)	8.0 km	Class D (bad)	2.0 km

Tidal Stour

Class A (good)	27.0 km	Class C (poor)	0 km
Class B (fair)	2.0 km	Class D (bad)	0 km

Flood Protection

River Gipping and Associated Tributaries

Length of Designated Main River	: Fluvial	29.0 km
	: Tidal	17.3 km
Length of Embanked Main River	: Tidal	16.7 km
Length of Sea Defences	: 2.6 km	
Area at risk from tidal flooding	: 391 ha	
Area at risk from fluvial flooding	: 828 ha	

River Stour and Associated Tributaries

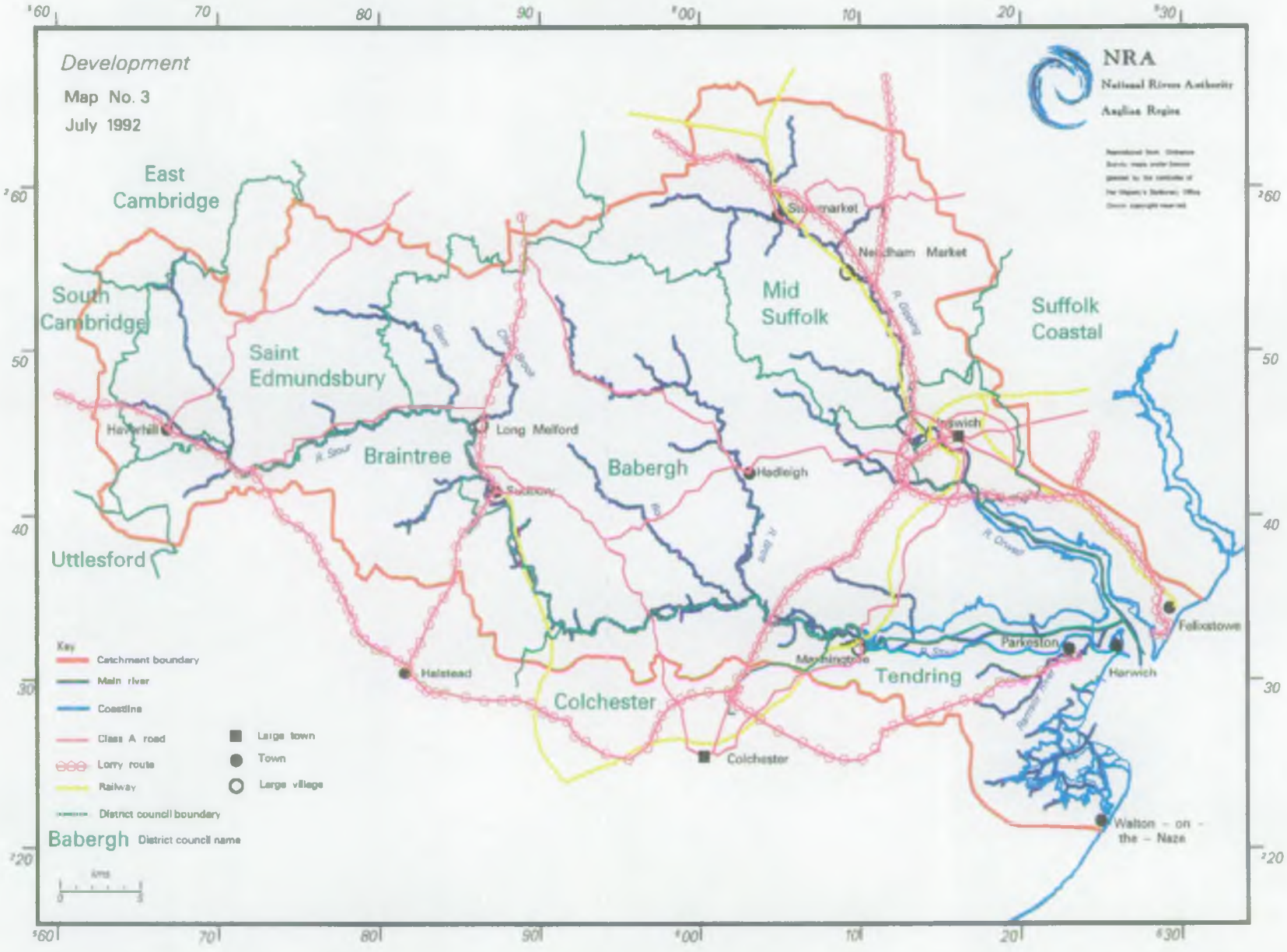
Length of designated main river	: Fluvial 300.5 km Tidal 41 km
Length of embanked main river	: 18 km
Length of Sea Defences	: 55 km
Area at risk of tidal flooding	: 1,748 ha
Area at risk from fluvial flooding	: 5,000 ha

Fisheries

	Biomass Class				
	A	B	C	D	TOTAL
Length of cyprinid fishery	97.7	31.3	6.3	4.8	140.1
Length of salmonid fishery	4.3	26.4	0	0	30.7
TOTAL	102	57.7	6.3	4.8	170.8

Conservation

Number of SSSIs	: 39
Number of water dependent SSSIs	: 14


Development
Map No. 3
July 1992
NRA
National Rivers Authority
Anglian Region
East Cambridge
South Cambridge
Saint Edmundsbury
Mid Suffolk
Suffolk Coastal
Braintree
Babergh
Uttlesford
Colchester
Tendring
Ipswich
Sudbury
Hadleigh
Halstead
Felixstowe
Harwich
Parkeston
Walton - on - the - Naze
Key
Catchment boundary
Main river
Coastline
Class A road
Lorry route
Railway
District council boundary
Babergh District council name
Large town
Town
Large village

3.0 CATCHMENT USES

3.1 Development - Housing And Commerce

3.1.1 General

Development must be considered when planning the use of a river catchment. This use relates to existing and predicted future residential, commercial and industrial development which is identified in adopted and draft county structure and district local plans. These plans identify policies against which the planning authorities consider development proposals.

The NRA is a statutory consultee under planning legislation and advises county and local authorities on development proposals which may have an impact on matters relevant to the NRA.

The NRA seeks to pursue its aims and policies in relation to development through the planning consultation process, and although the final decision on planning matters rests with the planning authority, government guidelines advise on the need to consider the NRA's concern in determining proposals.

Irrespective of obtaining planning consent the NRA may use its relevant powers to control the nature of development proposals.

3.1.2 Local Perspective

(Refer to Map No 3)

The Catchment is situated mainly within the county of Suffolk with its southern boundary in the county of Essex and a small proportion of the western boundary in the county of Cambridgeshire. The catchment covers the entire Borough of Ipswich and District of Babergh and parts of the Districts of Suffolk Coastal, Mid Suffolk, St Edmundsbury within the Suffolk County; parts of the Districts of Tendring, Braintree, Uttlesford and the Borough of Colchester within the Essex County; and parts of the Districts of East Cambridgeshire and South Cambridgeshire.

Population, Housing and Settlement indicated within relevant County Structure Plans recognises a need for growth and provides for a potential increase in housing within the catchment area of approximately 21,500 new houses by the year 2000.

Employment growth provided by commercial development including industrial, retail, warehousing etc. is also recognised as a need within County Structure Plans. Provision is made for development sites

within the catchment area, the overall area of which could be in excess of 150 hectares during the forthcoming decade.

Much of the growth is likely to be accommodated in the existing towns and main villages although it is expected that some will be provided by limited infilling within existing rural villages.

Protection against flooding from rivers and the sea, protection of water resources and the protection of ground and surface waters from pollution is of particular concern in the catchment.

3.1.3 Development - Objectives

Flood Defence:

- To ensure new development is not at risk from flooding and does not put other areas at risk of flooding which could endanger life and damage property.

- To ensure any work which is needed to reduce the risk of flooding created by a new development is paid for by the developer and not the public.

Conservation and Enhancement of the Water Environment:

- To protect the water environment from any detriment due to development.

- To enhance the water environment in conjunction with development.

Water Quality:

- To protect inland, coastal and groundwaters from pollution.

- To ensure that adequate pollution prevention methods are incorporated into new developments and are consistent with the Groundwater Protection Policy.

Water Resources:

- To ensure that development does not cause unacceptable effects on surface water and ground water sources and to protect the rights of those who abstract water.

- to ensure water resources are made available to meet the reasonable needs of future development.

3.1.4 Development - Policy Summary (See Appendix 1 for Anglian Region Model Policies)

Flood Defence:

- There will be a presumption against development, including the raising of land where, in the opinion of the NRA, such development would be likely to impede the flow of flood water, or increase the risk of flooding elsewhere or increase the number of people or properties at risk.

Conservation and Enhancement of the Water Environment:

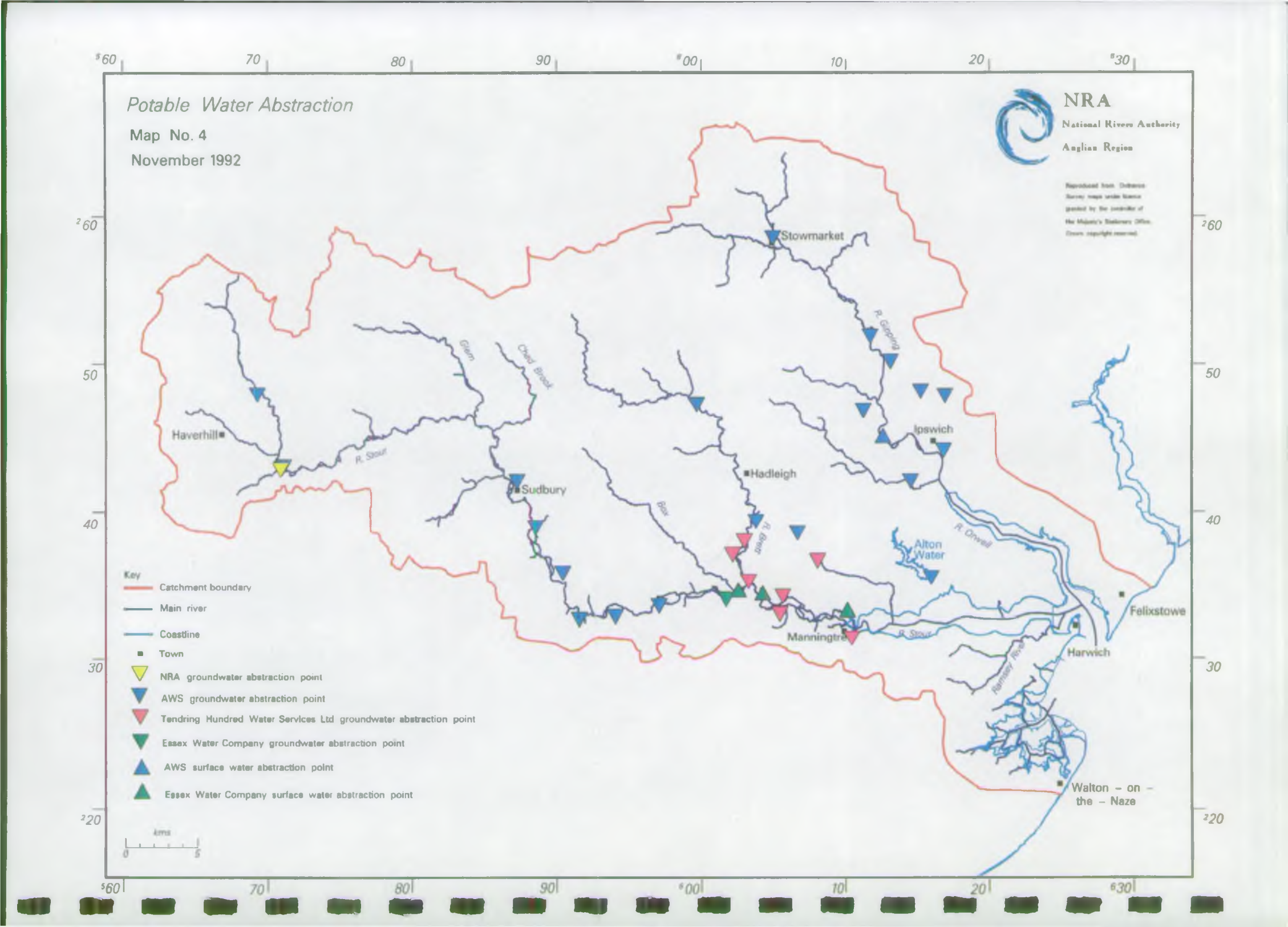
- The conservation and enhancement of wildlife, landscape and archaeological features associated with rivers, ponds, lakes, estuaries etc. will be encouraged.

Water Quality:

- There will be a presumption against development including changes in land use which, in the opinion of the NRA, will pose an unacceptable risk to the quality of ground and surface water.

Water Resources:

- There will be a presumption against development including changes in land use which, in the opinion of the NRA, will have a detrimental impact on water resources.


Potable Water Abstraction
Map No. 4
November 1992
NRA
National Rivers Authority
Anglian Region
Stowmarket
Haverhill
Sudbury
Hadleigh
Ipswich
Alton Water
Felixstowe
Harwich
Manningtree
Walton – on – the – Naze
R. Stour
R. Gipping
R. Orwell
R. Box
R. Glem
Chad Brook
Key
Catchment boundary
Main river
Coastline
Town
NRA groundwater abstraction point
AWS groundwater abstraction point
Tendring Hundred Water Services Ltd groundwater abstraction point
Essex Water Company groundwater abstraction point
AWS surface water abstraction point
Essex Water Company surface water abstraction point
kms
0
5

3.2 Potable Water Supply - Groundwater Sources

3.2.1 General

This relates to the use of groundwater for domestic purposes, such as drinking, cooking and washing. The water is abstracted from wells and boreholes constructed into the underground water retaining rocks (called aquifers). The major source of groundwater in this catchment is the Chalk aquifer.

Abstractions are made by the water companies, in particular Anglian Water Services, Tendring Hundred Waterworks Company and Essex Water Company. In addition, individual householders abstract water from wells or boreholes for their own domestic use.

The abstractions made by the water companies are controlled by abstraction licences issued by the NRA.

Abstractions made by private individuals for their own individual domestic use are not required to have an abstraction licence under the Water Resources Act 1991 unless the quantity used exceeds 20 cubic metres per day.

3.2.2 Local Perspective

(Refer to Map No 4)

There are 27 Chalk borehole sites licensed in the catchment for public water supply. Anglian Water Services operate 19 sites, Tendring Hundred Water Services Limited operate 7 and Essex Water Company operates one.

All the water companies operate a comprehensive water supply mains network and hence the water can be distributed from the borehole source to the point of demand. The major demand centre within the catchment is Ipswich, supplied by Anglian Water Services, though much of this demand is satisfied through the combined use of surface water and groundwater sources. Generally, the supply needs of other communities in the catchment are met locally with chalk groundwater.

The total quantity of groundwater licensed by Anglian Water Services in this catchment is 35 million cubic metres per year. Some of the sources are currently not used.

Groundwater resources in the Gipping are fully committed. Developments to meet predicted demand are likely to be met from outside the catchment, eg, the Deben, or by increased conjunctive use of existing groundwater and additional surface water imports.

of existing groundwater and additional surface water imports.

Tendring Hundred Waterworks Company supply groundwater locally to meet the needs of customers in the Tendring Peninsula. The total quantity of water licensed by Tendring Hundred Water Company in this catchment is 10.4 million cubic metres per year, which is sufficient to meet demands within the planning horizon.

Essex Water Company operate one source at Langham for use in emergency when surface water abstraction from the Stour is affected by drought or pollution.

The catchment is characterised by a large number of private groundwater sources used for domestic supply. These abstractions are principally shallow wells into local Sands and Gravel deposits.

3.2.3 Environmental Objectives

Water Quantity

To manage groundwater resources where possible, in such a way as to meet all reasonable demands, including those of the environment, having due regard to overall costs.

- To augment and/or redistribute water resources, where appropriate, to meet water demands to appropriate standards of reliability.

- To ensure the proper use of groundwater resources.

- To conserve water resources, for example by encouraging efficient water use and leakage control.

Water Quality

- Standards are set in accordance with EC Groundwater Directive 80/68/EC and NRA Water Quality Objectives.

3.3 Potable Water Supply - Surface Water

3.3.1 General

This describes the abstraction of surface water, ie, inland waters, rivers and springs for domestic potable use. Abstractions by water companies are controlled by abstraction licences issued by the NRA. The abstractions by a private individual for one household's domestic supply would only require a licence if the abstraction is greater than 20 cubic metres per day.

3.3.2 Local Perspective

(Refer to Map No 4)

Anglian Water Services operate one surface water supply works for public supply in the catchment. This abstraction is from the River Gipping at Sproughton. Water is transferred to Alton Water surface reservoir for storage, where it provides recreational and amenity facilities prior to subsequent treatment and distribution to the Ipswich area. Surface water can also be piped into Alton reservoir from the Mill River. The total quantity licensed is 10,783 thousand cubic metres per year. The licence contains a clause to protect the downstream flows and quality of the river.

Essex Water Company operate three surface water supply works for public supply, all from the River Stour, exporting water out of the catchment to supplement supplies into Essex. The total quantity licensed is 315,000,000thousand cubic metres in a five year period. The licence contains a clause to protect the downstream flows and quality of the river. River flows and abstractions are supplemented at times of low flows by operation of the NRA's transfer schemes augmenting supplies into the area, ie, Ely Ouse to Essex transfer, incorporating the Great Ouse Groundwater Scheme and the Stour Augmentation Groundwater Scheme.

There are a small number of spring sources within the catchment which are used for private domestic supplies.

3.3.3 Environmental Objectives

Water Quantity

To manage surface water resources where possible, in such a way as to meet all reasonable demands, including those of the environment, having due regard to overall cost.

- To augment and/or redistribute surface water resources, where appropriate, to meet water demands to appropriate standards of reliability.

- To ensure the proper use of surface water resources.

- To conserve surface water resources, for example by encouraging efficient water use and leakage control.

Water Quality

- Standards are set in accordance with EC Surface Water intended for Drinking Water Abstraction Directive 75/440/EC and NRA Water Quality Objectives.

3.4 Agricultural Abstraction

3.4.1 General

This use relates to the abstraction of water from ground and surface waters for agricultural use including spray irrigation and general agricultural use (stock watering, crop spraying, etc). All uses, except general agricultural less than 20 cubic metres per day from surface waters, require a licence.

3.4.2 Local Perspective

(Refer to Map No 5)

Spray Irrigation

Spray irrigation is widely practised across the catchment. There is a total of 207 licences which permit abstraction for this use from surface water, chalk and sand and gravel. Total quantities licensed in the catchment are 4723 thousand cubic metres per annum (tcma), (73%) from surface water and 1714 tcma (27%) from groundwaters. Of the surface water licensed, 25% is abstracted during the winter months for storage and use during the following summer. A small but increasing proportion (8%) is licensed subject to the operation of river support schemes - in this case, the Ely Ouse to Essex transfer scheme. This class of licence only applies to sub-catchments 36/11, 36/15 and 36/18 (River Stour) at present. This use is wholly consumptive, ie not returned to the system after use and not returned to the resource.

There is likely to be an increase in future demand for water for this use, which is estimated to be around 4% per year over the next 20 years. Summer surface water, and groundwater in some parts of the catchment (notably 35/8 (River Gipping)), is fully committed and so there will be an increasing need to rely on winter storage or river support to meet this demand.

General Agriculture

There are 345 abstractions licensed to take a total of 1585 tcma for this purpose. In the main, they are small abstractions having little impact either locally or on overall resources.

3.4.3 Environmental Objectives

Water Quantity

To manage water resources where possible, in such a way as to meet all reasonable demands, including those of the environment, having due regard to overall costs.

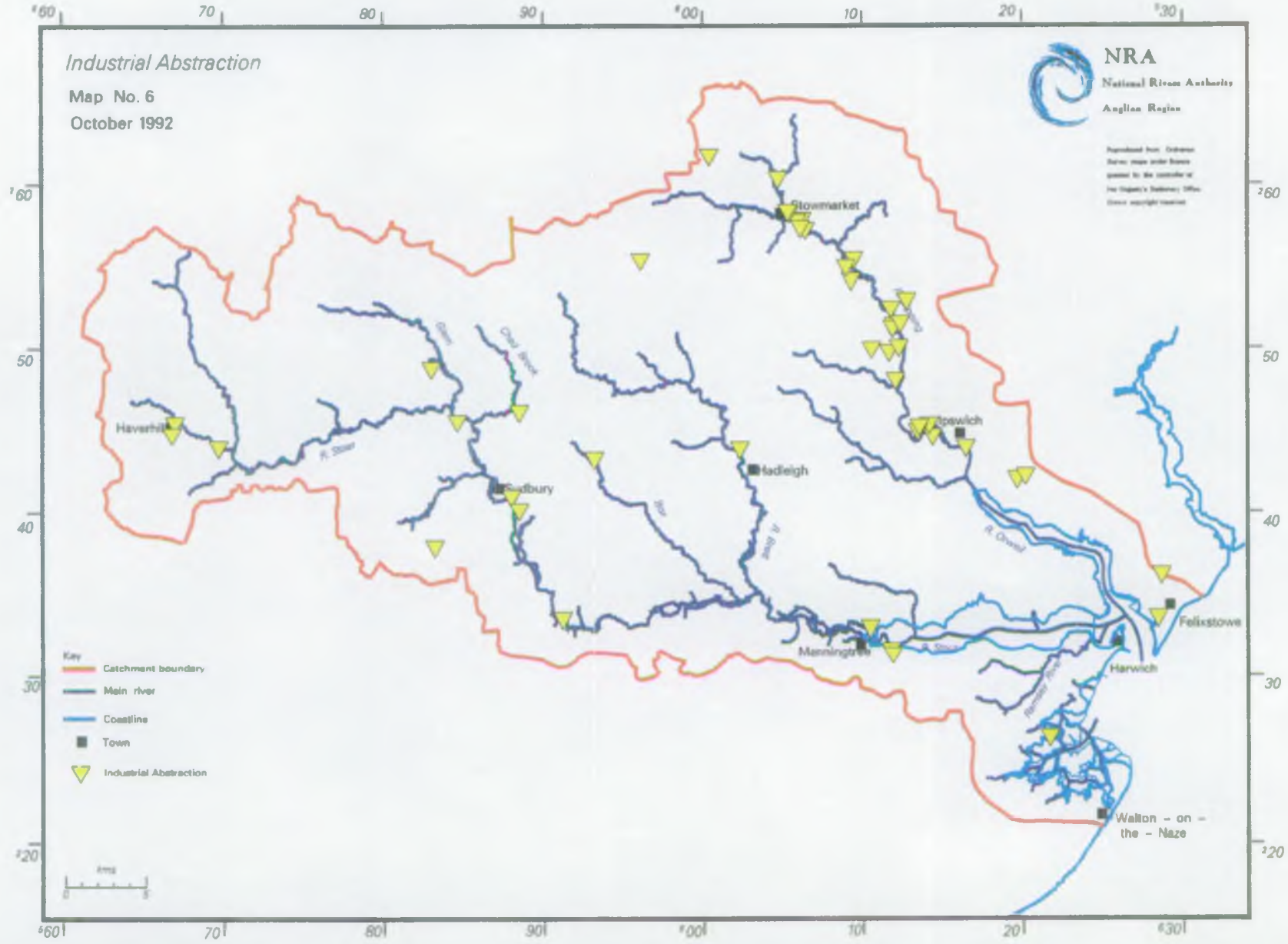
- To augment and/or redistribute water resources, where appropriate to meet water demands to appropriate standards of reliability.

- To ensure the proper use of water resources.

- To conserve water resources, for example by encouraging good irrigation practice. To encourage surface water abstraction during winter for storage.

Water Quality

- To maintain and improve Water Quality in accordance with NRA Water Quality Objectives.


Industrial Abstraction
Map No. 6
October 1992
NRA
National Rivers Authority
Anglian Region
Stowmarket
Ipswich
Haverhill
Sudbury
Hadleigh
Manningtree
Harwich
Felixstowe
Walton - on - the - Naze
R. Stour
R. Orwell
Key
Catchment boundary
Main river
Coastline
Town
Industrial Abstraction

3.5 Industrial Abstraction

3.5.1 General

This use relates to the abstraction of water from ground and surface waters for industrial use. Industrial abstractions include water used for industrial processes, cooling and sand and gravel washing. Such abstractions are controlled by abstraction licences issued by the NRA.

3.5.2 Local Perspective
(Refer to Map No 6)

There are 46 licensed industrial abstractors in the catchment, permitted to take up to 26153 thousand cubic metres per annum. 41 of these take water from the chalk or sand and gravel aquifers, the remaining 5 being direct river abstractions from the Gipping (2), Stour (2) and Glem (1). Of the total quantity licensed, nearly 20,000 tcma is concentrated in 10 major licences, most of which is used for non-consumptive cooling purposes.

3.5.3 Environmental Objectives

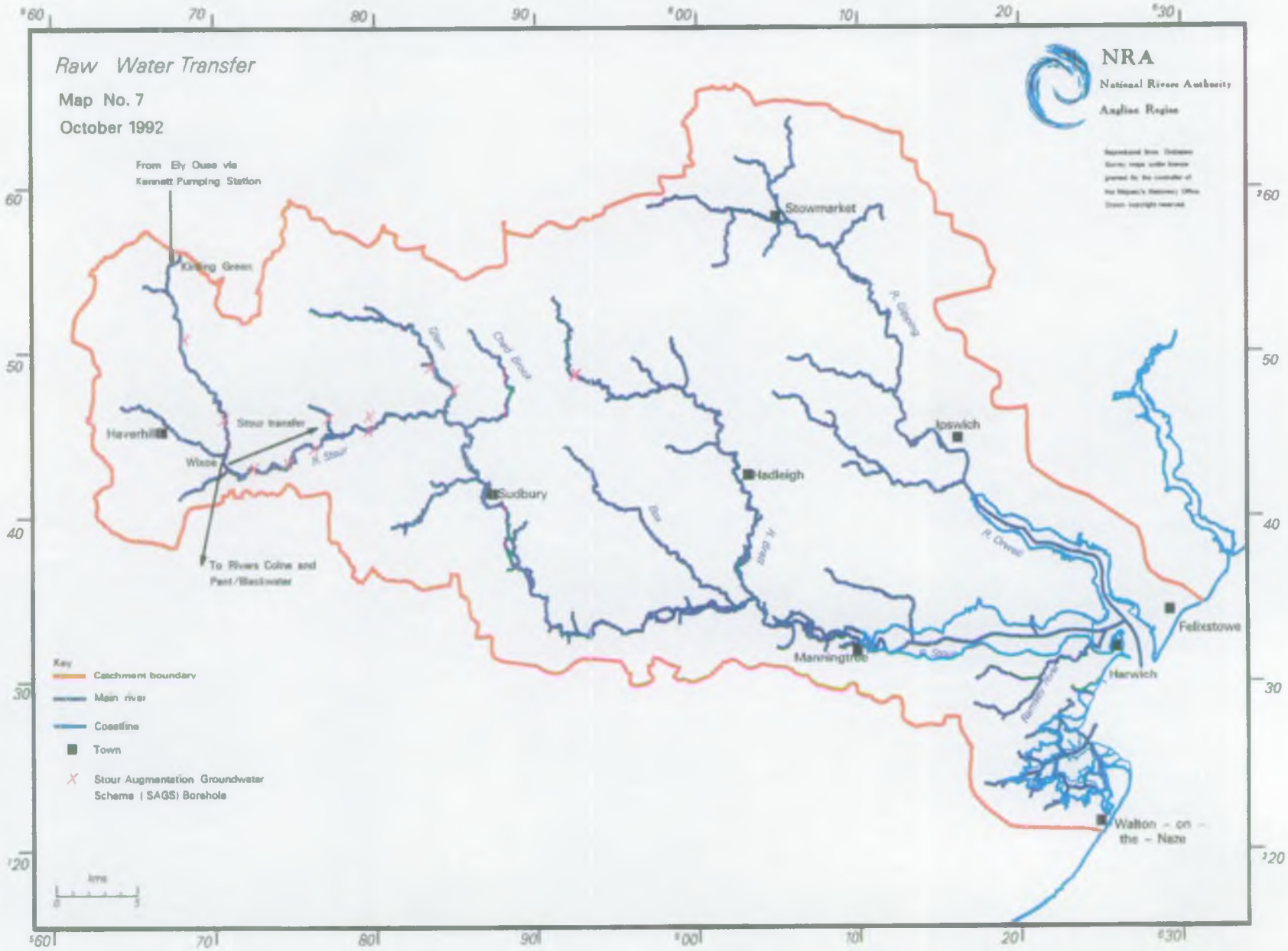
Water Quantity

To manage water resources where possible, in such a way as to meet all reasonable demands, including those of the environment, having due regard to overall costs.

- To augment and/or redistribute water resources, where appropriate, to meet demands to appropriate standards of reliability.
- To ensure the proper use of water resources.
- To conserve water resources, for example by encouraging efficient water use.

Water Quality

- To maintain and improve water quality in accordance with NRA Water Quality Objectives.


Raw Water Transfer
Map No. 7
October 1992
NRA
National Rivers Authority
Anglian Region
From Ely Ouse via
Kennett Pumping Station
Kentford Green
Stowmarket
Haverhill
Stour transfer
Wixoe
R. Stour
Sudbury
Hadleigh
Ipswich
R. Orwell
Felixstowe
Manningtree
Harwich
Walton - on - the - Naze
To Rivers Colne and Pant/Blackwater
Key
Catchment boundary
Main river
Coastline
Town
Stour Augmentation Groundwater Scheme (SAGS) Borehole
kms
0
5

3.6 Raw Water Transfer And River Support Schemes

3.6.1 General

(Refer to Map No 7)

There are two major schemes affecting the Catchment; the Ely Ouse to Essex Transfer Scheme, which includes Great Ouse Groundwater Scheme transfers and the Stour Augmentation Groundwater Scheme (SAGS).

1. Ely Ouse to Essex Transfer Scheme

This scheme, opened in 1971 is designed to transfer surplus water from the Ely Ouse to the headwaters of the Rivers Stour, Colne and Blackwater, to increase their flows and make available extra water to licenced abstractors, and particularly to the Essex Water Company who operates reservoirs at Abberton and Hanningfield, and treatment works at Langham and Langford.

As part of the scheme, water which originates from the River Ouse at Denver is discharged into the headwaters of the River Stour at Kirtling Green. A pumping station at Wixoe allows some or all of this water to subsequently be transferred to the Rivers Pant/Blackwater. There is also the facility to support flows in the River Colne. Licence conditions allow up to 455 tcmd to be transferred into the Stour and up to 341 tcmd to be abstracted from the Stour at Wixoe. But actual abstraction is currently limited by installed pump capacity at Wixoe to 227 tcmd.

2. Stour Augmentation Groundwater Scheme (SAGS)

The Stour Augmentation Groundwater Scheme currently consists of a total of 12 boreholes, sunk into the chalk in the Stour Catchment and used to support the river at times of low flows. A further four small boreholes have been provided to ameliorate the local effects of operating SAGS boreholes in the area between Clare and Stoke by Clare. The total daily licensed quantity from the SAGS boreholes is 99.5 tcmd although a further restriction that not more than 39,200 tcm shall be abstracted in any 15 year period was included to protect the aquifer against long term damage.

3.6.2 Operating Rules

The prime requirement of the Ely Ouse to Essex Transfer Scheme is to provide water to Essex Water Company at their reservoirs at Abberton and Hanningfield. To this end the timing, pumped flow rates and duration of transfer is determined, using reservoir control curves (see Appendix 2), to achieve the optimum reservoir re-fill rate. Natural flows in the Rivers Stour and Blackwater, together with the availability of water at Denver Sluice determine the limits within which these transfer assessments are made.

Due to the complex nature of the calculations and the many people affected by the operation of the scheme, a formal planned pumping procedure co-ordinates the whole process. This ranges from annual to daily pumping programmes and ensures an efficient flow of information and co-ordination of resources.

Additional benefits of the scheme operation are the maintenance of a 30 tcmd flow in the River Stour at Wixoe, between March and November for effluent dilution; support to flows in the Rivers Pant and Blackwater for spray irrigation and potable water supplies, together with other supported licences of the River Stour; provision of dilution water at other times following pollution incidents or as required by the Environmental Manager of the NRA.

3.6.3 Environmental Objectives

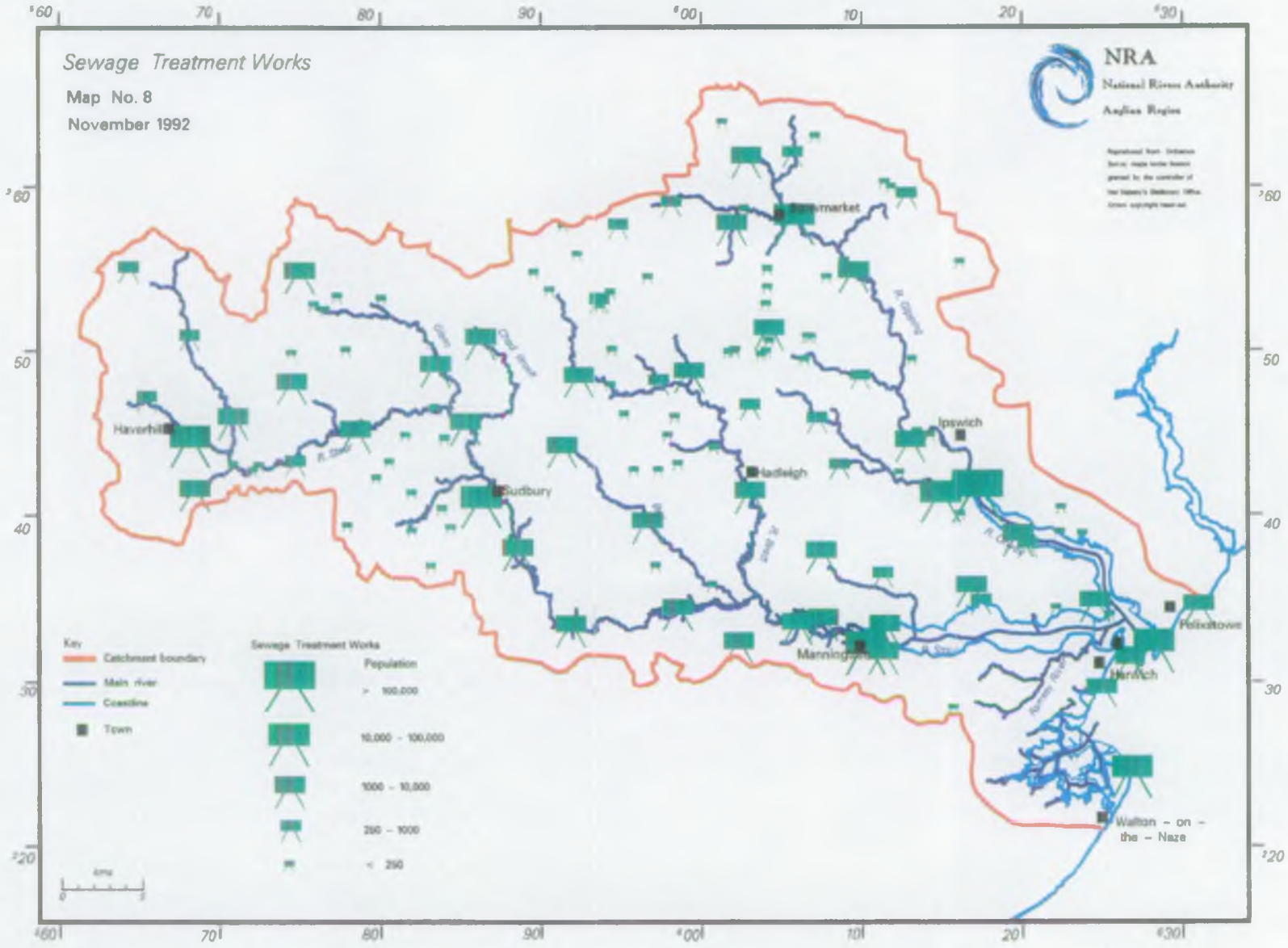
Water Quantity

To manage water resources where possible, in such a way as to meet all reasonable demands, including those of the environment, having due regard to overall costs.

- To augment and/or redistribute water resources, where appropriate, to meet water demands to appropriate standards of reliability.
- To ensure proper use of water resources.
- To conserve water resources.

Water Quality

- To maintain and improve water quality in accordance with NRA Water Quality Objectives.


Sewage Treatment Works
Map No. 8
November 1992
NRA
National Rivers Authority
Anglian Region
Haverhill
Sudbury
Ipswich
Felixstowe
Harwich
Walton - on - the - Naze
Key
Catchment boundary
Main river
Coastline
Town
Sewage Treatment Works
Population
> 100,000
10,000 - 100,000
1000 - 10,000
250 - 1000
< 250

3.7 Sewage Treatment Works

3.7.1 General

The criteria which must be complied with by dischargers to controlled waters are stipulated in a consent granted by the NRA. Consents are calculated by taking into account upstream water quality and the dilution available in the receiving watercourse. Consents are designed to ensure that downstream water quality remains acceptable for its many uses and compliant with prescribed water quality standards.

3.7.2 Local Perspective

(Refer to Map No 8)

There are 106 sewage treatment works and sea outfalls operated by Anglian Water Services (AWS) within the catchment area. In addition to the AWS sewage treatment works there are a considerable number of small sewage treatment works operated by commercial undertakings, local authorities, private householders etc. Of these, 25 are considered to be of significance and are regularly monitored by the NRA. A total of 131 private and AWS sewage treatment works are shown located on the attached map and are graded according to the size of the individual works related to the population which they serve.

Results of the routine monitoring of the treated effluent from the sewage treatment works is available from the Water Resources Act Register at the NRA Regional Headquarters, Peterborough.

The main discharges to coastal waters and estuaries within the catchment are Ipswich (Cliff Quay), Felixstowe, Harwich, Dovercourt, Manningtree and Walton on the Naze. With the exception of Manningtree and Walton on the Naze, these discharges are presently of screened or settled sewage only and schemes have been proposed for improvements which will enable these discharges to meet NRA water quality objectives and EC requirements.

The inland sewage treatment works which serve populations in excess of 10,000 are Haverhill, Sudbury, Ipswich (Chantry) and Stowmarket. The effluents from these works generally comply with their present consent limits on quality but in the case of Haverhill and Stowmarket the present quality limits do not reflect river requirements. Schemes are in hand to improve them to meet standards which are related to river quality objectives.

In addition to the discharge from the sewage treatment works and sea outfalls, there are numerous storm overflows which relieve the

sewerage system in the event of overloading. Particular quality problems are experienced in Ipswich with such discharges to the Upper Orwell estuary and Lower River Gipping. The high frequency of discharge from these overflows is presently adversely affecting river quality. Schemes are in hand by AWS to resolve this problem.

3.7.3 Environmental Requirement

To ensure that river quality objectives are complied with and improvements to the quality of sewage effluents are identified and pursued where present effluent quality is causing a failure of river quality objectives.

3.7.4 Environmental Objective

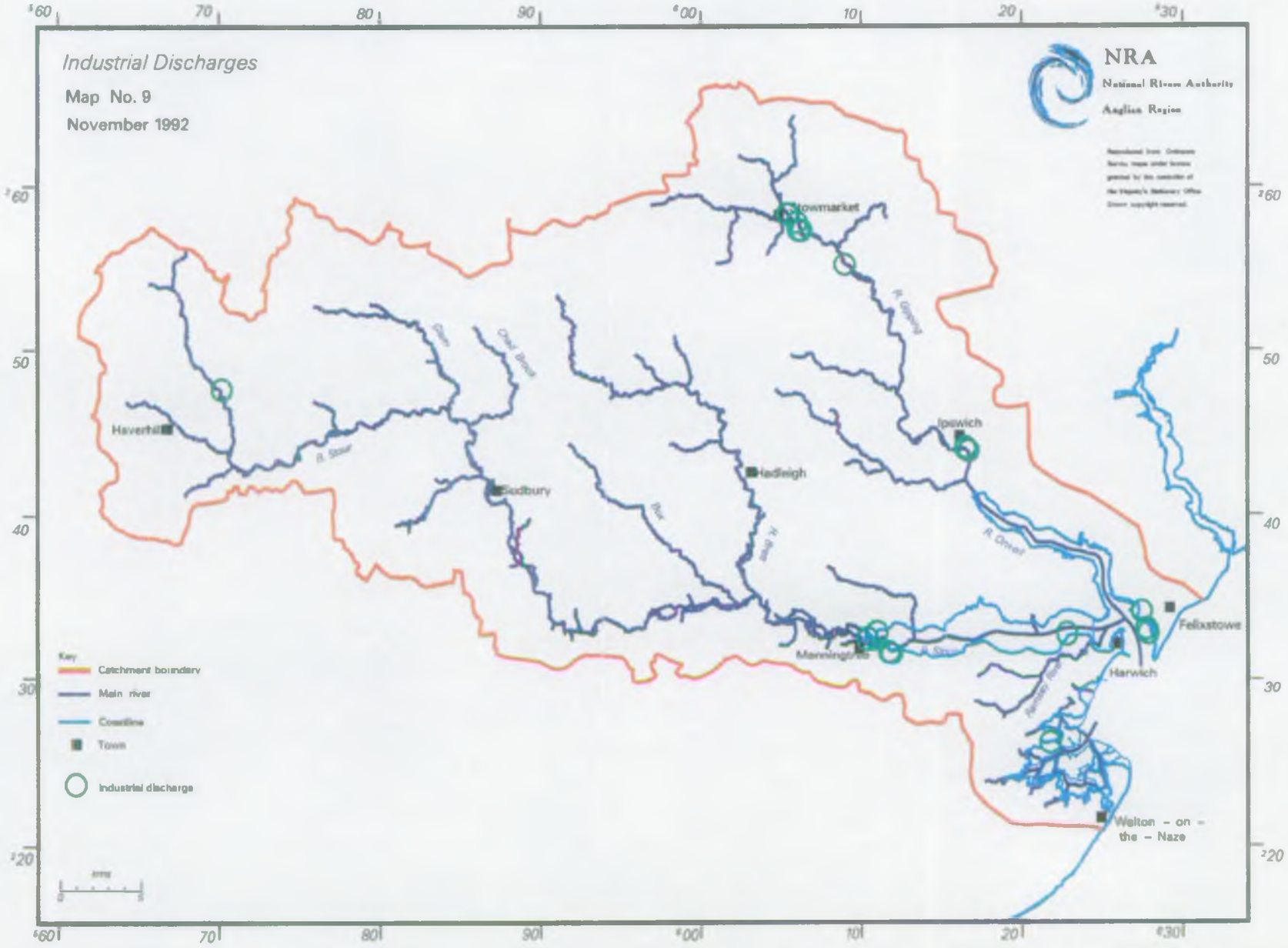
Water Quality:

- To ensure consent conditions adequately safeguard river quality objectives and prevent exceedence of EC Directives.

- Monitoring of surface waters and sewage effluents to establish compliance and take action in the event of non-compliance.

Water Quantity:

- No diminution in river flows below that used for setting quality limits in Consents. Consents are normally set assuming a low river flow.


Industrial Discharges
Map No. 9
November 1992
NRA
National Rivers Authority
Anglian Region
Newmarket
Haverhill
Sudbury
Hadleigh
Ipswich
Felixstowe
Harwich
Manningtree
Walton - on - the - Naze
R. Stour
R. Orwell
Key
Catchment boundary
Main river
Coastline
Town
Industrial discharge

3.8 Industrial Discharges

3.8.1 General

Industrial discharges are controlled by ensuring compliance with NRA consents. Conditions stipulated in trade effluent consents are calculated to prevent specified water quality standards and use related objectives being exceeded in receiving watercourses.

3.8.2 Local Perspective
(Refer to Map No 9)

Within the catchment there are 21 significant industrial discharges. They are mainly located at the major conurbations, although two discharges are sited in the Brantham industrial area and one is located on Bramble Island in the Walton Backwaters. The discharges are controlled by means of a Discharge Consent with quantity and quality limits. Results of the routine sampling of these discharges are available from the Water Resources Act Register at NRA Regional Headquarters, Peterborough. The location of these discharges is shown on the attached map.

Over the last decade or so, numerous industrial estates have been developed in the catchment. Although these estates do not give rise to direct discharges of industrial effluent to the river, they often have connections to surface water sewers which discharge to the river. The surface water which discharges is sometimes contaminated by the various industries on an estate and gives rise to concern in areas such as Sudbury, Haverhill and Ipswich.

Drainage from RAF Wattisham gives rise to concern. This is an operational airfield and in order that it remains so all year round, de-iceant material is applied regularly to the run-ways during the winter period. Surface water drainage containing de-iceant gives rise to water quality problems in the headwaters of the Brett and Gipping, but due to operational requirements of the base, the complete resolution of this problem is difficult.

3.8.3 Environmental Objectives

Water Quality

- To ensure compliance by industrial discharges within the quality limits laid down in their consents.

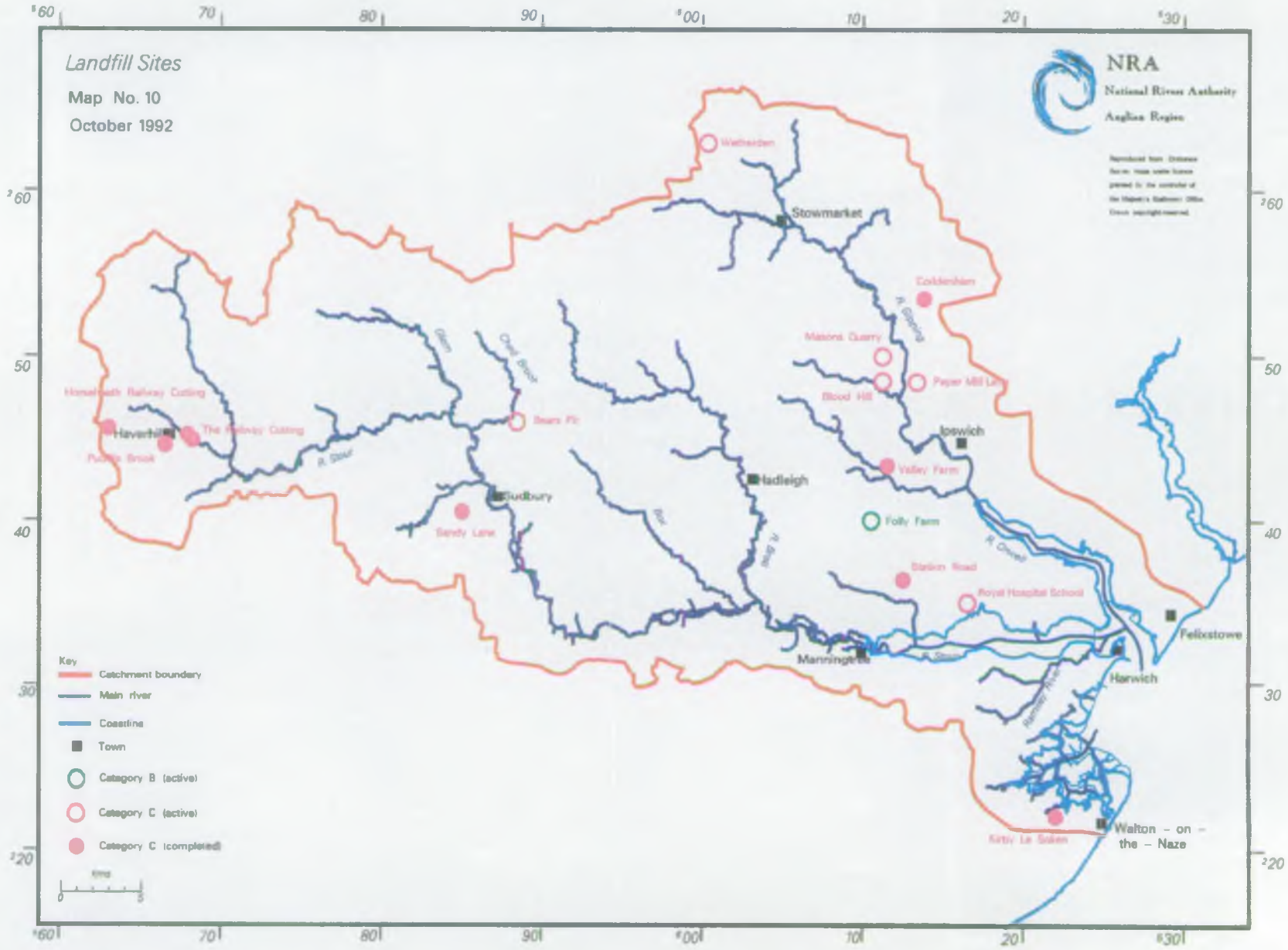
- To ensure that water quality objectives are met and to prevent exceedence of EC Directives.

- Monitoring of surface waters and discharges to ensure compliance with Consents and objectives.

- Investigation of incidents of pollution or unconsented discharges.

Water Quantity

- No diminution in river flows below that used for setting quality limits on Consents. Consents are normally set assuming a low river flow.


Landfill Sites
Map No. 10
October 1992
NRA
National Rivers Authority
Anglian Region
Stowmarket
Ipswich
Hadleigh
Sudbury
Haverhill
Felixstowe
Harwich
Walton – on – the – Naze
Manningtree
Wetheringsett
Coddenham
Masons Quarry
Paper Mill Lane
Blood Hill
Valley Farm
Folly Farm
Station Road
Royal Hospital School
Bears Pit
Sandy Lane
Kirby Le Soken
Key
Catchment boundary
Main river
Coastline
Town
Category B (active)
Category C (active)
Category C (completed)
kms
0
5

3.9 Landfill Sites

3.9.1 General

The NRA is a statutory consultee of Waste Disposal Authorities (WDAS) throughout the life of any landfill site. It is also a statutory consultee of Planning Authorities under the Town and Country Planning Acts. A valid planning permission is required before a waste disposal licence may be issued. The planning permission is presently the means by which aftercare provision on closed landfill sites may be regulated. The waste disposal licence relates to only the operational phase of any site at present but, with adoption of Part 2 of the Environmental Protection Act 1990, it will be possible to apply aftercare provisions to the licence.

It is recognised that a wide range of waste disposal operations require a waste disposal licence. These include scrap yards, transfer stations, incinerators, waste storage facilities etc. Often the greatest threat to surface and groundwater quality is posed by landfill activities.

3.9.2 Local Perspective

(Refer to Map No 10)

In the past, the majority of landfill sites were operated on the "dilute and disperse" principle, ie Polluting liquid, known as leachate, emerging from the base of a site and into the underlying strata, was considered to be improved by natural attenuation processes and to be diluted by the general movement of groundwater passing under the site. Unfortunately it is now known that in some instances the dilution and attenuation processes were insufficient for rendering the leachate innocuous. Currently these sites do not affect any abstractions within the catchment. In future it is likely that the majority of landfill sites will be constructed as "containment" sites whereby the waste disposal licence will specify the engineering measures which must be taken to minimise the escape of any leachate generated. In addition, monitoring boreholes will be required around each site in order to assess the integrity of these leachate containment measures.

Landfill sites are licensed to accept various categories of waste. Category A consists of dry inert material such as top soil, concrete and bricks. Category B wastes may contain substances which decompose slowly such as wood, paper and wool. Category C wastes include materials which decompose rapidly such as domestic wastes, animal carcasses and food processing waste. Within the area there are no sites licensed to accept hazardous waste, but there are a number of active and completed category C sites. Active category B and C, together with significant completed category C sites are

marked on the attached map.

In addition to landfill sites, there are a number of areas of land in the catchment which have been contaminated by past industrial activities. Sites of demolished gas works are an example. Identification of these sites in order to assess the implications of future development is required.

3.9.3 Environmental Requirements

- To ensure that landfill activity does not compromise water quality or water resources and proceeds in accordance with advice laid down in Regional and National Groundwater Protection Policies.

- To ensure, by liaison with the Planning Authorities, that advice is given on future development proposals which may impact on water resources.

3.9.4 Environmental Objectives

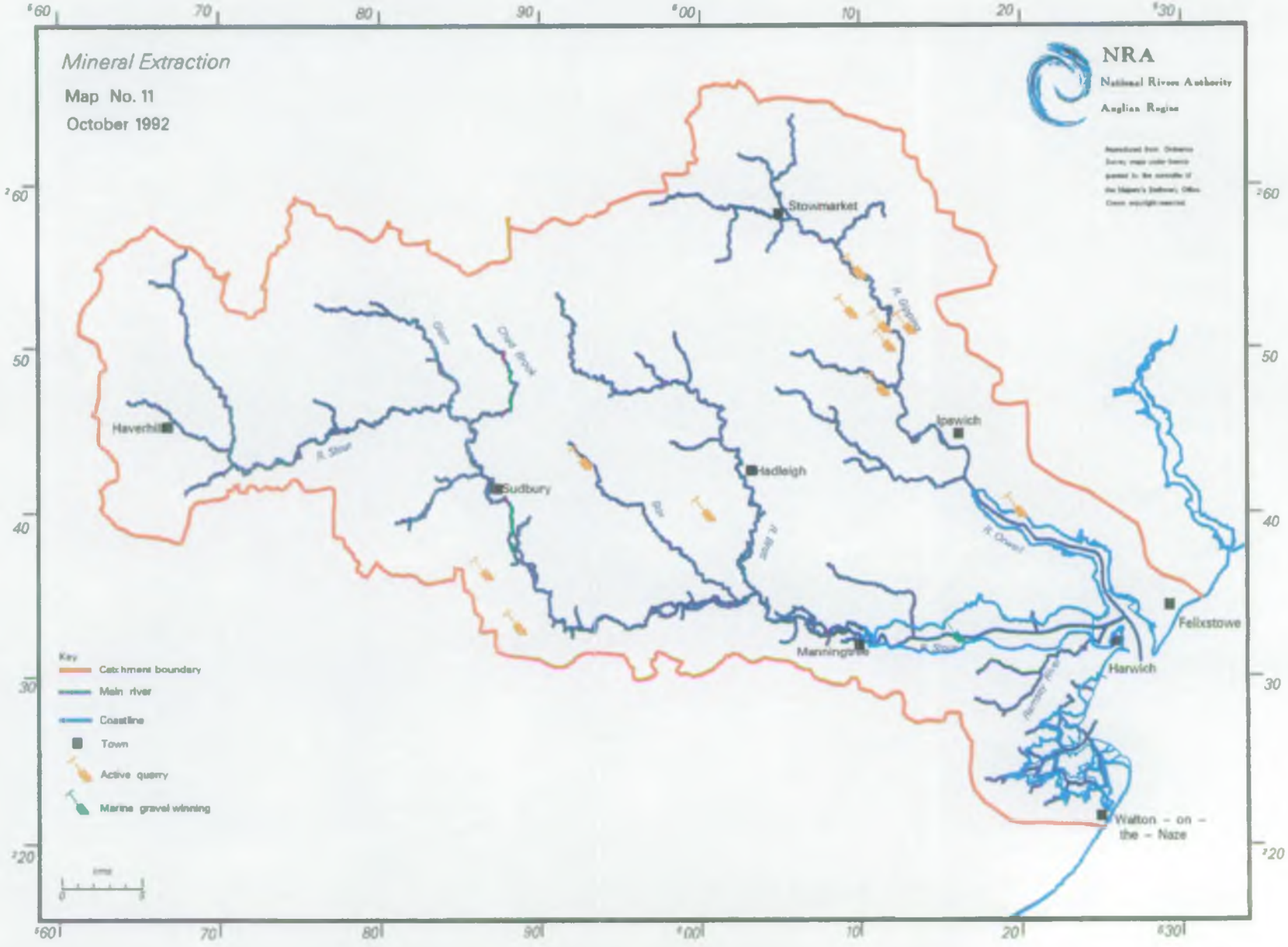
Water Quality

- Compliance with the EC Directive 80/68/EEC on the Protection of the Quality of Groundwater.

- Implementation of the NRA's National Groundwater Protection Policy.

- Prevention of pollution of surface and groundwaters.

- Monitoring of landfill sites for effect on the quality of ground and surface waters.


Mineral Extraction
Map No. 11
October 1992
NRA
National Rivers Authority
Anglian Region
Stowmarket
Haverhill
Sudbury
Hadleigh
Ipswich
Manningtree
Harwich
Felixstowe
Walton - on - the - Naze
R. Stour
R. Orwell
Key
Catchments boundary
Main river
Coastline
Town
Active quarry
Marine gravel winning
kms
0
5

3.10 Mineral Extraction

3.10.1 General

Mineral extraction can affect both groundwater quantity and quality. It can reduce storage in an aquifer and divert flow. In addition, purification which occurs as water percolates through the unsaturated zone cannot occur if it has been removed. Subsequent infilling of mineral extraction sites can also pose a significant threat to groundwater quality, divert flow and prevent aquifer recharge.

If badly sited, extraction can destroy riparian areas of conservation interest. However, correctly designed and managed they can be of great benefit for conservation, recreation and amenity as an after use.

3.10.2 Local Perspective

(Refer to Map No 11)

The Counties of Suffolk and Essex hold significant sources of sand and gravel and a number of extraction sites exist whilst others are proposed, some of which benefit from current planning permission. All County Councils within the catchment have produced Mineral Plans as required under the Town and Country Planning Act 1990, in accordance with Planning Policy Guidance Note 12. The NRA, as a statutory consultee, makes representation to any Mineral Plans.

Current extraction sites, including marine gravel winnings within the catchment area are indicated on the map opposite.

Existing sites do not present the NRA with any problems, however, proposed sites must be 'vetted' to ensure that proposals will not adversely affect the status quo. This can be ensured by employing Regional policy standards and comparing these against the operational measures proposed.

3.10.3 Environmental Requirement

Whenever possible groundwater reserves must be conserved and protected. Mineral workings must be operated within the guidance given in the NRA's Groundwater Protection Policy.

3.10.4 Environmental Objectives

Water Quality

- No deterioration of groundwater or surface water quality.

Water Quantity

- To ensure that dewatering a mineral extraction site does not cause unacceptable effects on surface waters and groundwater resources and to protect the rights of those who abstract water.

Physical Features

- Restoration of all sites to an acceptable environmental standard.
- To minimise the loss of flood plain habitats of conservation value.

Flood Defence

Map No. 12

October 1992

NRA

National Rivers Authority

Anglian Region

Stowmarket

R. Gipping

Ipswich

Haverhill

Urban scheme
Channel improvement
& flood storage
reservoir
(1:20 +)

R. Stour

Glem

Chad Brook

Sudbury

Hadleigh

Box

R. Brett

Urban scheme
Flood relief scheme
(1:20 +)

Nayland

Urban
(1:50)

Manningtree

R. Orwell

R. Stour

Ramsey River

Harwich

Felixstowe

Walton – on – the – Naze

Key

- Catchment boundary
- Main river
- Coastline
- Town
- Tidal control sluice
- Surge tide barrier
- Fluvial embankment
- Flood plain
- Flood storage area

kms 0 5

Existing standards of flood protection
(return period in years)

- 1:51 – 1:100
- 1:21 – 1:50
- 1:10 – 1:20
- < 1:10

NRA pumping station

Non – NRA pumping station

- Hard defence
- Revetted earth embankment
- Salt marsh
- Beach

3.11 Flood Defence

3.11.1 General

This use deals with the provision of effective defence for people and property against flooding from rivers and the sea. Normally flooding is a result of extreme climatic conditions, such as high winds or very heavy rainfall. Flood events are described in terms of the frequency at which, on average, a certain severity of flood is exceeded. This frequency is usually expressed as a return period in years, eg, 1 in 50 years.

The effectiveness of flood defences can be measured in terms of the return period up to which they prevent flooding. It is clear that different types of land use, for example, urban areas and pasture land, require different levels of effectiveness for the defences.

Under the Water Resources Act 1991 the NRA has a general duty to oversee, and has powers to control, significantly obstructive works on main river. Works proposed on non main river are constrained to achieve consent under the Land Drainage Act 1991.

The nature of the works carried out for flood defence means that this use can come into conflict with other river uses - notably fisheries and conservation. Consultations are carried out and, where feasible, methods are devised whereby the river can achieve its flood protection target, and provide significant habitat enhancements.

3.11.2 Local Perspective

(Refer to Map No 12)

Sea Defences

The NRA maintains the sea defences, and has commissioned a sea defence management study to help examine coastal processes. Following the East Coast Flood disaster in January 1953, when much of the coastal strip was inundated and 40 people drowned, the sea defences during 60's and 80's were reconstructed to improved standards.

Along the coast and up the River Orwell the defences protect against tidal flooding. Those facing the North Sea are substantial in construction, mainly being of steel and concrete construction. In the estuary and up the tidal river there are lesser constructions particularly on those marshes where the defence is limited to protecting agricultural land.

The Stour estuary, although large, does not have extensive sea defences, much of the land being above surge tide levels. The greatest lengths of sea walls are around the low lying land on Hamford water. This area is particularly important for nature conservation, providing a unique combination of mud flat, salt marsh and pasture islands. The defences are predominantly earth embankments, with a concrete revetment to seaward. The sea walls are included in the SSSI's of the upper Stour estuary. Much of the old Essex marshes may qualify for ESA status.

River Gipping

The Gipping catchment extends from the North Sea inland for some 30 km with a general fall of 25m to 30m from the highest land to the west to marsh land adjacent to the coast.

In the Gipping valley the flooding events are fluvial. The gradient of the catchment and short duration of an event results in overspill on to the valley floor. Flood relief works have recently been completed towards the head of the catchment to allow control of the Rivers Gipping and Rat above Stowmarket and prevent flooding here and further downstream at Needham Market.

River Stour

Inland on the Stour the flood defences are modest. Generally rivers are the natural channel with a flood plain configuration; although some heavy dredging was carried out by the NRA's predecessors. Flood defence schemes have only consisted of selected urban protection, and replacement structures.

The other major influence on the Stour besides rainfall and sluice gates is the Ely Ouse to Essex Water Transfer Scheme. This is under operational control at NRA District level but is co-ordinated by the NRA Water Resources Section at Regional Headquarters, Peterborough. Care has to be taken to avoid aggravating flood conditions when transfers are critical during Autumn/Spring periods.

Abrupt changes in the rate of transfer are occasionally unavoidable due to operational constraints. However, these can cause difficulties in resetting manually operated river control structures such that a small transition between flow regimes is achieved without any loss of retained water levels behind the structures. Consequently such changes are kept to a minimum, especially if they are of short duration only.

General

Where there is major urban development, major flood defence works have been carried out not only to provide protection from tidal flooding but also from fluvial events.

The maintenance of the sea defences and the river channels is essential and this is done in ways sensitive to the environment, whilst at the same time preserving the integrity of embankments and defences and the flood capacity of the channels. Maintenance works are kept to a minimum, are subject to environmental surveys and extensive consultation with conservation bodies.

Flood Warning

The NRA provides information and advice to the County Police Force for the purpose of giving them sufficiently advanced warnings of areas likely to be affected by tidal and/or fluvial flooding. Forecasts of flooding are compiled using tidal, rainfall and riverflow data collected from outstations by the regional telemetry system.

In tidal events the initial colour phase warning is given to the Police at the "Alert" state, normally 12 hours before high water. As the situation develops more detailed site specific advice is issued and updated.

3.11.3 Environmental Objectives

To provide effective defence for people and property against flooding from rivers and the sea. The standard of protection to be appropriate to the land use, where this is economically viable.

To provide adequate arrangements for flood forecasting and warning.

To maintain river channel structures and sea defences to protect people and property to the appropriate standard and take account of environmental needs and requirements.

To ensure the correct operation of relevant sluice gates.

To assess the environmental assets within the coastal zone.

To re-assess the flood discharge characteristics of the river systems.

To provide an emergency repair service to help prevent failure of defences during flood events.

Physical Features

- Sensitive management to maintain or enhance the conservation and aesthetic value of the river corridor.

- To develop a programme of enhancement for identified stretches.

- To develop a further understanding of the appropriate channel design and morphology, given not just flood defence, but also water quantity and usage constraints, and to utilise this in all maintenance works. This will include provision of higher water tables as required for ESA's, conservation wetlands etc and regard for the the ecological needs of the channel during the design, working and maintenance stages.

- Protection of saltings and mudflats for both their flood defence value and high conservation status.

- To pay due regard to archaeological features.

Amenity and Tourism

Map No. 13

October 1992

NRA
National Rivers Authority
Anglian Region

560 70 80 90 600 10 20 630

260 50 40 30 220

Stowmarket
R. Gipping
Ipswich
Haverhill
CP
R. Stour
Glem
Chad Brook
Sudbury
Hadleigh
Box
R. Brett
Alton Water
R. Orwell
Felixstowe
Manningtree
R. Stour
Harwich
Ramsey River
Walton – on – the – Naze

Key

- Catchment boundary
- Main river
- Coastline
- Town
- Picnic area
- Linear walk
- Circular walk
- Historical building
- Row boat hire
- CP Country park
- Proposed extension to linear walk
- Proposed new Belstead Brook Park
- Area of high amenity
- Sailing

kms 0 5

3.12 Amenity, Recreation And Tourism

3.12.1 General

Amenity relates to the aesthetic aspects of features related to the water environment.

3.12.2 Local Perspective
(Refer to Map No. 13)

The amenity value and aesthetic characteristics of watercourses must not be underestimated or overlooked. Many people live adjacent to watercourses in the catchment and more come to visit them for recreational activities such as walking and fishing. The significance of the amenity value may range from a high amenity area, eg a watercourse passing through an area often frequented by the public, to a low amenity watercourse passing through remote, inaccessible countryside.

In the case of the Rivers Gipping and Stour, both watercourses can be regarded as high amenity areas with access to the watercourses available for most of their length by means of riverside walks.

The Eastern Council for Sport and Recreation has produced a strategy report for Water Recreation covering the waters of Essex and parts of Suffolk (Zone 3). The NRA has a seat on the Zone 3 Committee and seeks to contribute towards the development of public amenity in a way that complements its statutory duties and responsibilities.

Recreation And Tourism

There is a proposal for a new park on the Belstead Brook, a tributary of the River Gipping. Belstead Brook Park is in an extension of the Bourne Park which presently serves housing estates on the South East fringes of Ipswich.

The Park will stretch across the Southern edge of Ipswich, covering 375 acres and will include meadows, woodland, footpaths, including boarded walks in marshy surrounds, ponds, wildlife habitats and designated play areas. Once complete the park will provide a complete insight into the countryside and wildlife almost on local residents doorsteps.

The River Gipping is more orientated towards recreation than tourism. Recreational activities primarily include walking and fishing.

Walking is well catered for by the riverside walk, formerly the 17 mile long tow path running most of the length of the Gipping from Stowmarket to Ipswich and also seven circular walks are available based on the river path spine and extending out into the Gipping Valley. The Gipping Valley is well served by eight picnic sites, 5 of which are situated adjacent to the river and many of which feature as part of the riverside walk and/or the circular walks.

Walks routes and picnic sites are provided by the Gipping Valley Countryside and Recreation Project which was established in 1978. The main aims of the Project are to work within the Valley to improve and enhance: countryside recreation, wildlife conservation and valuable landscape features.

The Stour Valley and Dedham Vale has been a tourism destination since the latter part of the 19th century. Specific reasons for the level of tourism interest in this area are awareness that it is primarily "Constable Country" and the attractions that this promotes such as Flatford Mill (Visitors Centre) which was 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, photography, etc.

The River Stour also boasts a popular tourist's riverside walk from Dedham to Flatford which continues along the tidal section of the Stour as far as Cattawade. This route also continues in the opposite direction from Dedham to Sudbury and is proposed to be continued from Sudbury to Newmarket. A number of circular walk routes exist within the Stour Valley either relating to popular attractions such as Sudbury "common lands", Arger Fen Nature Reserve; or alternatively relating to tributaries of the Stour, such as Assington Brook, Chad Brook and the River Glem. Picnic sites are available at the more popular destinations.

However, unlike the Gipping, the Stour is designated a statutory navigation between Sudbury and Brantham and a designated "recreational waterway" from Brantham to the sea. The River Stour Trust provide leisure trips up and down the river between Flatford and Dedham. Tourists can hire rowing boats at Flatford, Dedham and Sudbury and the river is used for a through route by canoeists.

The management of picnic sites, riverside walks, countryside recreation, wildlife and landscape conservation are well documented within the Dedham Vale and Stour Valley Countryside and Recreation Project. This catchment Management Plan should help to ensure the protection and conservation of the area comprehensively.

The estuaries of the Rivers Orwell and Stour provide good recreational amenity value to the catchment area. There are opportunities for both sail and and motor powered craft. The area has moorings, sailing clubs and cruising clubs (see Boating and Navigation Section). There are many popular bathing beaches on the coast, attracting large numbers of people to the catchment.

3.12.3 Environmental Requirement

To maintain and improve water quality in order that the amenity value of watercourses may be enhanced and protected.

3.12.4 Environmental Objectives

Water Quality

- Minimum requirement being the protection of the amenity value of the watercourse.

- Water to be free from surface films and extraneous floating material, discolouration and unpleasant odour.

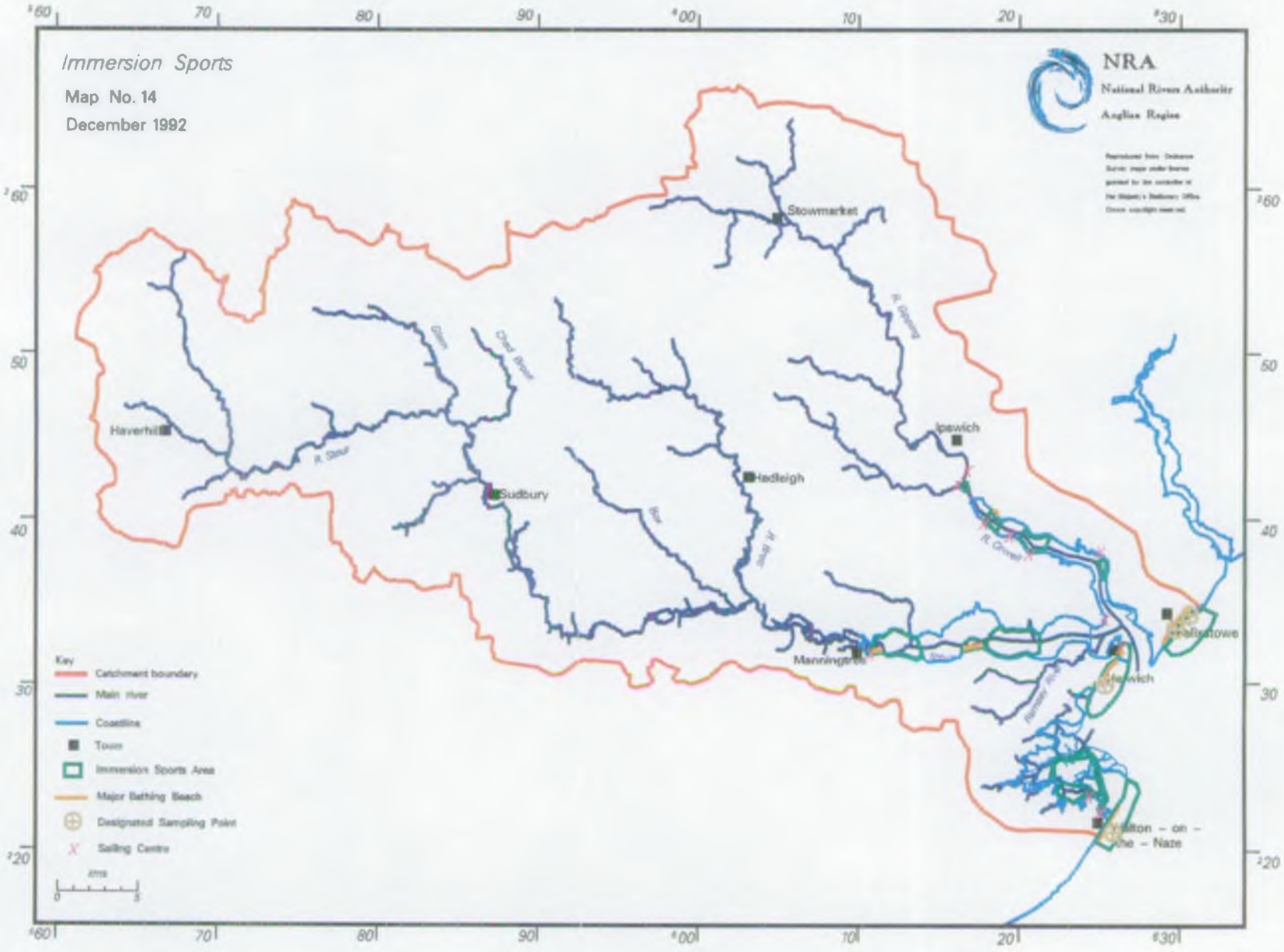
Water Quantity

- Basic flow regime including the operation of transfer and augmentation schemes, to minimise detriment to recreation and amenity.

Physical Features

- Maintenance of existing footpaths.

- Maintenance of existing access points.


Immersion Sports
Map No. 14
December 1992
NRA
National Rivers Authority
Anglian Region
Stowmarket
Haverhill
Sudbury
Hadleigh
Ipswich
Manningtree
Harwich
Clacton - on -
Naze
Key
Catchment boundary
Main river
Coastline
Town
Immersion Sports Area
Major Bathing Beach
Designated Sampling Point
Sailing Centre
kms
0
5

3.13 Immersion Sports (Marine)

3.13.1 General

This criteria includes swimming, water skiing, dinghy sailing, sailboarding, SCUBA diving and jet skiing. At the present time the only mandatory water quality requirement is in respect of EC Bathing water sites.

3.13.2 Local Perspective
(Refer to Map No 14)

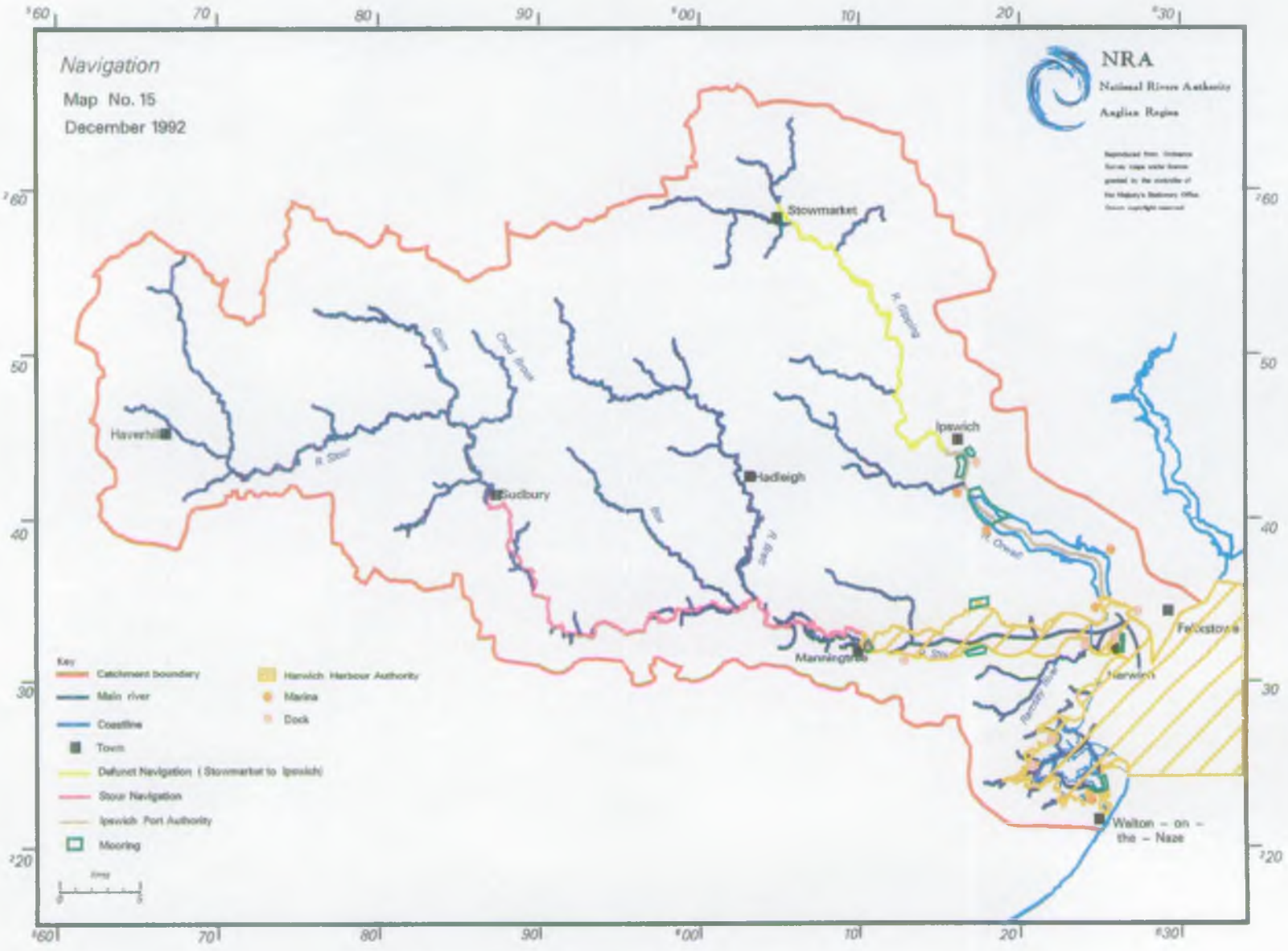
Popular Coastal bathing beaches exist in this catchment with EC designated sites at Felixstowe, Dovercourt and Walton. Water quality is monitored throughout the bathing season for bacteriological compliance with EC standards. All sites complied during the 1991 season. Other bathing sites on estuaries are popular with locals and are at such sites as Manningtree, Wrabness, Nacton, Pin Mill and Shotley.

Throughout the entire marine area of this catchment there are water contact sports, with a variety of marinas, sailing clubs and small launching areas. Historically this area has been an important sailing area and the facilities currently continue to expand within the estuaries.

Sailboarding is popular in the Stour estuary and off the southern end of Felixstowe Town Beach. Water skiing and jet skiing occur in the Stour estuary.

3.13.3 Environmental Requirements

To maintain the water quality at the EC designated bathing waters so that the quality requirements of the EC Bathing Waters Directive (76/160/EC) are met. At non-designated bathing waters and waters used for other immersion activities, quality objectives will be formulated and the water quality maintained or improved, where necessary, to meet these objectives.


Navigation
Map No. 15
December 1992
NRA
National Rivers Authority
Anglian Region
Stowmarket
Haverhill
Sudbury
Hadleigh
Ipswich
Felixstowe
Harwich
Manningtree
Walton – on – the – Naze
R. Stour
R. Orwell
Key
Catchment boundary
Main river
Coastline
Town
Dallinet Navigation (Stowmarket to Ipswich)
Stour Navigation
Ipswich Port Authority
Mooring
Harwich Harbour Authority
Marina
Dock

3.14 Boating And Navigation

3.14.1 General

This use relates to waterways (inland and tidal estuary) providing commercial and pleasure navigation facilities.

3.14.2 Local Perspective
(Refer to Map No 15)

Inland Waters

River Gipping - the Stowmarket to Ipswich navigation constructed in the 1700's had the right to navigation revoked in 1932. However, some very limited leisure boating activities take place with the agreement of riparian owners. The lock structures survive, but without lock gates, and now act as control structures with either fixed or movable weirs or vertical sluice gates. Recent interest has been expressed by various bodies in reinstating navigation on some stretches of the river.

River Stour - The only right of navigation is between Brandon Mill and Brantham. The NRA is the navigation authority, and is charged with maintaining it in a similar condition to that which existed in 1977. The navigation is now without most of the locks necessary for larger vessels. Boat traffic is limited to manually or sail propelled craft, with the exceptions of the upper two reaches between Ballingdon Bridge and Cornard; and Cornard and Henny where powered craft are allowed.

The inland Stour navigation is mostly unspoilt river. The River Stour Trust is a local group dedicated to protecting and enhancing the public rights of navigation. Flatford Lock and Dedham Lock have now been re-opened. The Flatford and Dedham Locks now also contain flood discharge sluices which operate automatically in the winter.

Tidal

River Orwell - The river is used extensively by private pleasure craft and there are tidal marinas at Wherstead, Woolverstone and Levington. Shotley Marina and Ipswich Docks have a lock and provide non-tidal berths. River moorings can be found over the length of the river, but particularly concentrated upstream of Pin Mill.

Commercial shipping makes extensive use of Harwich Harbour and the River Orwell.

River Stour - The tidal estuary is the venue for much boating activity. The area hosts everything from commercial container ports and ferry terminals to local dinghy hards. There are yacht marinas at Shotley Point and Walton.

There are many sailing/cruising clubs in the catchment including Wherstead, Woolverstone, Pin Mill, Manningtree, Walton and Wrabness.

3.14.3 Environmental Objectives

Boating and navigation rights should be protected and enhanced where possible.

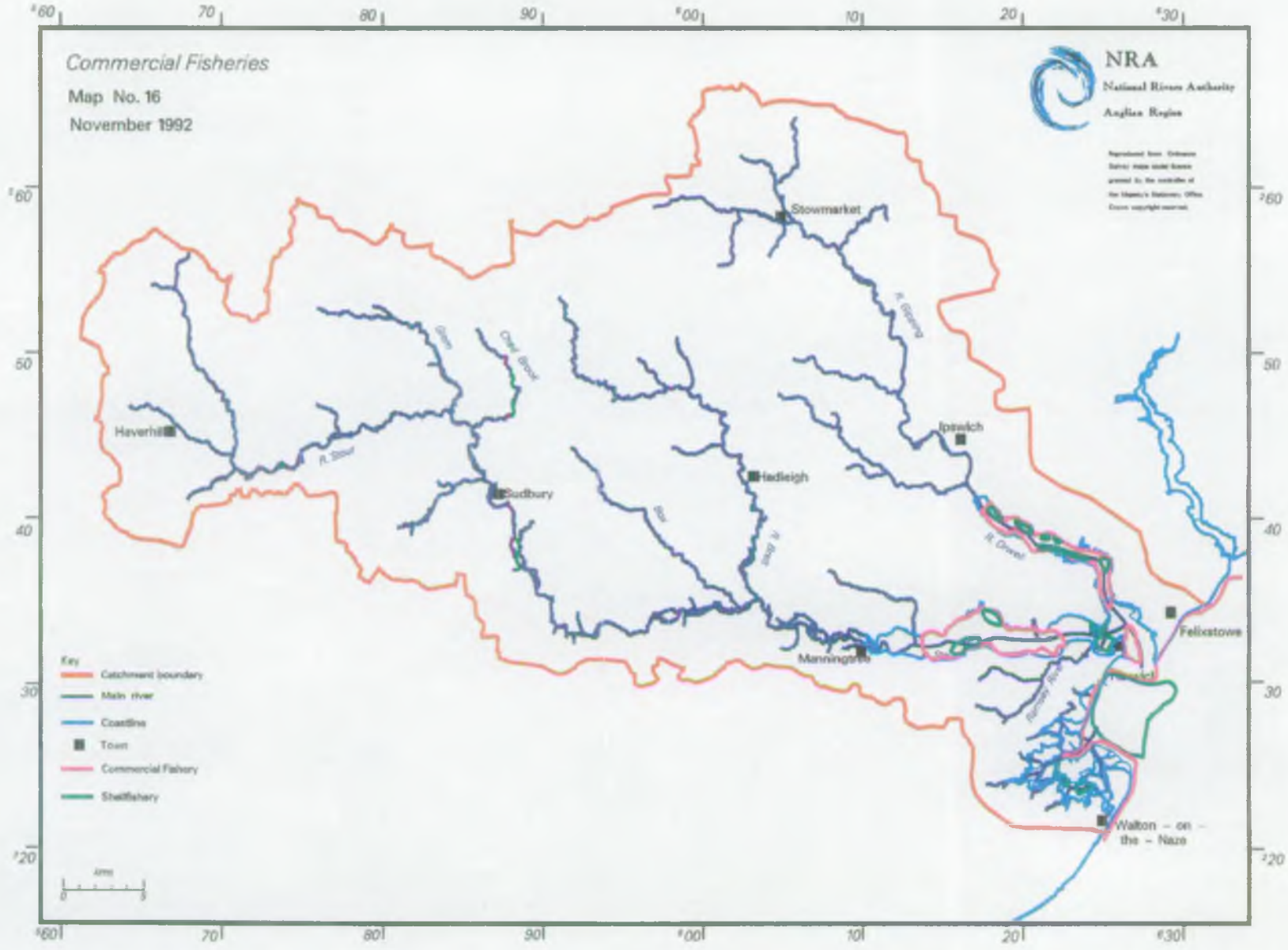
Inland Waters:

To maintain all remaining lock structures for their historic and amenity value.

To maintain the quantity and quality of the water sufficient for this use.

Tidal Waters:

To maintain water quality to provide suitable conditions for all types of boating.


Commercial Fisheries
Map No. 16
November 1992
NRA
National Rivers Authority
Anglian Region
Stowmarket
Haverhill
Sudbury
Hadleigh
Ipswich
Felixstowe
Manningtree
Walton - on - the - Naze
R. Stour
R. Orwell
Key
Catchment boundary
Main river
Coastline
Town
Commercial Fishery
Shellfishery

3.15 Commercial Fisheries and Shell Fisheries (Marine)

3.15.1 General

This criteria covers all the:-

i) small local fisheries and the medium sized fisheries offshore. At the present time much of the control and management of such fisheries is undertaken by MAFF and Kent and Essex Sea Fisheries Committee.

ii) sites used in the harvesting of shellfish. This includes cockles, whelks, oysters and mussels. EC Regulations, however, only apply to the commercial bi-value mollusc layings.

3.15.2 Local Perspective

(Refer to Map No 16)

In the estuaries and backwaters a variety of fish are netted, these include eels, mullet, bass, sole and herrings. Commercially the fish stocks within the estuaries are not viable for larger fisheries and medium sized boats will work at least 2 - 3 km from the coast.

The EC designated shellfish waters in the Walton Backwaters applies only to the oysters in Rinsby creek and the Twizzle. These oysters are currently exported without a need for cleaning. Other shell fisheries in the catchment are not important commercially, with only occasional fishing taking place in the Stour and Orwell estuaries. Cockling on a larger scale is, however, planned for the Dovercourt Bay area. No new shellfish harvesting area designations are planned in this area at the present time.

Lobster pots are also utilised offshore in the Harwich, Felixstowe and Walton vicinity.

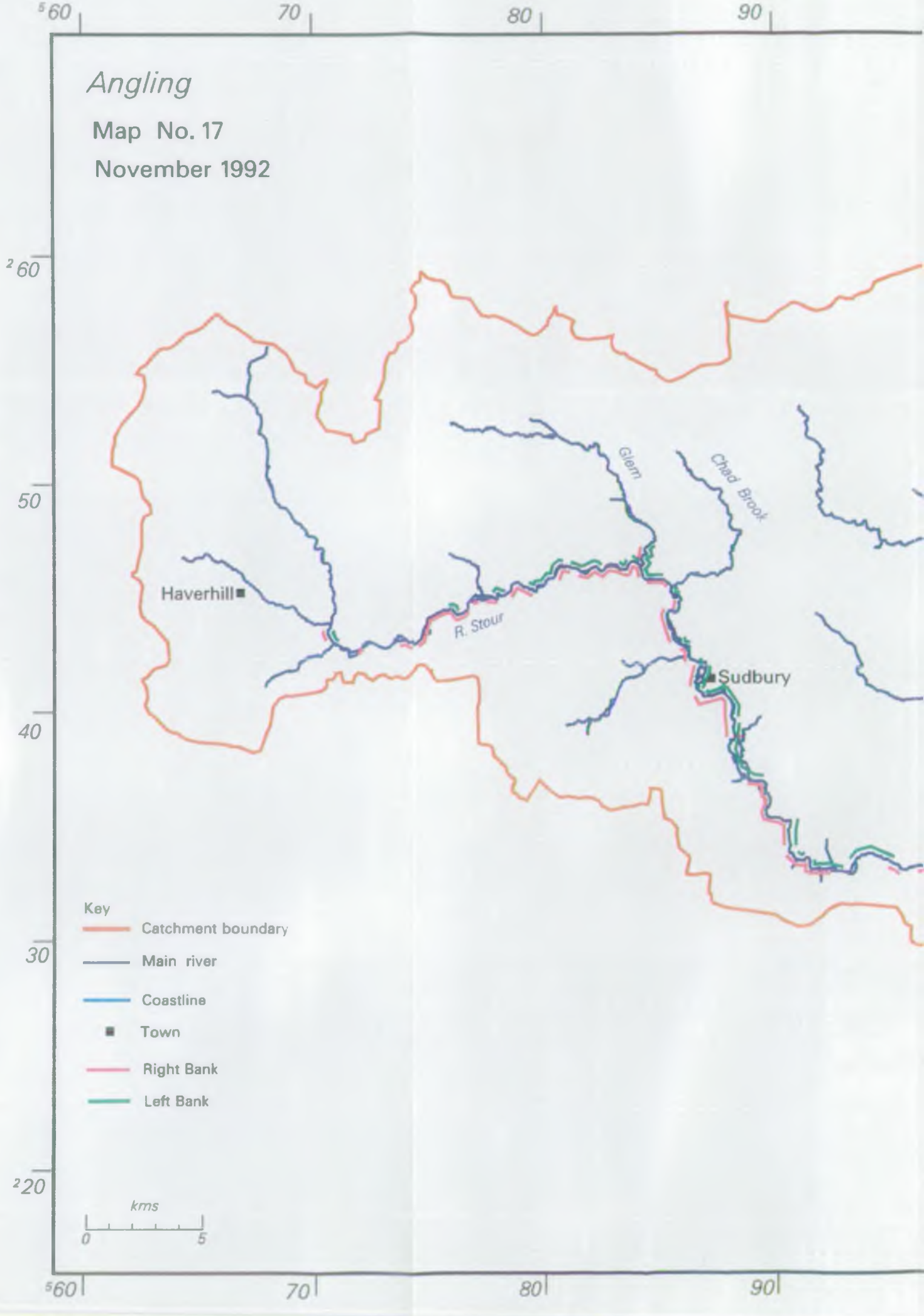
3.15.3 Environmental Objectives

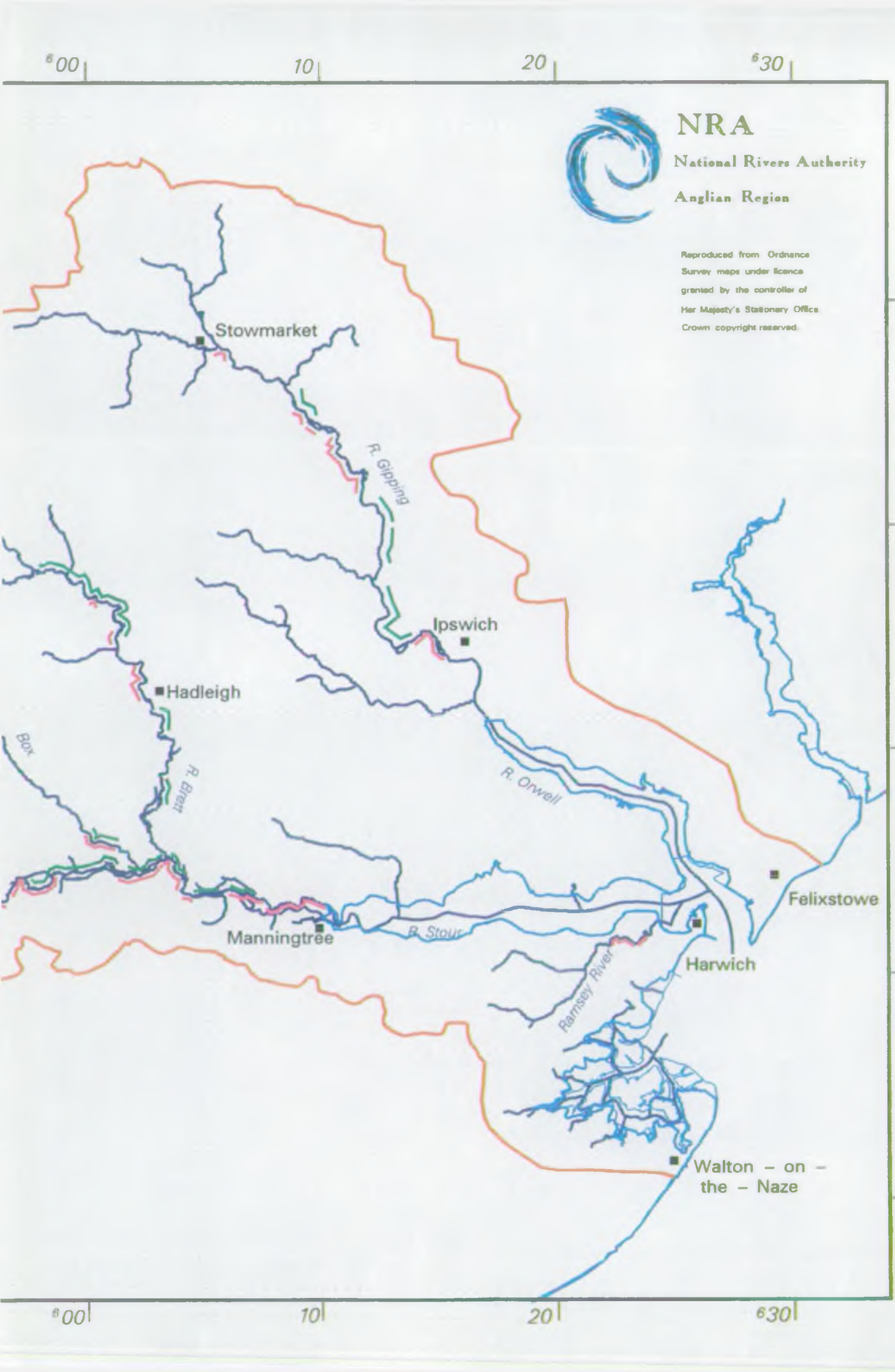
Water Quality

- Water quality objectives will be formulated to protect local and migratory fish populations. Water quality in the commercial fisheries will then be maintained or improved, as necessary, to meet these objectives.

- To maintain and improve, as necessary, the water quality in and around the shellfish layings to meet future statutory quality objectives.

- To maintain and improve, as necessary, the water quality in Walton Backwaters to meet the requirements of the EC Shellfish Waters Directive at the two designated sites.


560
70
80
90
Angling
Map No. 17
November 1992
260
50
40
30
220
Haverhill
R. Stour
Glem
Chad Brook
Sudbury
Key
Catchment boundary
Main river
Coastline
Town
Right Bank
Left Bank
kms
0
5


600
10
20
630
NRA
National Rivers Authority
Anglian Region
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260
50
40
30
220
Stowmarket
R. Gipping
Ipswich
Hadleigh
Box
R. Brett
R. Orwell
Felixstowe
Manningtree
R. Stour
Harwich
Ramsey River
Walton – on – the – Naze

3.16 Freshwater Angling

3.16.1 General

This specifically relates to the use of the catchment by anglers.

3.16.2 Local Perspective
(Refer to Map No 17)

Angling for brown trout occurs on the Belstead Brook, and River Box. This is not organised by angling clubs. The River Box sustains a regular private "put and take" game fishery which could not survive without constant introductions of rainbow trout.

Coarse angling on the River Gipping is controlled by two clubs, the Gipping Valley Angling Club and the Gipping Angling Preservation Society. Matches are regularly held on the lower stretches.

The River Stour is used widely for coarse fishing. The majority of waters are controlled by twenty four Angling Clubs. The majority of bank space is held by the minority of the clubs. There is a small amount of syndicated water. Angling is available to the general public at a very few locations, mostly under the auspices of Suffolk County Council. The residents of Sudbury are entitled to fish from the Sudbury common lands.

Throughout the catchment area there are a large number of lakes, gravel pits, reservoirs and ponds of all sizes, which are used for both coarse and trout angling. These are frequently controlled by angling clubs or syndicates, although there are also private and commercially run waters. There are too many enclosed waters to illustrate them on the map opposite.

3.16.3 Environmental Requirement

To provide suitable and safe conditions for successful angling.

3.16.4 Environmental Objectives

Water Quality

- To be of suitable quality to comply with the basic amenity quality of the water body.

- To be aesthetically acceptable in order to enhance angling i.e. water to be free from surface films, extraneous floating material, excessive weed growth, discolouration and unpleasant odours.

- To comply with appropriate NRA Statutory Water Quality Objectives for Fisheries.

Water Quantity

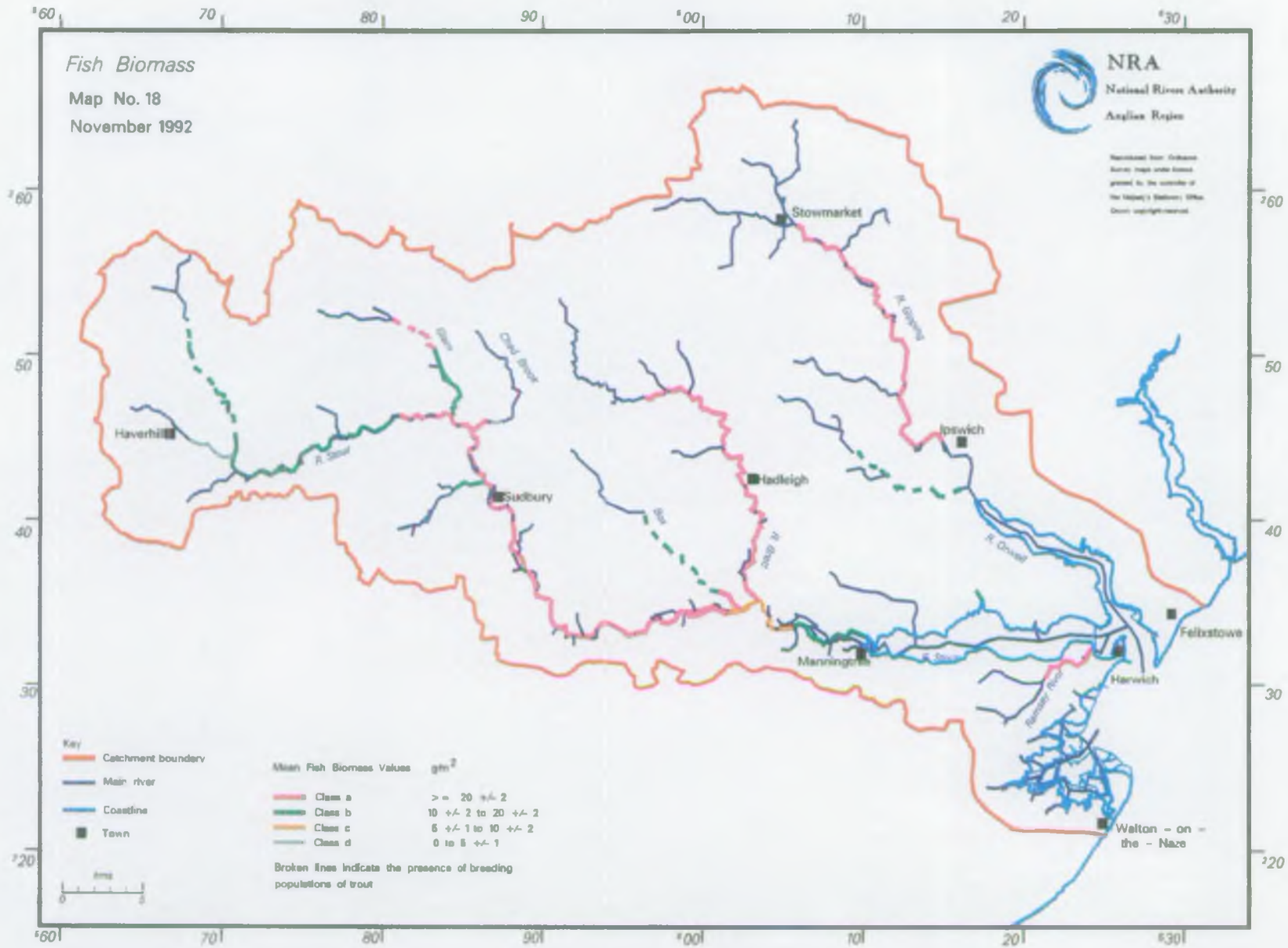
- The operation of the Ely Ouse to Essex Transfer Scheme and the Stour Augmentation Groundwater Scheme such that artificially enhanced flows do not detract from angling success, or decrease the occurrence of flow regimes, which allow angling to take place.

- To maintain river water levels within satisfactory limits, particularly during periods of flow change.

Physical Features

- The maintenance of sufficient access points for angling.

- The maintenance of a mixture of open water as well as instream and bankside vegetation.


Fish Biomass
Map No. 18
November 1992
NRA
National Rivers Authority
Anglian Region
Stowmarket
Haverhill
Sudbury
Hadleigh
Ipswich
Felixstowe
Manningtree
Harwich
Walton - on - the - Naze
R. Stour
R. Orwell
Key
Catchment boundary
Main river
Coastline
Town
Mean Fish Biomass Values gm-2
Class a >= 20 +/- 2
Class b 10 +/- 2 to 20 +/- 2
Class c 5 +/- 1 to 10 +/- 2
Class d 0 to 5 +/- 1
Broken lines indicate the presence of breeding populations of trout

3.17 Fisheries (Freshwater)

3.17.1 General

The NRA has duties to maintain, develop and improve fisheries and to further the conservation of fish species. Fish populations are affected by the quality and quantity of water as well as by the availability of suitable physical habitat features. Fish are therefore important indicators of the overall health of the river.

This use covers:-

i) Game Fisheries, ie the maintenance of breeding populations of salmonid fish species, namely brown trout in this catchment.

ii) Coarse Fisheries, ie the maintenance of breeding populations of course fish species.

3.17.2 Local Perspective

(Refer to Map No 18)

The NRA undertakes fish population surveys on major rivers on a three year rolling programme. Extensive data on fish populations is collected and this has been used to calculate a fisheries classification system (see map), based on fish biomass, graded on an A to D scale.

The River Gipping has a well balanced and diverse fish fauna, and supports many large fish, including specimen carp. It achieves Class A status in all reaches, with an exceptional mean biomass figure in excess of 45 gm^2. Belstead Brook contains a thriving population of native brown trout.

Stocks in the Stour are dominated by coarse fish, mainly bream, chub, dace, gudgeon and roach. Perch, pike and eels also contribute significantly. The alien predatory fish, zander, occurs in the Stour. Barbel were introduced to the Stour late in 1991.

Salmonid species are represented mainly by brown trout, which occur in very small numbers in the higher reaches of the Rivers Stour, Glem and Box.

The Ramsey River supports an outstanding riverine carp population, as well as consistently returning some of the highest mean biomass figures ever recorded in the Anglian Region. At the other extreme, Stour Brook is almost devoid of fish life.

3.17.3 Environmental Requirement

The overall objective is to sustain a natural fish population appropriate to the catchment and achieve Class A or B on the fisheries classification system.

3.17.4 Environmental Objectives

Water Quality

- River stretches suitable for brown trout are not to deteriorate outside the limits for pollutants as specified in the EC Fisheries Directive (78/659/EC) for salmonid fish.

- The remaining river stretches downstream to the demarcation points are not to deteriorate outside the limits for pollutants as specified in the same EC Directive for coarse fish species.

- Compliance with appropriate NRA Statutory Water Quality Objectives for fisheries.

Water Quantity

- To ensure river flows are adequate to sustain fisheries requirements. Under spate conditions the release of water through control structures to be gradually increased in order to minimise the sudden flushing of fish out of the river system.

- The operation of the Ely Ouse to Essex Transfer Scheme and the Stour Augmentation Groundwater Scheme, such that artificially enhanced flows do not materially affect the character of the river habitat, or the species balance present. Augmentation flows must not be allowed to adversely effect the spawning success of the fish stocks.

Physical Features

- A diversity of natural river features to ensure a variety of habitat to maximise the production of fish populations including pool/riffle sequences, gravel beds and weedbeds for feeding, spawning etc.

- The presence of bankside vegetation to provide adequate shade and cover.

- To ensure that river maintenance operations have a minimal deleterious impact on fish populations and enhance river habitat where practical.

3.18 Surface Water Drainage

3.18.1 General

This use deals with the provisions for the passage and disposal of surface water from the catchment via watercourses or sewers to the tidal estuary.

3.18.2 Local Perspective

Rural

The River Gipping catchment has an area of 315 square kilometres which drains via ditches and small watercourses into 29 kilometres of main river.

The major part of the Gipping catchment is covered by heavy boulder clay, with permeable deposits outcropping in the river valley. The clay limits infiltration of rainwater into the underlying chalk aquifer, so heavy rainfall quickly runs off into the river and causes a rapid increase in river flows.

Average rainfall	- 625 mm
Effective rainfall	- 150 mm
Average river flow at Bramford Gauging Station	- 1.14 cu mec
Ratio of daily flow (max to min)	- 800:1

Outfall to the tidal River Orwell is via two sluices on each arm of a bifurcation of the river in Ipswich.

The Belstead Brook and its tributaries, with a catchment area of 50 square kilometres outfalls into the River Orwell via a sluice at Wherstead.

The Stour Catchment could generally be described as a natural catchment. Arable areas have been extensively land drained by farmers, but these usually fall into the natural land gradient with many small field outfalls.

Urban

In the Stour catchment, urban drainage is to a greater extent made up of old surface water sewers with many outfalls to watercourses and rivers/estuaries. New development of sufficient size can cause floodings due to surface water concentrations. In these cases balancing of discharges is required. Examples can be found at Haverhill and Sudbury developments.

Along the River Orwell valley run off is rapid. Due to the steepness of the valley sides, watercourses often empty directly into the river without need for a control structure.

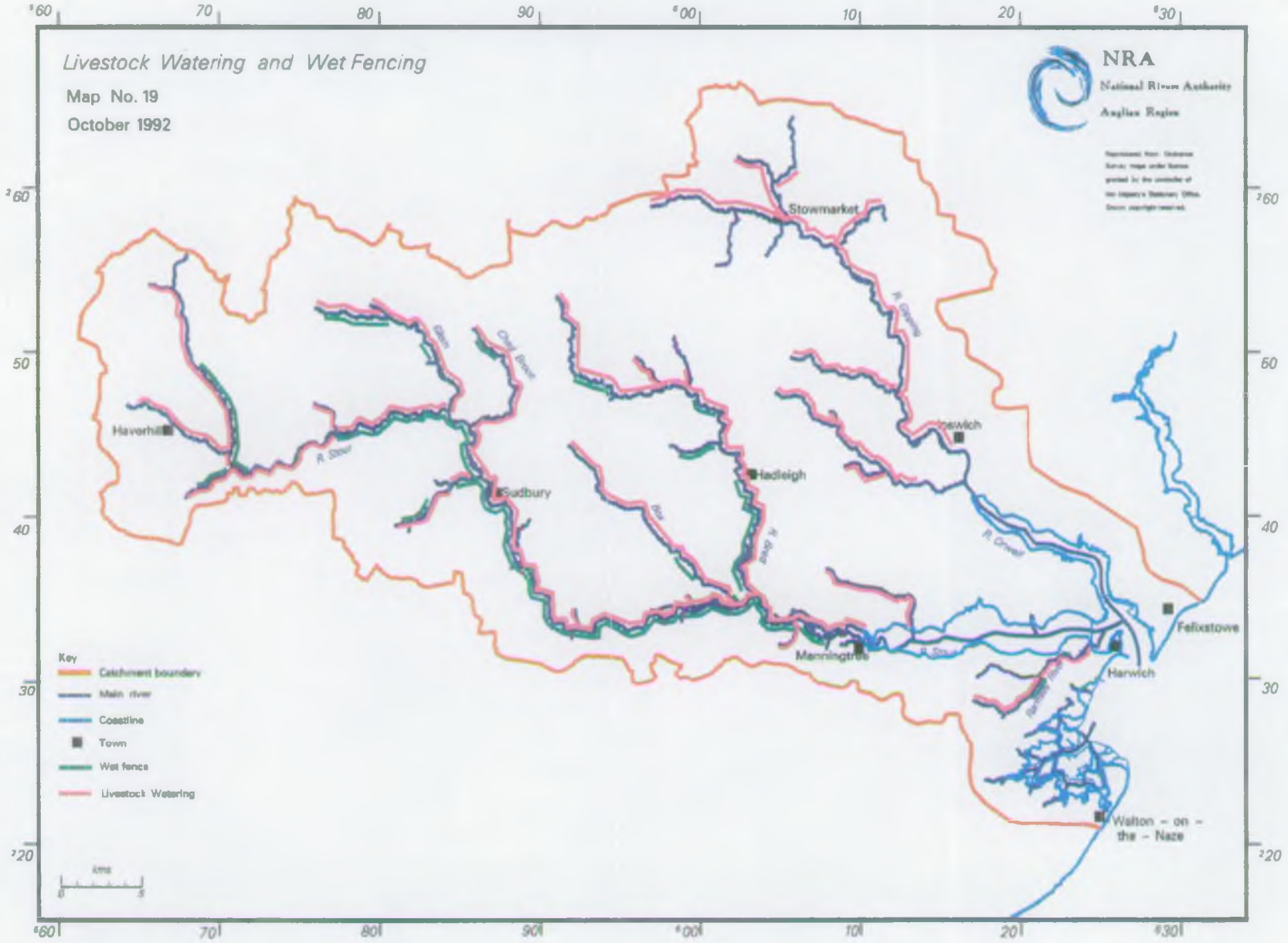
Where run-off is via finger valley watercourses, outfall is through a tidal sluice. Felixstowe Docks area and that of Trimley Marsh to the north are pumped systems, gravity drainage no longer being feasible at these sites.

In the urban area of Ipswich there are a number of main drainage discharge points which in the first instance deal with surface water drainage, but can take foul sewage overflows when the sewerage systems become overloaded. In other parts of the catchment where there are large urban conurbations, Needham Market and Stowmarket, there are likewise main surface water discharge outfalls.

3.18.3 Environmental Objectives

- To ensure adequate controlled discharge to watercourses exists wherever new development can cause surface water flooding problems.

- To seek more involvement in major agricultural drainage schemes to discourage draining of wetlands, ESA areas and culverting of watercourses, all damaging nature conservation.


Livestock Watering and Wet Fencing
Map No. 19
October 1992
NRA
National Rivers Authority
Anglian Region
Stowmarket
Haverhill
Sudbury
Hadleigh
Manningtree
Harwich
Felixstowe
Walton - on - the - Naze
R. Stour
R. Orwell
Key
Catchment boundary
Main river
Coastline
Town
Wet fence
Livestock Watering
kms
0
5

3.19 Livestock Watering and Wet Fencing

3.19.1 General

Streams identified for livestock watering are safeguarded to provide water of a suitable quality. Biological quality is not guaranteed, however, Statutory Water Quality Objectives will provide a standard for industrial and agricultural use.

Where pasture is grazed, the presence of a watercourse of sufficient depth and width provides a natural barrier to livestock, removing the need to provide livestock fencing.

3.19.2 Local Perspective
(Refer to Map No 19)

The majority of streams in the catchment are used or have a potential to be used for livestock watering purposes.

There are a few areas of pasture lying mostly in the river flood plains. Wet fences are therefore often relied upon for retaining livestock where the river is not too shallow. Cattle however, can do much damage to banks, a problem particularly noticeable on the Lower Stour water meadows.

3.19.3 Environmental Objectives

- To meet the quality criteria laid down in Statutory Water Quality Objectives for the protection of livestock which use certain waters for drinking.

- Maintain retained water levels (often the subject of Mill rights), and avoid abrupt changes to these consequent upon the operation of water transfer and augmentation schemes.

- Where bank damage is a problem, encourage farmers to use light, cheap electric fences to deter cattle from trampling down banks, and encourage the construction of cattle drinkers for livestock safety.

3.20 Agricultural Land Use

3.20.1 General

The main farming operations can be split into those covering arable, grassland and intensive livestock operations.

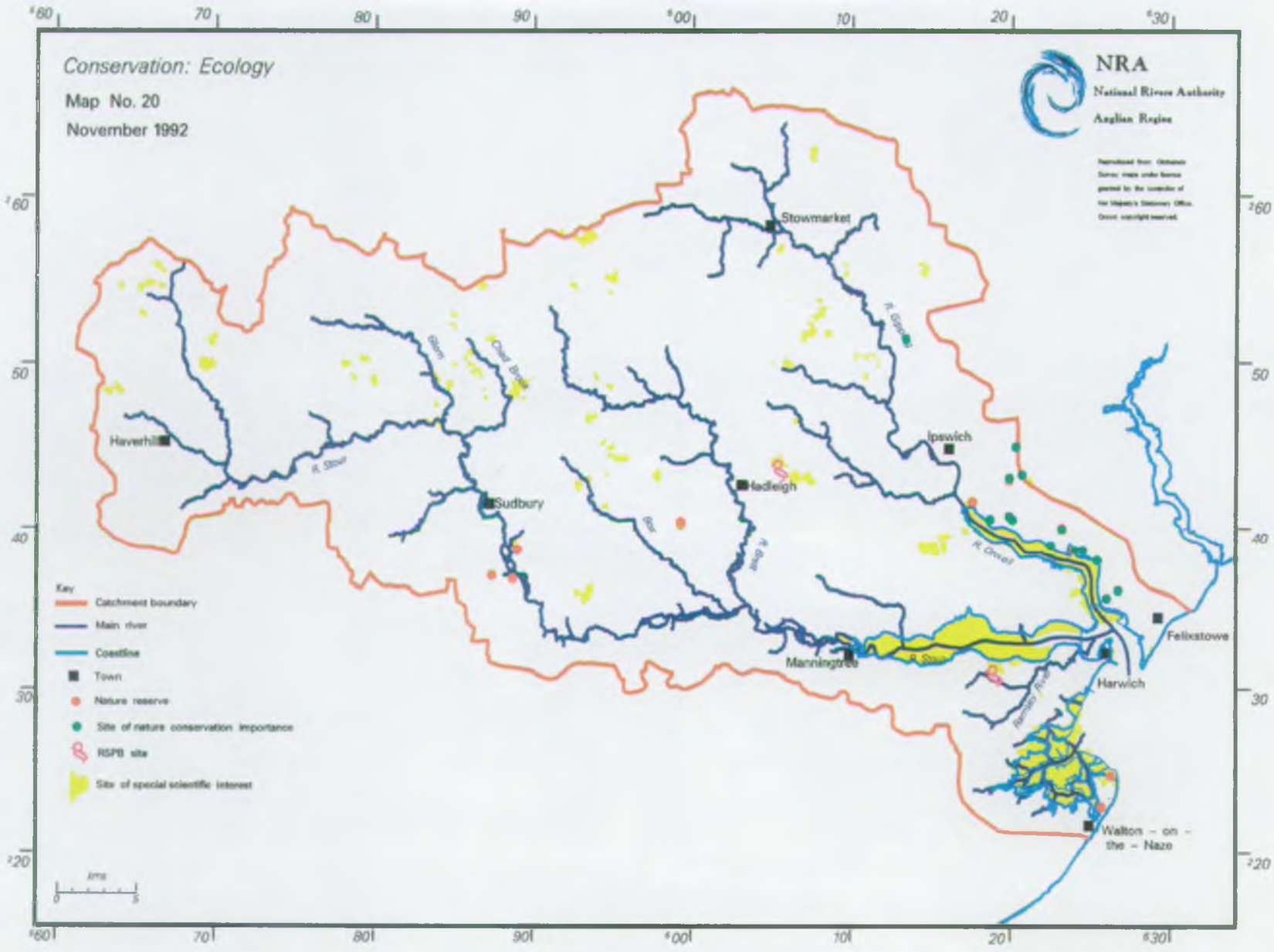
3.20.2 Local Perspective

The great majority of the agricultural land use in the catchment is arable and this area is predominantly down to cereal crops. In the Stour catchment, much of this falls in to the grade 2 category, with isolated areas of grade 1.

The largest areas of grazing land are generally found either, in tidal areas, the smaller marshes protected by tide walls offering a limited flood return period; or, in fluvial areas, the bottom of river valleys liable to regular flooding or poor drainage. In the Stour catchment, the saltmarshes have been used as summer pasture for sheep grazing. This now only occurs on a limited basis on Horsea Island in the Walton Backwaters.

3.20.3 Environmental Objectives

- Develop objectives to take account of extended Environmentally Sensitive Area (ESA) status and increased pasture land set aside.
- Review the NRA's standards of service in relation to flood defence to best support the specialist needs of this area.
- Encourage appropriate diversification, wherever possible.
- Development and support of wetlands is vital.
- Reassessment of coastal zone land use.
- Continue to monitor present and future intensive livestock units to prevent pollution.


Conservation: Ecology
Map No. 20
November 1992
NRA
National Rivers Authority
Anglian Region
Stowmarket
Haverhill
Sudbury
Ipswich
Ipswich
Felixstowe
Manningtree
Harwich
Walton - on - the - Naze
R. Stour
R. Orwell
R. Gipping
Key
Catchment boundary
Main river
Coastline
Town
Nature reserve
Site of nature conservation importance
RSPB site
Site of special scientific interest
kms
0
5

3.21 Conservation - Ecology

3.21.1 General

Conservation of ecological features in this context can be viewed as comprising three main components:-

- the river and the river corridor
- the coastal and estuarine habitats
- the wide countryside including formally designated sites, and lastly, semi-natural habitats that occur throughout the countryside.

The NRA has a duty to further the conservation and enhancement of natural beauty and the conservation of flora, fauna and geological or physiographical features of special interest whilst carrying out its functions, including commenting on the proposals by others.

3.21.2 Local Perspective
(Refer to Map No 20)

The SSSI interest in the catchment is listed in Appendix 3.

Main River and River Corridor

The botanical and ornithological status and the habitats of all main river have been recorded and plotted as part of the Rivers Environmental Database (RED). In addition, fisheries and invertebrate lists are compiled by the Fisheries and Biology teams respectively. Once the analytical and output programs for RED have been completed it should be possible to produce ecological summaries and comparative analyses of all main river within the catchment, including an analysis of physical habitat and geomorphological status.

Several SSSI's occur adjacent to main river in this catchment and others have a relationship with main river in that they occur upstream of the main river designation, see Map opposite.

Coastal and Estuarine

The bird and plant communities and habitats associated with the tidal defences in Essex have been recorded as part of the coastal wildlife database.

The flora associated with the tidal defences is particularly rich and contains 675 noteworthy species, referred to as target species.

The sea defences around Hamford Water have locally abundant populations of the very rare Sea Hogs Fennel. This is the food plant of the Fisher's Estuarine Moth larvae, and is the only known site for this species in Britain.

Conservation in the Wider Context within the Catchment

Conservation interests in the wider countryside can be separated into formally protected sites, the SSSIs and non-statutory recognised sites; nature reserves and county wildlife sites.

The catchment contains the Dedham Vale AONB (Map 21) and lies within the Suffolk River Valleys ESA, whilst various fields may be covered by countryside stewardship agreements. Water availability is an integral component for payment under these schemes.

3.21.3 Environmental Requirements

To protect and further the conservation of river corridors, estuaries and coastal habitats.

To protect and further the conservation of aquatic and wetland habitats within the wider countryside.

To reduce to an unavoidable minimum any direct adverse disruption to existing habitat and to ensure appropriate re-instatement and/or mitigation.

3.21.4 Environmental Objectives

Water Quality

- All rivers to comply with the appropriate statutory Water Quality Objective.

- Buffer zones should be encouraged wherever they may enhance water quality.

Water Quantity

- Maintenance of adequate water levels to maintain the water table that will sustain nature conservation and appropriate uses and conditions in riparian land, including the fulfilment of ESA and Countryside Stewardship requirements.

- Groundwater levels to be protected from the unacceptable effects of abstraction in SSSIs and any other sites of importance.

- To investigate wetlands in order to understand their vulnerability to abstraction.

- The operation of the Ely Ouse to Essex Water transfer scheme, and the Stour Augmentation Groundwater scheme, such that artificially generated flows do not materially affect the character of the river habitat, or the species balance present.

Physical Features

- The maintenance, enhancement and re-instatement of the diversity of natural river features, such as cliffs, gravel beds, meanders, pool/riffle/glide sequences, and marginal shelves or gentle bank slopes for aquatic and emergent vegetation development.

- The maintenance, enhancement and re-instatement of a diversity of river corridor habitats, such as fen, marsh, flood meadow, side channels, grassland, trees, scrub, hedges, woodlands, dykes and ditches.

- Appropriate management of riparian or sea bank habitats, eg, grass cutting (frequency and timing), brushing (coppicing and pollarding), etc.

- The channel cross section to be appropriate for the river flow regime in flood, normal and low flow conditions, and taking into account the water requirements of riparian habitat. The self-cleansing ability of rivers to be maximised.

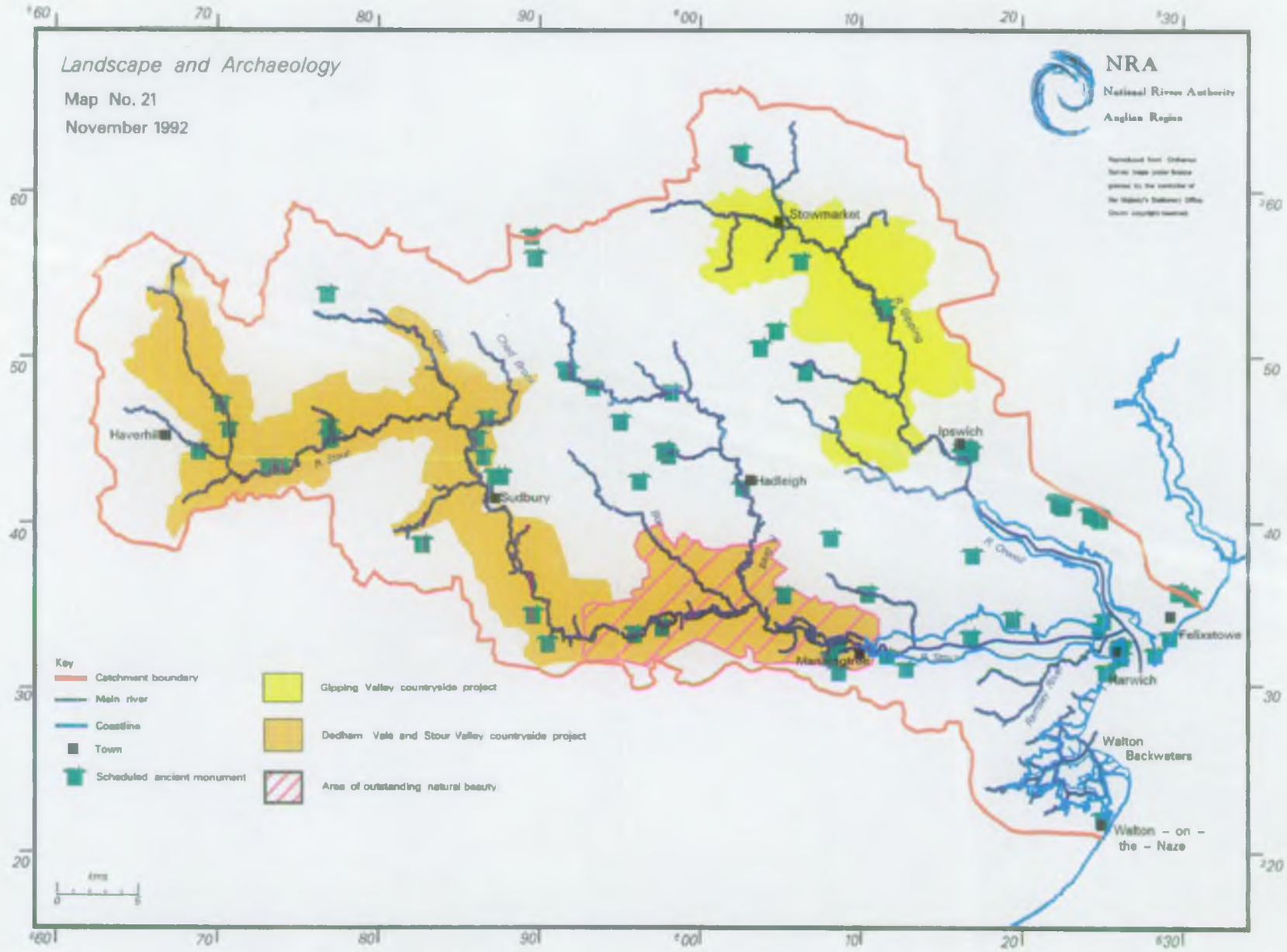
- Management of sea defences to take due account of existing nature conservation interests, particularly to very rich plant communities, and also maintaining or enhancing bird populations.

- Saltmarsh and mudflat extent and health to be encouraged by physical and water quality improvement and the presumption against any activity that may damage these most important (from flood defence and nature conservation) habitats.

- The maintenance of coastal freshwater grazing marsh and dyke systems.

Recreational Use

- To encourage recreational use compatible with conservation aims and objectives.


Landscape and Archaeology
Map No. 21
November 1992
NRA
National Rivers Authority
Anglian Region
Stowmarket
Haverhill
Sudbury
Hadleigh
Ipswich
Felixstowe
Harwich
Walton Backwaters
Walton – on – the – Naze
Key
Catchment boundary
Main river
Coastline
Town
Scheduled ancient monument
Gipping Valley countryside project
Dedham Vale and Stour Valley countryside project
Area of outstanding natural beauty
kms
0
5

3.22 Archaeology And Landscape

3.22.1 General

This use covers:-

- The protection of areas formally designated as being of value, ie Areas of Outstanding Natural Beauty (AONB).

- The protection of areas which although valuable in landscape and archaeological terms are not formally protected.

The NRA has the duty to conserve and enhance landscape and archaeological features associated with water.

3.22.2 Local Perspective

(Refer to Map No 21)

Both the Stour and the Gipping have River Valley Projects, funded by the local Authorities and Countryside Commission, associated with them. The aims are to maintain and enhance the aesthetic landscape, nature conservation, recreational and educational aspects of the river valley. The Stour and its tributaries form part of the Dedham Vale Area of Outstanding Natural Beauty (AONB). The focal point of this river valley must be the Constable landscapes of Dedham, Flatford and East Bergholt.

Part of the Suffolk Coast and Heath AONB lies within the catchment area. The NRA are represented on the project group and within this role contribute to a sub-group drawing up a management plan for the Stour and Orwell estuaries.

Many of the aims of the River Valley projects are compatible with the NRA's conservation and recreation duties.

Archaeological sites

The number and range of known individual sites is too great to be worth plotting out at this stage, particularly as an absence of known archaeology in any specific location is as likely to be due to lack of research as a true gap.

Most of the archaeological sites are in the middle and lower reaches of the three main river valleys (Stour, Gipping and Brett). Generally these sites are on the gravel terraces of the valleys, but relevant information can also come from the river beds and flood plain deposits where, due to waterlogging, organic remains rich in

environmental data are often preserved and where the potential exists for water frontage structures (docks, water mills, bridges etc).

The types of archaeological site vary with changes in the landscape across the region. In the Shotley peninsula aerial photography has revealed large areas of ancient field systems, enclosures and tracks (probably mainly Bronze Ageand Iron Age) showing as cropmarks. In the river valleys there is less evidence for field systems, but instead there are the cropmarks of a large number of prehistoric burial sites visible as ring ditches, sometimes clustering in cemeteries, as at Stoke-by-Nayland, Hadleigh and Baylham/Barking.

The major foci of Roman settlement are also in the valleys, with major centres at Coddenham, Long Melford and Wixoe. On the heavier soils of the more upland areas the landscape typically still reflects a Medieval pattern of villages, greens and homestead moats (the latter being the commonest type of surviving earthwork) but with a thinner scattering of earlier sites.

The Walton Backwaters area is particularly rich in Redhills (debris left over from salt making from the late Iron Age to the Middle Ages) and sites of early Roman salt making.

3.22.3 Environmental Requirement

To protect the landscape and archaeological features associated with rivers, estuaries and coastal areas and to safeguard the special interest for which the sites have been designated.

3.22.4 Environmental Objectives

Water Quantity

- Appropriate flood levels, timing and duration to be maintained in riparian habitats, eg, washland, marsh.

- Maintenance of adequate water level to maintain a water table that will sustain archaeological and landscape features and appropriate uses and conditions in riparian land, including the fulfilment of ESA and Countryside Stewardship requirements.

Water Quality

- Water quality to be maintained such that archaeological and landscape features are not affected.

River Physical Features

- To avoid disturbance to archaeological sites unless otherwise impracticable, informing the County Archaeologist if this is the case.

- The maintenance, enhancement and re-instatement of landscape features.

Recreational Use

- To take full advantage of the high public profile of the rivers and the presence of River Valley Projects to enter into collaborative projects aimed at enhancing the value of the river corridor and its educational potential.

Future Targets – Water Quality

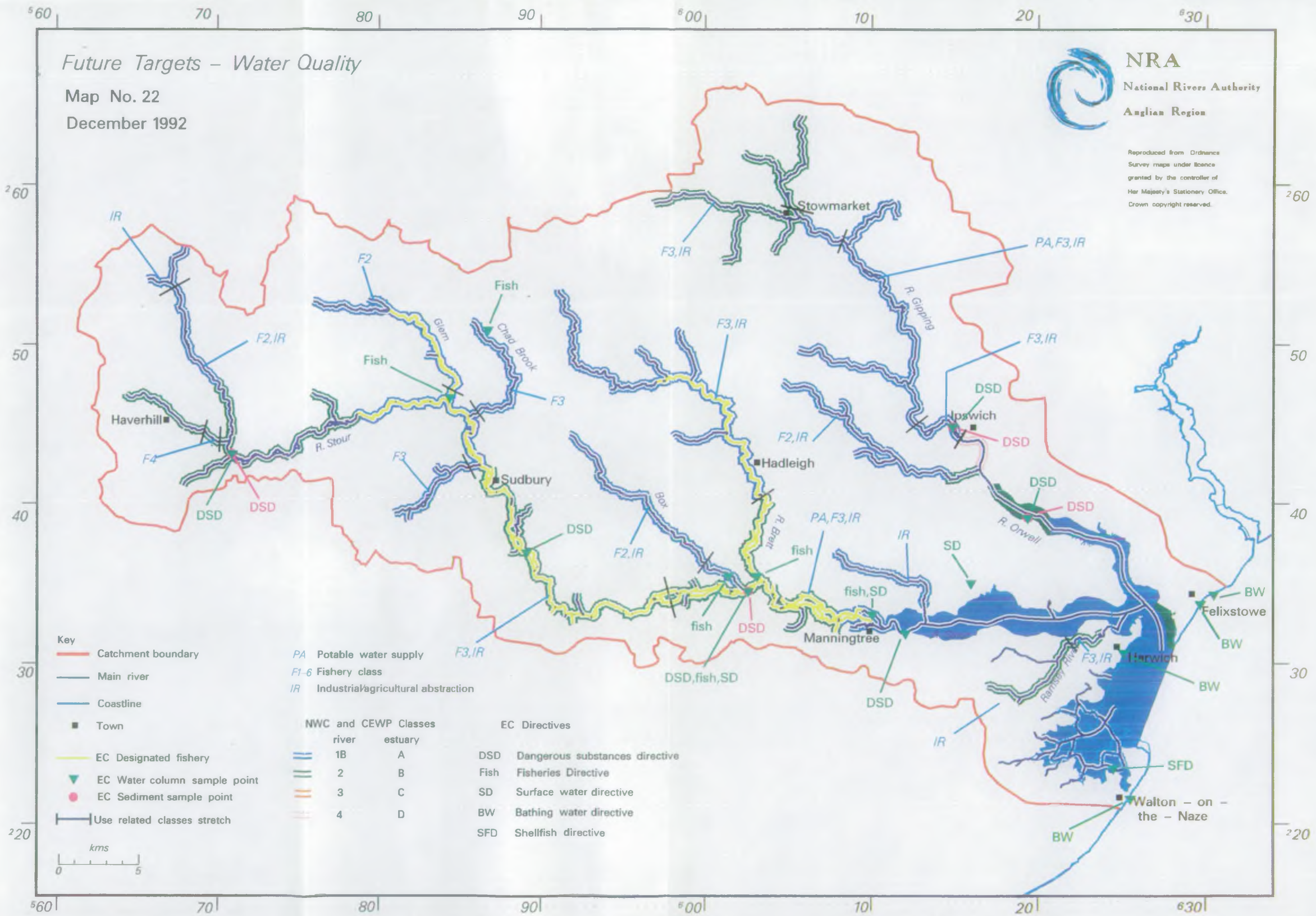
Map No. 22

December 1992

NRA

National Rivers Authority

Anglian Region



4.0 CATCHMENT TARGETS

4.1 WATER QUALITY

Water quality in the Anglian Region is currently assessed by reference to a number of control measures. These are:-

i) Compliance with River Quality Objectives (RQOs)

ii) National Water Council (NWC) target classes

iii) Biological target classes

iv) Compliance with relevant EC Directives

The DoE will shortly be producing a series of Statutory Water Quality Objectives (SWQOs), with the overall objective for a river stretch containing components similar to those above and which will provide a clear indication of the desired water quality in a given length of watercourse. For this catchment plan, the NRA's draft SWQO proposals are being used to set targets and determine compliance.

Each river stretch is accorded uses which have their own requirements for water quality. These include potable water supply (PA), fishery ecosystem, industrial/agricultural abstraction (IR), water contact activity, special ecosystem and commercial harvesting of marine fish/shellfish. The fishery ecosystem is sub-divided into 6 classes (F1-6).

When the SWQOs are adopted, it is proposed to replace the NWC classification system by a 'General Classification Scheme'. However, the NWC target classes have been retained for this plan. They are based upon a limited range of criteria, for example, Biochemical Oxygen Demand, Dissolved Oxygen and ammonia, and are ranked in order of decreasing water quality as 1A, 1B, 2, 3, 4.

Biological classification, by reference to the presence and abundance of species, provides an alternative indication of water quality than sampling and analysis for some chemical parameters. Biological Sampling is undertaken regularly at approximately 40 points throughout the catchment and the results are assessed against a prediction for the particular watercourse.

EC Directives stipulate standards for relevant parameters which the directives seek to control, for example, the Dangerous Substances Directive and the Surface Water Directive.

4.1.1 Groundwater Protection

In November 1991 the NRA issued for public consultation its Groundwater Protection Policy. Groundwater is a vital natural resource and under particular threat from the effects of human activity. Once polluted groundwater is often difficult and very expensive to remediate. Therefore preventing groundwater contamination is a major objective for the NRA. The Authority would like this policy to be viewed by all those whose activities may compromise groundwater quality, as a guide to assist and influence future planning and strategy decisions.
The document outlines the concept of vulnerability, that is the designation of areas of land where certain activities can have an appreciable affect on groundwater quality in an aquifer system and where pollution could quickly enter groundwater. It deals in particular with:-

i) waste disposal to land
ii) disposal of slurries and sludge to land
iii) Physical disturbance of aquifers affecting quality and quantity
iv) contaminated land
v) diffuse pollution

and unacceptable activities in high risk areas.

It is important to note that the definition of "controlled water" provided by the Water Act 1989 included groundwater.

Future Targets – Water Quantity

Map No. 23

December 1992

NRA
National Rivers Authority
Anglian Region

Potential enhancement to Ely Ouse – Essex transfer scheme

Ely Ouse – Essex Transfer pipeline

Potential new reservoir site

Kirtling Green

Haverhill

Wixoe MRF: 30 Ml/day

R. Stour

Glem

Chad Brook

Sudbury

Ely Ouse – Essex Transfer pipeline to River Pant/Blackwater

Stowmarket

R. Gipping

Hadleigh

Box

R. Brett

Sproughton MRF: 9Ml/day

Ipswich

R. Orwell

Manningtree

R. Stour

Cattawade MRF: 2Ml/day

Ramsey River

Harwich

Felixstowe

Walton – on – the – Naze

MRF to be established and set

Key

- Catchment boundary
- Main river
- Coastline
- Town
- Area where groundwater resources are essentially fully committed
- Area of chloride content 250 – 500 mg /l in chalk groundwater
- Area of high chloride concentration in chalk groundwater

kms 0 5

560 70 80 90 600 10 20 630

260 50 40 30 220

4.2 WATER QUANTITY

4.2.1 General

This section considers the requirement for meeting existing and future water abstraction demand in the catchment whilst protecting the existing uses and users of water.

The Water Quantity objectives (given in chapter 3) constitute the general NRA statutory objectives.

(a) To manage water resources where possible, in such a way as to meet all reasonable demands, including those of the environment, having due regard to overall costs.

(b) To augment and/or redistribute water resources, where appropriate to meet water demands to appropriate standards of reliability.

(c) To ensure the proper use of water resources.

(d) To conserve water resources.

4.2.2 Local Perspective

The future targets for this Region and this catchment have been listed under each objective heading.

(a) To manage water resources where possible, in such a way as to meet all reasonable demands, including those of the environment, having due regard to overall costs.

NRA Anglian Region is actively reviewing the methodology used for the allocation of water resources between human and environmental uses. In addition, the calculations are being reviewed in light of the current drought statistics.

A groundwater computer model exists for the Gipping catchment, the calibration of which will be reviewed at regular intervals. The model is used to simulate groundwater levels within the sub-catchment based on various abstraction regimes and locations. A similar model is available in the neighbouring Pant catchment and another planned for completion in 1993 for the Deben. Such models are useful management tools with respect to groundwater allocation. New models, in particular for the Stour catchment, are required to further our understanding

of the processes involved and enable better assessment of the resources available.

The NRA aims to carry out extensive ecological and hydrological studies to examine the existing ecology of the river system and to define the minimum water level, flow and quality required to maintain the system. Such "in river needs" studies will use data already available as well as further field work. The rivers Brett and Gipping have already been identified as rivers possibly adversely affected by low flows and further investigations into these and other rivers are progressing.

There is a need to identify the water catchment areas for the wetland sites of conservation interest in order to better regularise the protection of these sites.

The NRA reviews and updates the Ely Ouse to Essex Flow Simulation Model. This model is used to simulate flow conditions in the Region's largest river to river transfer system.

This transfer scheme is used to export water from Norfolk, which would otherwise be lost to tide, via a network of rivers and tunnels, through the catchment to reservoirs located in Essex. A review of Naturalised Flows, (ie - the flow that occurs naturally before either abstraction from or effluent discharge to the system) is currently being carried out to better assess yield potential. These schemes are, and will continue to be, designed and operated to avoid them having any unacceptable environmental effects on the receiving watercourses, and on the legitimate uses of the watercourses.

All these studies will assist the NRA in identifying Minimum Residual Flows (MRFs) for river systems in the catchments.

(b) To augment and/or redistribute water resources, where appropriate to meet water demands to appropriate standards of reliability.

The NRA already operates raw water transfer schemes in this catchment. The further enhancement of such schemes will continue to meet the needs for water both within the catchment and for export.

The Anglian Region is producing a Water Resources Strategy to define how future demands will be met in the Region. The key options include:-

- demand management,
- consideration of the reduction of the MRF atDenver - to make available more water for transfer,
- further groundwater abstraction in Norfolk,
- the transfer of water from the River Trent into the region, and
- the construction of a storage reservoir (one possible site is Great Bradley).

The options are currently under consideration, but any outcome will have an effect on the future allocation and management of water resources in this catchment.

The **appropriate standards** for each use are given as follows:

Public Water Supply

The NRA accepts the operational standards given by OFWAT for public water supply. These are:

- A hosepipe ban on average not more than once every 10 years,

- The need for voluntary savings of water on average not more than once in twenty years,

- The risk of rota cuts or use of standpipes on average not more than once in one hundred years.

Spray Irrigation

The Regions target level of service for spray irrigation is that there should be risks of shortages not more than once in twelve years on average.

Others - Industrial, Agricultural etc

There is no specific target level of service for these uses.

(c) To ensure the proper use of water resources

The NRA will give equal priority to existing protected rights to abstract and to established environmental needs before allocating any further water for abstraction.

The NRA must decide on whether the future requirement for water meets "reasonable needs". The consideration of alternative supplies or demand management must be shown as well as consideration of recycling. Specific requirements according to each use, are as follows:

Public Water Supply

The planning horizon is currently year 2011; it is not considered reasonable to allocate water for needs beyond this. The water companies must have demonstrated that they have carried out effective demand management, reduced leakage and, where water resources are under stress, at least considered metering of domestic use before extra water resources are allocated.

Spray Irrigation and Agriculture

The requirements of water needed with respect to the type of crops and soil conditions or stock types and numbers are taken into account.

Industrial

The process is considered as well as the expected life of the plant.

(d) To conserve Water Resources

The NRA encourages the storage of winter surface water in reservoirs.

Efficient water use is encouraged and where possible re-use for purposes appropriate to the quality of the resource.

The NRA will encourage groundwater abstraction in preference to summer surface water abstraction, other than at or near the tidal limit of the river.

The drought has served to develop better practice of water resource management both by the NRA and abstractor.

The promotion of efficient water use will continue in the future.

A future target for the whole of the NRA is to seek to revoke the unused licences and to reduce those under-used.

The NRA will encourage the discharge of effluents to be made within a catchment as far upstream as possible in order to minimise the impact of abstraction upon river flows.

The NRA will encourage the use of flood plains to store flood water.

Future Targets – Physical Features

Map No. 24

November 1992

NRA

National Rivers Authority

Anglian Region

560 570 580 590 600 610 620 630

260 250 240 230 220

Stowmarket
Ipswich
Haverhill
Sudbury
Hadleigh
Manningtree
Felixstowe
Harwich
Walton – on – the – Naze

R. Gipping
Glem
Chad Brook
R. Stour
Box
R. Brett
R. Orwell
R. Stour
Ramsey River

Key

- Catchment boundary
- Main river
- Coastline
- Town
- Flood protection scheme
- Sea defence
- Tidal embankment
- Foreshore /beach recharge

- Weir
- Flow gauging station
- NRA pumping station
- Non-NRA pumping station
- Fluvial control sluice
- Surge tide barrier

kms 0 5

4.3 PHYSICAL FEATURES

4.3.1 General

This section considers the requirements for physical features on rivers and river corridors in the catchment. The physical features targets for the identified uses are combined to give a map representing targets for the whole catchment.

4.3.2 Local Perspective

(a) Weirs and Sluices

Wherever possible they should be maintained in their original configuration to protect the architectural heritage, and flood discharge functions. However, some automation may be beneficial to the proper retention of water levels at times of rapid flow change, whether natural or consequent upon the operation of the transfer and augmentation schemes.

(b) Flood Protection Schemes

These fall into two categories, fluvial and tidal. Priority is currently given to tidal flood risk due to the extensive coastline in East Anglia. The condition of tidal defences also represents a higher flood risk to life and property. Generally schemes aim to either prevent land from flooding or to discharge flood water in a controlled way allowing some land to flood.

The target is to maintain and improve appropriately, flood defences to provide adequate standards of service. The Region has adopted minimum target standards of flood protection as set out in Appendix 4.

c) Rivers Access and Footpaths

Maintenance of existing access points and associated features. Maintenance of existing and future riverside footpaths.

d) Roads

Ensure through consultation that new roads do not adversely affect the water environment. 10 new bypasses are currently proposed in the catchment.

e) Fisheries and Angling

- Maintenance of a mixture of open water as well as instream and bankside vegetation.

- Maintenance of a diversity of natural river features to ensure a variety of habitat to maximise the production of fish populations including pool/riffle sequences, gravel beds, and weedbeds for feeding, spawning etc.

- Maintenance of the presence of bankside vegetation to provide adequate shade and cover.

- Ensure that river maintenance operations have a minimal deleterious impact on fish populations and enhance river habitat where practical.

g) Conservation - Ecology

- Maintenance, enhancement and reinstatement of the diversity of natural river features and river corridor habitats.

- The channel cross-section to be appropriate for the river flow regime in flood, normal and low flow conditions, and taking into account the water requirements of riparian habitat. The self-cleansing ability of rivers to be maximised.

- Appropriate management of riparian or sea bank habitats, eg, grass cutting (frequency and timing).

h) Conservation - Landscape and Archaeology

- Avoidance of disturbance to archaeological sites, unless otherwise impracticable, informing the County Archaeologist if this is the case.

- Maintenance, enhancement and reinstatement of the diversity of natural river features and river corrider habitats.

- Structures to be retained, reinstated or introduced in a sympathetic style of construction and management.

i) Channel Gradient

Riparian rights (mill rights) and statutory rights (navigations) can limit the scope to re-grade the channel. In general the benefits of a steeper gradient in the upper tributaries should be protected, because of its value in providing diversity of river conditions. Major new impounding should be presumed against, although small structures can provide slack water/shelter from the current for fish, invertebrates etc. Pools can also be excavated where shallow fast flowing water exists.

j) Channel Cross- Section

Whenever the opportunity arises, to provide for a diversity of habitat. This may be by two stage channel configuration providing a low level berm, or by creating a very flat sloping bank that merges with the water edge. These features need to be identified at the scheme planning stage using RED survey data and consultation with conservation officers.

k) Pools and Riffles

Whenever possible and appropriate these features should be enhanced and created, as they provide diversity for fauna and flora. However, where the nature of the river is an impounded, lowland channel,- the features are inappropriate.

Current Shortfalls of the Catchment – Water Quality

Map No. 25

December 1992

NRA
National Rivers Authority
Anglian Region

560 70 80 90 600 10 20 630

260 50 40 30 220

Fails IR
Fails IR & class 2
Stowmarket
Fails IR & class 1B
Fails IR, PA & class 1B
R. Gipping
Fails IR & PA
Fails PA
Fails F2
Fails class 1B
Fails F3 & Class 1B
Ipswich
Tidal limit
Fails Zn & Cu
Fails F2 & class 2
R. Orwell
Felixstowe
Harwich
Fails IR F3
Class 2
Ramsey River
Walton – on – the – Naze

Fails F2
Glem
Chad Brook
Fails 1B & F3
Haverhill
Fails LW, F4 & class 2
R. Stour
Sudbury
Fails F3

Fails F3
Hadleigh
Fails 1B & F2
Box
Fails F2
R. Brett
Fails 1B & F2
Fails F3
Fails F3
Manningtree
R. Stour

Key
- Catchment boundary
- Coastline
- Town
- Main river
- Fails biologically
- Fails tests specified

kms
0 5

5.0 CURRENT SHORTFALLS OF THE CATCHMENT

5.1 WATER QUALITY

5.1.1 General

Having set water quality targets it is possible to assess the state of the catchment against these targets. Data from routine water sampling biological surveys have been used to facilitate this comparison.

The map opposite identifies failures to meet the use related targets, relevant EC Directives and the NWC river classification.

5.1.2 Issues Identified

5.1.2.1 River Gipping - Headwaters to Sproughton (Issue 1)

The river has suffered considerably from the effects of low natural flows and abstraction. It has a naturally high conductivity which causes the target for Industrial/Agricultural abstraction to be occasionally exceeded but with little significance. The failure to achieve the target standards is due in the headwaters to low flows coupled with land and urban run-off. Below Stowmarket discharges of treated sewage effluent have a significant effect. The stretch with the potable water abstraction use fails due to high levels of nitrate but this is not critical as the water is impounded before treatment.

5.1.2.2 River Gipping - Sproughton to Tidal Limit (Issue 2)

The river fails both its target class and fishery objective standard due to the sewage discharges from a number of unsatisfactory storm overflows in the stretch. Capital schemes are programmed by Anglian Water Services to up rate the sewerage system which should permit the river to improve. The problem is exacerbated by the abstraction for potable supply. This reduces the dilution available for a greater period of time.

5.1.2.3 Belstead Brook (Issues 3 and 4)

The river only marginally fails the fishery objective standard which is considered to be due to several organic discharges. Due to saline intrusion at the lower end, the brook also fails its target class.

5.1.2.4 River Orwell - Ipswich to Chelmondiston (Issues 5 and 13)

Upstream of Woolverstone the River Orwell fails its class limits. In the Ipswich area there has been a long history of unsatisfactory discharges from industry, the sewage treatment works at Cliff Quay and storm overflows to the sewer. The latter discharges contribute to an unacceptable quantity ofsewage derived solid material into the river leading to much public complaint. On occasions, in recent years, the dissolved oxygen content of the estuary in its upper reaches has dropped to low levels resulting in fish mortalities.

The river also fails the EC Dangerous Substances Directive for List II metals (copper and zinc). The reason is unclear but may be caused by the considerable number of working and pleasure craft that use the estuary - zinc arising from sacrificial anodes and copper from the antifouling.

5.1.2.5 River Stour and Stour Brook - Downstream of Haverhill Sewage Works (Issues 6 and 32)

Haverhill sewage effluent and surface water have a significant effect on the watercourse and result in it failing to meet all the targets. Anglian Water Serives has recently completed a capital scheme which should improve the quality of the effluent. Further capital work is planned for completion in 1995 which should result in the river meeting its target. Due to trade effluent discharges to the sewerage system the works effluent imparts a distinctive odour that is discernible as far downstream as the abstraction point at Langham. This matter has been under discussion with Anglian Water Services for some time. When this problem occurs Essex Water Company extracts from a separate borehole source and excessive use of this is of concern.

5.1.2.6 Chad Brook - Headwaters to Acton (Issue 7)

Low flows coupled with organic discharges and pesticide inputs result in the stretch failing to achieve its target class.

5.1.2.7 River Box - Headwaters to Edwardstone (Issue 8)

Low flows and the effect of Great Waldingfield sewage works result in the river failing to meet the target class or the predicted biological score.

5.1.2.8 River Box - Boxford to the River Stour (Issue 9)

The failure to meet the target class was due to the sewage discharge from Boxford sewage works. This works has recently undergone improvements and now complies with its river needs consent. It is expected that the river will soon reflect this improvement.

5.1.2.9 River Stour - Kirtling Brook to Cattawade (Tidal Limit) (Issue 10)

The river is subject to eutrophication with the resultant loss of diversity of flora and failure to meet the predicted biological score and fishery classification. Essex Water Company is proposing toconstruct a nitrate removal plant at Langham to treat the water prior to supply. River quality taken over the year complies with the Surface Water Directive but there are occasions when the value is exceeded.

5.1.2.10 Ramsey River - Upper Reaches (Issue 15)

The quality of the upper reaches of the river, downstream of Wix sewage works, has been adversely affected by the effluent from the works and fails the class objectives. Extensions at the sewage works have recently been completed and an improvement in river quality is expected. It is possible that discharges from domestic premises and agricultural activities may also be affecting the river.

The lowest stretch of the river fails the irrigation use limit but this is only in a very localised area at Parkeston. The failure is due to high salinity levels because of the proximity of the tidal River Stour and is of little consequence.

5.1.2.11 Industrial Discharges - Brantham (Issue 14)

The quality of the local salt marsh in the Brantham area of the Stour estuary is causing concern. It is thought that this salt marsh is being adversely affected by discharges from industry in the Brantham area.

5.1.2.12 General Agriculture Pollution (Issue 11)

The rise in the number of intensive livestock units coupled with changes in arable farm practices over the last few decades has resulted in the the increasing wash-off from land of farm wastes, nitrates and pesticides. Pollution of this type, from diffuse sources, is difficult to control.

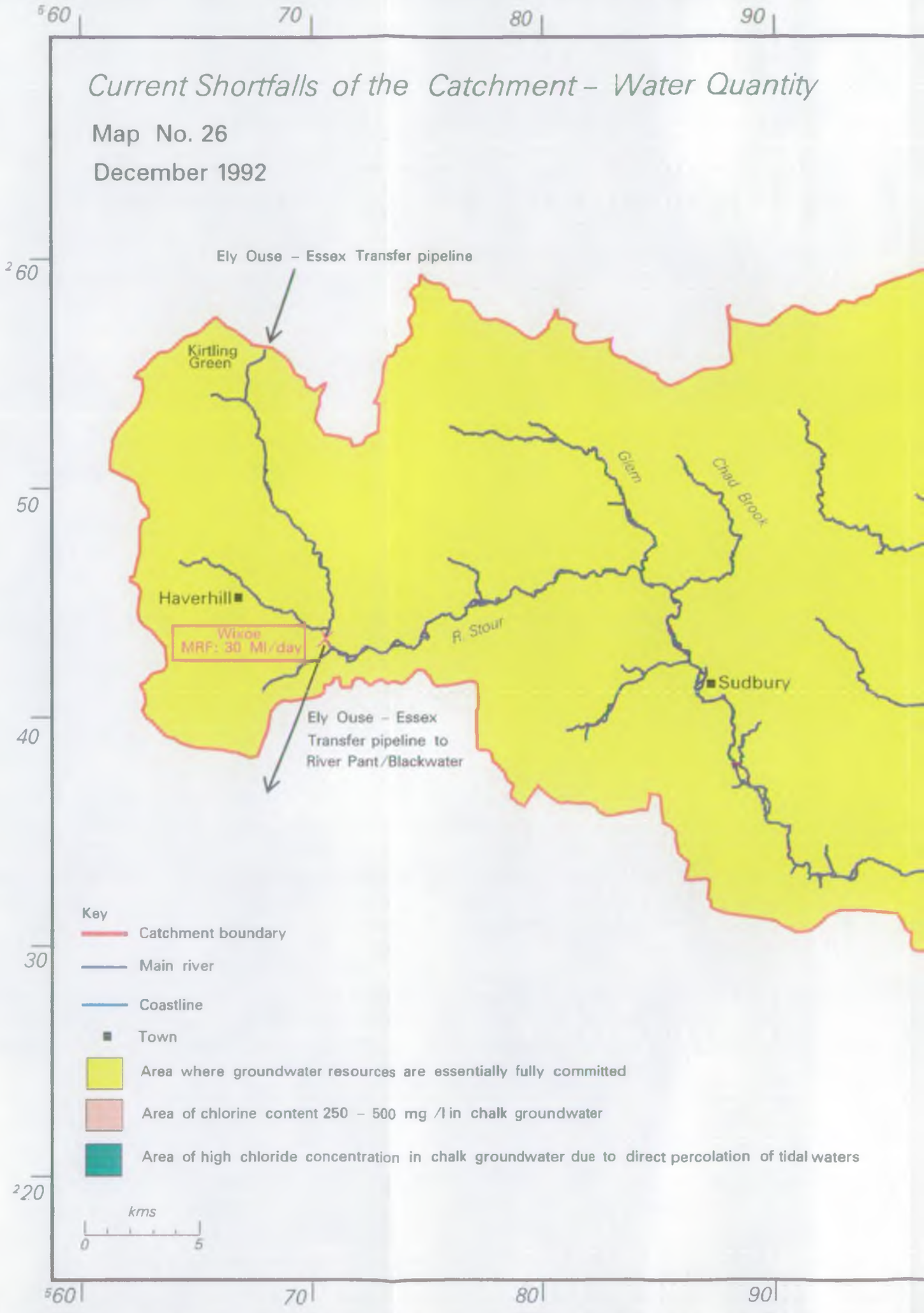
5.1.2.13 Coastal Sewage Outfalls (Issue 12)

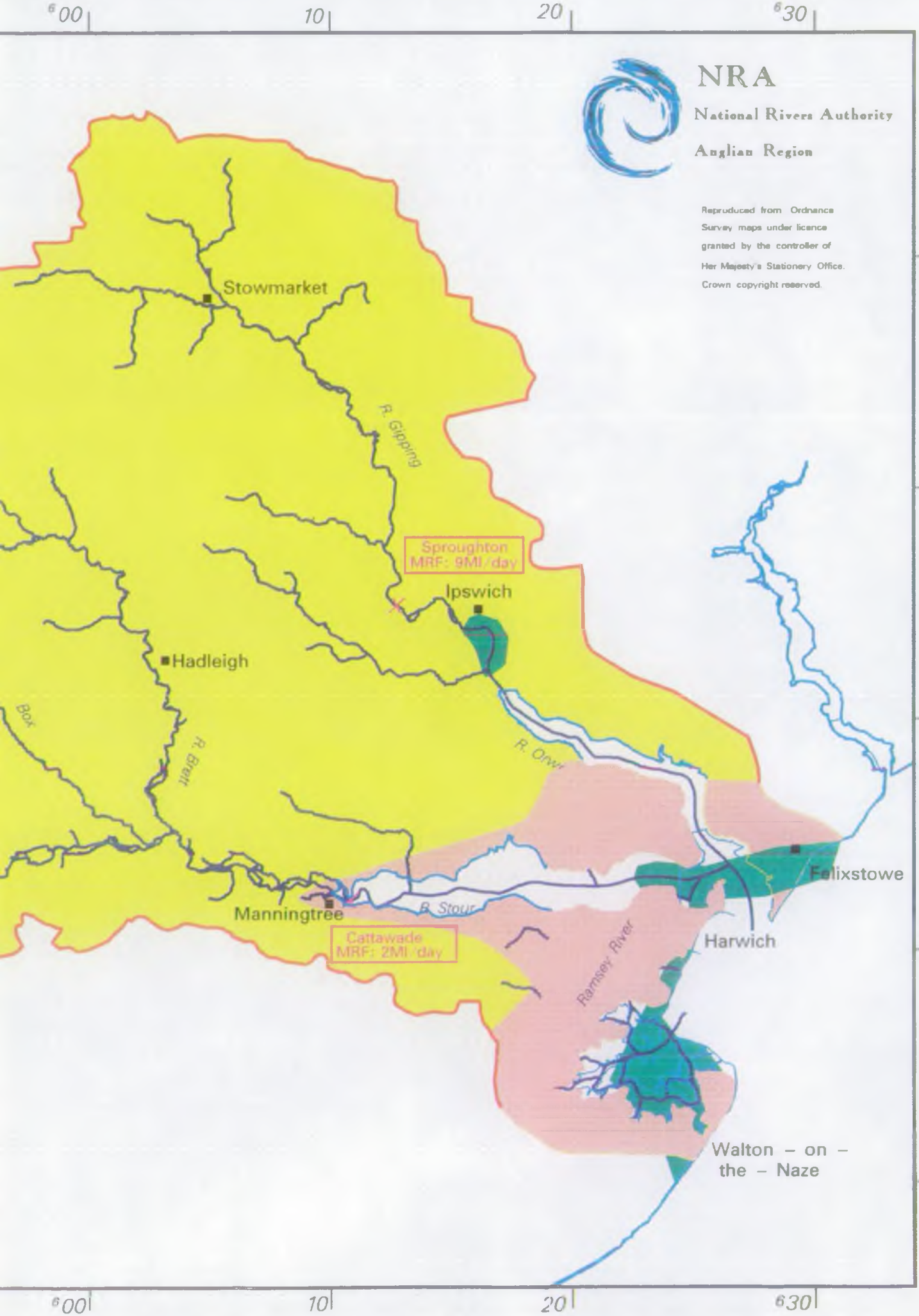
The sewage outfalls at Felixstowe, Harwich and Dovercourt give rise to much public complaint and locally are a cause of unacceptable water quality. Although the designated bathing beaches at Dovercourt and Felixstowe are compliant with the EC Directive limits for quality, the presence of sewage derived plastics and other solid material on the beaches is offensive.

Current Shortfalls of the Catchment – Water Quantity

Map No. 26

December 1992




600
10
20
630
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National Rivers Authority
Anglian Region
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260
50
40
30
220
Stowmarket
R. Gipping
Sproughton
MRF: 9Ml/day
Ipswich
Hadleigh
Box
R. Brett
R. Orwell
Felixstowe
Manningtree
R. Stour
Cattawade
MRF: 2Ml/day
Harwich
Ramsey River
Walton – on – the – Naze

5.2 WATER QUANTITY

5.2.1 General

Within NRA's water resource planning role is the requirement to balance the varied and competing needs for water resources. These include human needs, such as potable water supply, industry and agriculture, as well as those of the water environment such as rivers, spring and wetlands.

The water resources comprise the long term average recharge into the underlying chalk aquifer, which sustain the base flow in the rivers throughout the catchment, together with surface run-off which occurs after periods of heavy rainfall.

The surface water run-off component is much less reliable and contributes usefully only to those water users who have storage capacity to utilise it. This includes water exported from the tidal limit at Denver in Norfolk via the Ely Ouse to Essex transfer scheme to storage in the Essex reservoirs.

For most local users of water, it is the recharge to the chalk which provides the reliable water resource in the catchment. Long term average recharge is assessed on the basis of effective rainfall (rainfall minus evaporation), catchment area and geology. However, recharge varies from year to year, and there are other practical limitations on its use. The term "effective resource" is used to describe the portion of the long term average recharge which can be relied upon for abstraction and the needs of the environment, in particular minimum river flows.

The Water Resources Act 1991 empowers the NRA to set Minimum Acceptable Flows (MAFs) on rivers. To date this has not been fulfilled either Regionally or Nationally. However, the NRA Anglian Region has Minimum Residual Flow (MRF) conditions at a number of points on rivers in the catchment. In essence these are similar to the concept of MAFs but without the legal status. MRFs are used for river management and to guide decisions on licence applications to protect other existing uses and users of the rivers within the catchment. The MRFs used are as follows:

Location	Grid Reference	Mrf Requirement
River Stour at Wixoe	TL 720430	30 tcmd
River Stour at Cattawade	TM 100320	2 tcmd
River Gipping at Sproughton	TM 125451	9 tcmd

Future demands for water in the Anglian Region are progressively rising. Future demand for public supply is assessed by examining predicted changes in population and consumption habits as well as the potential for reducing demand by management practices such as leakage control and metering policies. Future growth in industrial and agricultural needs are also allowed for.

The environmental demand for water is represented by an allowance of total groundwater resource, provisionally set at the 95 percentile flow (the flow that is exceeded 95 percent of the time), less the reliable contribution of effluent discharges.

The detailed comparison of the current demand with effective resource is given in the next section. In general, it is NRA policy not to authorise abstraction in excess of reliably renewable resources; where demand exceeds resource, water has to be transferred between catchments. Such transfers are widely practised in the Anglian Region, with the Ely Ouse to Essex Scheme being the largest and most important of them. Future development of this scheme, including the possible construction of a storage reservoir, could greatly enhance both the availability and reliability of water resources, as well as offering improved opportunities for river regulation and management.

5.2.2 Local Perspective

The table below sets out the groundwater balance of water resources and the current groundwater demands for each of the major sub-catchments. This analysis is under review in the light of the current drought.

Groundwater Unit	Effective Resource (tcmd)	Environmental Demand (Net) (tcmd)	Licensed Abstraction (tcmd)	Nominal Groundwater Balance (tcmd)
Gipping	50.4	11.5	72.3*	-33.4
Stour	122.5	25	121.8	-24.3+

* NB Includes abstraction from confined chalk under Felixstowe Peninsula, 40-50% of which is saline groundwater.

\+ See text for explanation of deficit.

The current Policy with respect to the availability of water is as follows: An abstraction licence is only issued by the NRA if there is sufficient water available, the need for the

water is justified, all rights of existing users are protected and the water environment eg, rivers, springs and wetland sites, is not unacceptably affected.

A. Groundwater

The final column of the table above gives the nominal deficits within the catchment, after including due allowance for in river and environmental needs. The deficits indicated do, however, represent worst possible case scenarios.

Groundwater resources in the Gipping catchment are fully committed. It is NRA policy not to issue any new net groundwater abstractions for boreholes or wells in this catchment.
Overall the groundwater resources of the Stour catchment are also fully committed. However, it should be recognised that much of the chalk aquifer is confined by clay. Abstraction from the confined chalk is met by underflow of surplus recharge from upper adjacent sub-catchments and induced recharge in valley areas. This amount has not been quantified but tends to counteract the deficit in groundwater indicated in the final column of the table.

As such, limited quantities of groundwater are available in some sub-catchments for local development subject to sensitive distribution of abstraction and detailed technical appraisal. This will often involve undertaking Environmental Impact Assessments and could result in the requirement for further river support to maintain environmental waters.

The drought is putting the water environment under stress causing difficulty to many abstractors. For these reasons, the NRA has introduced a moratorium on the issue of certain categories of groundwater abstraction licences in certain areas.

The moratorium applies to all additional net abstraction of groundwater in the whole of the Gipping/Stour Catchment Plan Area.

B. Surface Waters

Some winter water is available in most rivers during periods of high flow and abstractors are encouraged to store this water in reservoirs for summer use.

Summer water is available only in limited quantities from rivers or drains augmented by raw water transfer schemes. Licence conditions will commit the holder to cease abstraction if the river is not being supported. Currently, river support of this nature is only available through the Ely Ouse to Essex transfer scheme for abstractors on the main River Stour.

5.2.3 Summary of Issues Identified

a) Available groundwater resources are inadequate to meet present and future predicted demands. (Issue 20)

b) Available surface water resources are inadequate to meet present and future seasonal demands. (Issue 19)

c) Lack of detailed understanding of Stour groundwater aquifer. (Issue 18)

d) Artificial river support by effluent discharges cannot be relied on. (Issue 17)

e) Actual minimum flows are predicted to be inadequate to meet in river needs. (Issue 16)

f) The need to identify catchment zones for wetlands of environmental importance. (Issue 21)

Current Shortfalls of Catchment – Physical Features

Map No. 27

December 1992

NRA

National Rivers Authority

Anglian Region

560 70 80 90 600 10 20 630

260 50 40 30 220

Stowmarket
R. Gipping
Glem
Chad Brook
Haverhill
R. Stour
Sudbury
Box
R. Brett
Hadleigh
Ipswich
R. Orwell
Felixstowe
Manningtree
R. Stour
Harwich
Ramsey River
Walton – on – the – Naze

Key

- Catchment boundary
- Main river
- Coastline
- Town
- Proposed bypass
- Flood wall improvement
- Proposed extension to linear walk
- Proposed new Belstead Brook Park
- Tidal embankment improvement
- Foreshore/Beach recharge
- Flood protection scheme reconstruction
- (f) Tidal sluice renovation
- (S) New/Renovated structures

kms 0 5

5.3 PHYSICAL FEATURES

5.3.1 General

The map opposite identifies current levels of features within the catchment.

5.3.2 Issues Identified

5.3.2.1 Weirs and Sluices (Issues 22 and 31)

The majority of structures are old. Some are operationally unsound. They are in need of regular repair, and many need major investment to retain them. Some are in private ownership. This presents the problems of funding, responsibility and co-ordination.

Unavoidable manual operation at times of rapid change in flow regime does not always permit satisfactory maintenance of water levels.

5.3.2.2 Flood Protection (Issues 23 and 23a)

Need for long term review of methods and strategy in the catchment, in the light of sea level rise, economics and land use.

Need to continue to provide adequate flood protection to both people and property from flooding - both tidal and fluvial. This is provided through a programme of new works and maintenance. (Capital Programme works will be detailed in the Action Plan).

5.3.2.3 Development (Issue 24)

Minimise the impact that new development can have upon the water environment and all NRA functions. Where rivers are subject to flooding, development can increase this risk, but the NRA has only limited powers to impose conditions on development, through planning liaison.

5.3.2.4 Navigation (Issues 25 and 26)

To investigate the likely impact that the proposed scheme to reinstate the River Gipping navigation will have on the river.

To investigate the the likely impact of renovating the River

Stour navigation structures. This could lead to increased navigable use on the river, with possible damage to other important river users.

5.3.2.5. Salt Marsh (Issue 27)

The amount of salt marsh in the catchment is decreasing, causing a loss of habitat and flood protection.

5.3.2.6 Public Access (Issues 28 and 29)

To identify and promote the need for further provision of public access for launching small craft on the estuaries in the catchment.

To identify and promote the need for further provision of public access to estuaries and the coastal zone.

5.3.2.7 Conservation (Issue 30)

The Cornard Mere SSSI is a seasonally flooded area of fen, surrounded by scrub and grousland. Over recent years, the frequency of flooding in the Mere has declined, giving rise to concern for its status as a wetland SSSI.

6.0 ISSUES AND OPTIONS

6.1 General

This section of the plan considers options to address the issues that have been raised in the preceding sections. The options as presented are the initial thoughts of the Anglian Region of the NRA and do not constitute policy statements. It must be re-emphasised that at this stage, it is not the objective to present a detailed programme of action or to prioritize the issues and options identified. It is recognised that considerable consultation and negotiation will be necessary before an acceptable and practicable action plan can be drawn up. This will be the next stage. Comments on the issues and options are therefore requested together with any new ideas/suggestions.

Wherever possible the body responsible for carrying out each option has been identified. In some cases this is identified as someone other than the NRA. However, the options as presented are intended as a plan to facilitate improvements to the water environment for the benefit of all users. Obviously this will entail many bodies and individuals working together to fulfil the aims and objectives as detailed in this Catchment Management Plan.

6.2 Issues and Options

Issue No. 1. River Gipping. (Section 5.1.2.1).
Headwaters to Sproughton - Failure to achieve target class.

Options	Responsibility	Advantages	Disadvantages
Review of Consents for existing dischargers leading to the imposition of River Needs Limits.	AWS/Industrial dischargers.	i) Compliance with target values. Benefit to other river users. ii) Effluents, which contribute a significant proportion of river flow, are retained.	Cost of improving effluent treatment to higher standards.
Relocate sewage and industrial discharges downstream of failing river stretches.	AWS/Industrial dischargers.	Compliance with target levels.	i) Major loss of river flow in upper stretches. ii) Cost of relocation.
Increase river flows to afford greater dilution.	NRA	i) General benefit to all river users. ii) Possibly satisfying future demands. iii)Possible improvement to habitat and amenity use.	i) Cost of augmenting flows. ii) Possible adverse environmental impact.

Issue No. 2. River Gipping. (Section 5.1.2.2).
Sproughton to Tidal Limit - Failure to achieve target class and fishery status.

Options	Responsibility	Advantages	Disadvantages
Uprate sewerage system.	AWS.	i) Compliance with class and fishery targets. ii) Improvement to river aesthetics. iii) Removal of existing development restrictions.	Cost

Issue No. 3. Belstead Brook. (Section 5.1.2.3).
Failure of fishery use.

Options	Responsibility	Advantages	Disadvantages
Improvements to Chantry STW to meet river needs consent, plus survey to assess other possible sources of pollution.	AWS/NRA.	Compliance with fishery limits.	Cost.
Relocate outfall from Chantry STW to below tidal sluice.	AWS.	Compliance with fishery limits.	i) Cost. ii) Decrease in river flow in lower stretches.

Issue No. 4. Belstead Brook. (Section 5.1.2.3).
Saline intrusion at tidal limit.

Options	Responsibility	Advantages	Disadvantages
Modify sluice.	NRA.	Reduction in chloride level in lower stretches.	Cost for little benefit.

Issue No. 5. River Orwell - Ipswich to Chelmondiston. (Section 5.1.2.4). Failure to achieve EC limits for copper and zinc.

Options	Responsibility	Advantages	Disadvantages
Research to assess sources and extent of effect.	NRA.	Determines the problem.	Cost.

Issue No. 6. River Stour and Stour Brook - Downstream of Haverhill STW. Failure to meet class targets and use objectives coupled with odour problems. (Section 5.1.2.5).

Options	Responsibility	Advantages	Disadvantages
Improvements to Haverhill STW to meet River Needs Consent limits and odour limits.	AWS.	i) Compliance with class objectives and reduction in odour complaints. ii) General improvement to downstream quality. iii) Re-instatement of fishery in Stour Brook.	Cost.
Relocation of discharge from Haverhill STW, downstream.	AWS.	Compliance with class objectives in Stour Brook.	i) Cost. ii) Odour problem not resolved. iii) Loss of flow from Stour Brook. iv) Loss of self-purification presently afforded by Stour Brook.

Issue No. 7. Chad Brook - Headwaters to Acton. (Section 5.1.2.6).
Failure to achieve class target.

Options	Responsibility	Advantages	Disadvantages
Survey to identify polluting sources.	NRA.	Action can be targeted.	Cost.
Review consent limits on discharges.	NRA.	Identify discharges requiring improvement.	Potential cost to dischargers.
Research to assess reason for declining river flows	NRA.	Action can be targeted.	Cost.

Issue No. 8. River Box - Headwater to Edwardstone. (Section 5.1.2.7).
Failure to meet target class and low biological score.

Options	Responsibility	Advantages	Disadvantages
Survey to identify polluting sources.	NRA.	Action can be targeted.	Cost.
Review consent limits on discharges.	NRA.	Identify discharges requiring improvement.	Potential cost to dischargers.
Research to assess reason for declining river flows.	NRA.	Action can be targeted.	Cost.

Issue No. 9. River Box - Boxford to River Stour. (Section 5.1.2.8).
Failure to meet target class.

Options	Responsibility	Advantages	Disadvantages
Monitoring to assess effect of recent improvements to Boxford STW.	NRA.	Identify other possible problems.	Cost.

Issue No. 10. River Stour - Kirtling Brook to Tidal limit. (Section 5.1.2.9). Failure to meet predicted biological score with loss of flora due to eutrophication.

Options	Responsibility	Advantages	Disadvantages
Research into factors increasing eutrophication and remedial action required.	NRA.	Identifies sources of problems leading to possible improvement.	Cost of a major R & D project requiring time for completion and remedial action to be taken.

Issue No. 11. Concern over agricultural pollution from diffuse sources. (Section 5.1.2.12).

Options	Responsibility	Advantages	Disadvantages
Buffer zones encouraged by Set Aside, ESAs, Countryside Stewardship.	NRA/MAFF/ Countryside Commission.	i) Reduction in river pollution. ii) Formation of river corridor for wildlife. iii) Attenuation of Surface Water Run-off.	Possible finite life.
Pollution prevention, enforcement and encouragement of Code of Good Agricultural Practice.	NRA/Farmers/ MAFF.	Reduction in pollution.	Staff resources.

Issue No. 12. Adverse effects from existing Harwich, Dovercourt and Felixstowe sewage outfalls. (Section 5.1.2.13).

Options	Responsibility	Advantages	Disadvantages
Improved discharge quality.	AWS.	i) Receiving waters meet quality requirements. ii) Removal of development restrictions.	Cost to AWS.
Relocation to meet needs of receiving water.	AWS.	i) Receiving waters meeting quality requirements. ii) Removal of development restrictions.	Cost to AWS.

Issue No. 13. Non-compliance with class limits on River Orwell upstream of Woolverstone. (Section 5.1.2.4).

Options	Responsibility	Advantages	Disadvantages
Improved discharges of sewage and industrial effluents to meet use needs of estuary.	AWS/Industry.	i) River meets quality requirements. ii) Removal of development restrictions.	Cost to Industry and AWS.

Issue No. 14. Concern over the effect of trade effluent discharges on the local salt marsh at Brantham. (Section 5.1.2.11).

Options	Responsibility	Advantages	Disadvantages
Review of Consent limits to liaison with conservation bodies.	NRA.	Enhanced knowledge leading to possible improvement.	Potential cost to industry.

Issue No. 15. Ramsey River - Upper Reaches. (Section 5.1.2.10). Failure of class limits.

Options	Responsibility	Advantages	Disadvantages
Extend and improve Wix STW (recently completed).	AWS.	Compliance with class limits.	Cost.
Potential further survey work (if river continues to fail class limit).	NRA.	Fully identifies reasons for failure.	i) Cost. ii) Potential cost to dischargers.

Issue No. 16. Actual minimum flows are perceived to be inadequate to meet river needs. (Section 5.2.3e).

Options	Responsibility	Advantages	Disadvantages
Review/set MRFs.	NRA.	Improved resource management.	i) Cost of investigations. ii) No progress can be made until study is complete. iii) Any reduction in present MRFs would have serious implications on discharge consents and the water environment.
"In river needs" study to assess requirements.	NRA.	Needed for setting MRFs.	Cost of study.

Issue No. 17. Artificial river support by effluent discharges is unreliable. (Section 5.2.3d).

Options	Responsibility	Advantages	Disadvantages
Co-operation with AWS/ Industry.	NRA/AWS/ Industry.	Supports river flows.	Companies subject to economic pressures.
Incentives through charging schemes to encourage non-relocation of outfalls.	NRA/AWS/ Industry.	Supports river flows.	Cost to NRA.

Issue No. 18. Lack of detailed understanding of the working of the Stour chalk aquifer. (Section 5.2.3c).

Options	Responsibility	Advantages	Disadvantages
Investigation/ modelling of aquifer in Stour catchment.	NRA.	Better understanding of system.	Cost.

Issue No. 19. Available surface water resources are inadequate to meet present and future seasonal demands. (Section 5.2.3b).

Options	Responsibility	Advantages	Disadvantages
Await outcome of Strategic Options Study currently being carried out.	NRA.	i) Comprehensive and co-ordinated approach. ii) Multi-disciplinary approach.	i) Timescale. ii) Cost.
Encourage winter storage.	NRA/ Abstractors.	i) Does not deplete resources elsewhere. ii) More reliable supply could reduce summer demand. iii) Efficient utilisation of water resources. iv) Possible amenity/ recreation advantage.	i) Cost to abstractor. ii) Subject to planning control.
Enhance existing Ely Ouse to Essex Transfer Scheme.	NRA.	i) Limited to rivers receiving support. ii) Optimises existing scheme. iii) Meets demands in short term.	i) Environmental impact. ii) Limited yield. iii) Cost.
Re-use of sewage effluent.	NRA/Water Companies.	i) Better utilisation of resource. ii) Reduction in discharges of effluents.	i) Loss of flow in receiving water. ii) Emotive. iii) Involvement of different companies.
Influence agricultural bodies to encourage agricultural practices which are more water efficient.	NRA/MAFF (ADAS)/ NFU/ Countryside Commission/ Farmers.	i) Minimal cost to NRA. ii) Effective use of Government subsidies. iii) Conservation and landscape advantages.	i) Limited in effect. ii) May require change in agricultural practice. iii) Cost to farmers.

Issue No. 19. Available surface water resources are inadequate to meet present and future seasonal demands. (Section 5.2.3b) - CONTINUED.

Options	Responsibility	Advantages	Disadvantages
Revoking of licences.	NRA.	i) Environmental improvement. ii) Reduction in summer abstraction. iii) Uses available winter water. iv) Possible higher effluent standards.	i) Compensation costs. ii) Possible implications for existing abstractions.

Issue No. 20. Available ground water resources are inadequate to meet present and future demands. (Section 5.2.3a).

Options	Responsibility	Advantages	Disadvantages
Await outcome of Strategic Options Study currently being carried out.	NRA.	i) Comprehensive and co-ordinated approach. ii) Multi-disciplinary approach.	i) Timescale. ii) Costs.
Reuse of sewage effluents.	NRA/AWS/ Water Companies	i) Better utilisation of resource. ii) Reduction in discharge of effluents.	i) Loss of flow in existing receiving water. ii) Emotive. iii) Involvement of different companies.
Use more surface water via transfer schemes.	NRA/Water Companies.	Meets demand.	i) Cost. ii) Possible environmental problems.
Encouraging aquifer recharge.	NRA.	Re-establishment of ground water levels.	i) Limited yield. ii) Affect on agriculture. iii) Pollution risk. iv) Unproven technique.
Demand management.	NRA.	i) Reduces demand. ii) Delays major expenditure.	Possibly expensive to water companies.

Issue No. 21. Need to identify catchment zones for wetlands of environmental importance. (Section 5.2.3f).

Options	Responsibility	Advantages	Disadvantages
Environmental studies to ascertain areas of extent of concern.	NRA/ Conservation Bodies.	Maintain and enhance wetland sites.	i) Cost. ii) Timescale. iii) Possible implications for existing abstractors.

Issue No. 22. Weirs and Sluices. (Section 5.3.2.1).

Problem of funding, responsibility and co-ordination of operation and repairs to private structures.

Options	Responsibility	Advantages	Disadvantages
Do nothing.	NRA.	No cost.	i) Loss of water levels. ii) Loss of amenity. iii) Possible flood defence problem. iv) Environmental concerns.
Rebuild structures to NRA requirements.	Private Owner/ NRA.	i) Co-ordinated approach. ii) Retains structures and associated benefits to river users. iii) Allow the introduction of more automation into river level control.	i) Cost. ii) Possible conflict between requirements and apportionment of costs.
Investigation into overall management policy of river system related to structures.	NRA.	i) Identifies real needs and environmental impact. ii) Includes co-ordinated approach.	Cost.

Issue No. 23. Flood Protection. (Section 5.3.2.2).
Review of tidal flood defence strategy related to future land use and environmental requirements, taking account of 23a.

Options	Responsibility	Advantages	Disadvantages
Do nothing.	NRA.	Cost savings.	Increased tidal flooding resulting from failure of present defences.
Maintain present standard.	NRA.	Secures existing protection levels.	i) Expensive. ii) No improved protection where required.
Enhanced or modified standard.	NRA.	i) Could be cost effective in certain areas. ii) Possible environmental benefits.	i) Could result in increased costs in certain areas. ii) Could be environmentall y detrimental.

Issue No. 23a. Standards of Service for Flood Defence. (Section 5.3.2.2).

Options	Responsibility	Advantages	Disadvantages
To assess the area at risk from flooding, the effective standard of service and the target standards of service in the catchment.	NRA.	Identifies planning gaps and enables capital and maintenance works to be prioritised. Utilises resources to best effect.	Does not cover "non" main river areas.

Issue No. 24. River Gipping and Stour. (Section 5.3.2.3).
Development often increases risks to the water environment but NRA has only limited powers to impose conditions on development.

Options	Responsibility	Advantages	Disadvantages
To gain a direct influence in the planning process using existing legislation and adoption of NRA Anglian Region model policies (Appendix 1).	Local Authorities/ NRA/ Developers/ Landowners.	Ensure matters the NRA are responsible for are fully taken into account in all development proposals.	Implications on LA control. Possible cost implications to landowners/ developers.

Issue No. 25. Impact of proposed scheme to re-instate the River Gipping navigation. (Section 5.4.2.4).

Options	Responsibility	Advantages	Disadvantages
Do nothing.	NRA/Inland Waterways Association/ County and District Councils.	i) Environment status quo maintained. ii) No cost.	Navigation is not resurrected.
Partial re-instatement.	As above.	i) Some navigation. ii) Gain to amenity.	i) Incomplete navigation. ii) Possible environmental effect. iii) Cost. iv) Possible effect on Flood Defence.
Complete re-instatement.	As above.	i) Complete navigation. ii) Gain to amenity.	i) Cost. ii) Possible environmental problems. iii) Possible effect on Flood Defence.
Study of potential impacts.	NRA.	Clearly evaluates problems.	Cost.

Issue No. 26. Impact of renovating Stour navigation structures. (Section 5.3.2.4).

Options	Responsibility	Advantages	Disadvantages
Do nothing.	NRA/River Stour Trust/Riparian owners.	No cost.	Navigation is not enhanced.
Partial re-instatement.	As above.	i) Gain to amenity.	i) Cost. ii) Possible environmental effect. iii) Flooding problems.
Complete re-instatement.	As above.	i) Complete through navigation. ii) Gain to amenity.	i) Cost. ii) Possible environmental problems. iii) Flood problems.
Study of potential impacts.	As above.	Clearly evaluates problems.	Cost.

Issue No. 27. Loss of salt marsh. (Section 5.3.2.5).

Options	Responsibility	Advantages	Disadvantages
Co-ordination of existing research and identification of further needs.	NRA.	i) Identifying cause leading to possible remedies and cost saving on flood defence. ii) Environmental gain.	Cost.

Issue No. 28. Lack of public access for launching small craft on estuaries. (Section 5.3.2.6).

Options	Responsibility	Advantages	Disadvantages
Identify and promote provision of extra access facilities.	NRA/Local Authorities.	i) Increase access. ii) Reduce congestion at existing sites.	i) Need for regulation of boats. ii) Minor costs.

Issue No. 29. Lack of public access to estuaries and coastal zone. (Section 5.3.2.6).

Options	Responsibility	Advantages	Disadvantages
Promote and provide facilities.	Landowners/ Local Authorities/ NRA.	i) Increased access. ii) Possible links with existing coastal paths.	i) Possible environmental damage. ii) Cost.

Issue No. 30. Concern over existing and future decline in water level in Cornard Mere. (Section 5.3.2.7).

Options	Responsibility	Advantages	Disadvantages
Limit or revoke abstractions.	NRA/ Abstractors.	Protection of Mere.	i) Cost of NRA. ii) Difficulty for abstractors.
Monitoring and remedial works.	AWS.	Protection of Mere.	i) Cost to AWS. ii) Possible need for further channel management.

Issue No. 31. Concern over regulation of river levels and flows. (Section 5.3.2.1).

Options	Responsibility	Advantages	Disadvantages
Reservoir in Upper Stour (Ely Ouse to Essex Transfer Operating Regime).	NRA.	i) Better regulation of flows. ii) Optimise resource. iii) Create recreational, conservation and fisheries opportunities.	i) Cost. ii) Time of construction. iii) Loss of farmland and dwellings.
Automated gates throughout river with monitoring of river level and gate setting.	NRA.	i) Better regulation of flows.	i) Cost. ii) Possible visual effect.

Issue No. 32. Excessive use of emergency boreholes at Langham during periods of water quality problems in drinking water supply to local users. (Section 5.1.2.5).

Options	Responsibility	Advantages	Disadvantages
Appropriate limits on effluent discharges.	AWS/ Industry.	i) Protects public water supply. ii) General benefit to river.	i) Possible high cost due to effluent treatment plant. ii) Possible difficulty in removing pollutants at source.
Nitrate removal.	Essex Water Company.	Drinking water complying with EC limits.	i) Increased nitrate loading on river. ii) Cost to Water Companies.

GLOSSARY

AODN - Above Ordnance Datum Newlyn.

AONB - Area of Outstanding Natural Beauty.

Aquifer - A water-bearing stratum situated below ground level. The water contained in aquifers is known as groundwater.

Base flow - The proportion of river flow that is provided by groundwater discharge from an aquifer.

Catchment Area - The area of land that collects the precipitated water flowing into a given reach of a stream or a lake or reservoir.

Coastal and Estuarine Working Party Classification - A summary of the quality of estuarine waters based on points awarded for biological, aesthetic and water quality.

Consent - A statutory document issued by the NRA to indicate any limits and conditions on the discharge of an effluent to a controlled water.

Controlled waters - All rivers, canals, lakes, groundwaters, estuaries and coastal waters to three nautical miles from the shore.

Countryside Stewardship - A scheme of grant aiding the retention and restoration of traditional countryside management practices suggested by the Countryside Commission.

Cyprinid Fish - Coarse fish e.g. Roach, Dace and Bream.

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.

Eutrophic - A description of water which is rich in nutrients. At worst, such waters are sometimes beset with unsightly growths of algae.

Finger Valley Watercourses - Small tributaries which make up the upper catchment of a river.

Fyke Net - A conical net used to trap eels.

Glide - An area of deeper, slower flowing water in a river.

Groundwater - Water which saturates a porous soil or rock substratum (or aquifer).

Loess - Fine grained wind blow deposit.

Main River - As defined by Act of Parliament.

Minimum Acceptable Flow - The Minimum Acceptable Flow as defined in Section 21 of the Water Resources Act 1991.

Minimum Residual Flow - The "hands-off" flow set by the National Rivers Authority for the stretches of river downstream of Public Water Supply Intakes.

National Nature Reserve (NNR) - An area of national importance for nature conservation.

National Water Council Class (NWC Class) - A summary of the quality of river water based largely on the measured chemical quality for the purposes of classification and reporting, originally devised by the National Water Council.

OFWAT - Office of the Water Regulator.

RAMSAR - Wetland Site of International Importance that is designated under the RAMSAR convention.

Riffle - A shallow area in a river where the substrate is composed of gravel and the flow is faster.

River Corridor - The continuous area of river, river banks and immediately adjacent land alongside a river and its tributaries.

River Quality Objectives (RQO) - The level of water quality that a river should achieve, in order to be suitable for its agreed use.

Saltings - An area of salt marsh.

Salmonid Fish - Game fish e.g. trout and salmon.

Sea Defences - Anything natural or artificial that prevents ingress by the sea.

Self Purification - When an organic polluting load is discharged into a water body it is gradually eliminated due to the activities of micro-organisms. This self-purification requires sufficient concentrations of oxygen.

Site of Special Scientific Interest (SSSI) - A site given a statutory designation by English Nature or the Countryside Council for Wales because it is particularly important, on account of its nature conservation value.

Statutory Water Quality Objectives (SWQO) - A quality objective given a statutory basis by Regulations made under the Water Act of 1989.

Surface Water - Water collecting on and running off the surface of the ground.

Telemetry - A means of collecting data from remote sites, enabling current date to be interrogated remotely.

Transmissivity (T) - Transmissivity is an index of aquifer productivity. $T = k \times b$, where k = hydraulic conductivity (md^{1}), and b = saturated aquifer thickness.

Two stage channel configuration with low level berm - A deeper channel for normal flows with a higher channel, formed by a low level berm, for flood flows.

APPENDIX 1

PROTECTING AND IMPROVING THE WATER ENVIRONMENT

MODEL POLICIES

NRA

National Rivers Authority
Anglian Region

MODEL POLICIES FOR THE PROTECTION AND IMPROVEMENT OF THE WATER ENVIRONMENT

INTRODUCTION

The NRA, Anglian Region welcomes consultation with planning authorities during the development of Structure and Local Plans.

At this strategic level, liaison is a two way process with the NRA having input into structure and other plans and seeking input by the planning authorities into NRA's plans. The NRA will make recommendations to the local planning authorities for the inclusion of policy statements in their plans to protect the public interest and NRA assets in the longer term.

At local plan level, development of particular sites begins to be identified. This stage is possibly the most vital part of the planning process. The NRA will offer critical advice as to which areas suggested for development are subject to constraints such as flood plains, flooding problems, aquifers and sensitive catchments. The technical constraints will be clearly spelt out for each individual development whenever possible.

These model policies and explanatory notes are intended to assist Chief Planning Officers and their staff by explaining the reasons why it is necessary to include policy statements to protect and improve the water environment. NRA planning liaison staff will make further recommendations where appropriate during the consultation stage.

The policies are grouped under the following headings:

1 Flood protection
2 Conservation and enhancement of the water environment, including recreation, navigation and fisheries
3 Water quality and water resources

1. FLOOD PROTECTION

AIMS

To ensure new development is not at risk from flooding and does not put other areas at risk of flooding which could endanger life and damage property.

To ensure any work which is needed to reduce the risk of flooding created by a new development is paid for by the developer and not the public.

SUMMARY POLICY STATEMENT

Flood Protection

Policy 1/1 There will be a presumption against development (including the raising of land) where, in the opinion of the Local Planning Authority after consultation with the NRA, such development would be likely to impede materially the flow of flood water, or increase the risk of flooding elsewhere, or increase the number of people or properties at risk.

KEY ISSUES AND POLICIES

Protection of the Flood Plain and Washlands

The floodplain is generally the area of low lying land adjacent to a watercourse which, by its very nature, is liable to flood under certain conditions. The floodplains are defined on maps held by the NRA. In addition some washlands, areas designed and maintained to provide storage of flood water, are defined in the NRA Anglian Region's Land Drainage and Sea Defence Byelaws. For a variety of reasons, some development has taken place on the floodplains of the region's rivers. Consequently people and property in these areas are at risk from flooding. These developments also reduce the capacity of the available floodplain and impede the flow of water, thereby increasing the risk of flooding elsewhere.

The Land Drainage and Sea Defence Byelaws specify a number of activities in the floodplain that require the prior consent of the NRA and inter alia give the NRA powers to protect an undeveloped strip of land along each main river bank.

Policy 1/2 In areas at risk from flooding (as defined by the NRA) there will be a general presumption against new development or the intensification of existing development. These areas will include defined washlands, natural floodplains and other areas adjacent to rivers to which access is required for maintenance purposes.

Policy 1/3 Appropriate flood protection will be required where the redevelopment of existing developed areas is permitted in areas presently having an unacceptable risk of flooding. The flood protection requirements for such redevelopments will be defined by the local planning authority in consultation with the NRA and funded by the developer.

Surface Water Run-Off

Unless carefully sited and designed, new development or the redevelopment of existing urban areas can exacerbate the problems of flooding in areas downstream through an increase in run-off from additional impermeable surfaces, such as roofs and paved surfaces. It is quite often the case that the effects of development in the upper parts of a river catchment are not apparent in the area within which such development occurs but have a significant effect in areas downstream.

Policy 1/4 Planning permission will not normally be granted for new development or redevelopment of existing urban areas if such development would result in an increased flood risk in areas downstream due to additional surface water run-off.

Policy 1/5 Where development is permitted which is likely to increase the risk of flooding, it must include appropriate attenuation or mitigating measures defined by the local planning authority in consultation with the NRA and funded by the developer. Works could be required at substantial distances from the development and the impact on conservation and recreation aspects will be considered.

Coastal and Estuarial Defences and Embanked Watercourses

A breach in the defences along an embanked watercourse, or coastal or estuarial defence can lead to significant flooding in areas of low lying land often well away from the location of the breach. In order to protect people and property from the effects of inundation, it is essential that the integrity of the defences and embankments is maintained. This should be determined in consultation with appropriate bodies, including the NRA. It is impracticable to prevent all flooding in extreme climatic

conditions. The NRA's aim is to protect people, property and land to standards which are practical and appropriate. A 'residual flooding hazard' is left after completion of any flood alleviation scheme.

The NRA Anglian Region Land Drainage and Sea Defence Byelaws specify a number of activities on sea defences that require the prior consent of the NRA and inter alia give the NRA powers to protect the sea defences from interference or damage.

Policy 1/6 Planning permission will not be granted for development which would adversely affect the integrity of tidal or fluvial defences.

Policy 1/7 In order to minimise the effects of tidal flooding, there will be a presumption against development on land to the seaward side of sea defences, including the siting of temporary holiday chalets and caravans. On land between a first line sea defence and the main defence, the siting of holiday chalets, caravans and camping sites may be permitted following consultation with the NRA. Time-limited occupancy conditions will be imposed and enforced preventing occupation during the period from November - March inclusive when the risk of tidal inundation is greatest.

Policy 1/8 On the landward side of sea defences and behind embanked watercourses, there will be a presumption against development in areas liable to flood unless the standard of defence is appropriate to the development proposed.

Policy 1/9 Where development is permitted in areas having substandard protection, appropriate increased protection must be provided in advance of the development as defined by the local planning authority in consultation with the NRA and funded by the developer.

Funding of Works

Lack of money means the NRA can only undertake flood defence schemes which are of the highest priority, those designed to protect life and property. Others, such as projects which would enable new development to take place, have the lowest priority and will not be carried out unless the developer pays for them. The NRA strongly recommends that if any work is needed to reduce the risk of flooding, the developer enters into a formal agreement with it or the local planning authority to provide the necessary flood protection work.

Policy 1/10 Developers will meet the cost of the physical infrastructure and facilities within the sites and the off site costs occurring as a direct result of the development. Developers and landowners will normally be expected to enter into a legally binding agreement with the NRA or local planning authority to provide the necessary flood protection work.

2 CONSERVATION AND ENHANCEMENT OF THE WATER ENVIRONMENT

AIM

To protect the water environment from any detriment due to development.

To enhance the water environment in conjunction with development.

SUMMARY POLICY STATEMENT

Conservation of the Water Environment

Policy 2/1 The conservation and enhancement of wildlife, landscape and archaeological features associated with rivers, ponds, lakes, estuaries etc will be encouraged.

KEY ISSUES AND POLICIES

Water Environment

The NRA has a statutory responsibility under Section 16 of the Water Resources Act 1991 to manage the water environment so as to:

- further the conservation and enhancement of the natural environment;
- promote facilities for sport and other forms of recreation, including public access;
- further the conservation of buildings, sites and objects of archaeological, architectural or historic interest.

The NRA also has a duty under the Water Resources Act 1991 to maintain, improve and develop fisheries.

Policy 2/2 The Planning Authority, in consultation with the NRA, will seek to promote river corridors as important areas of open land by:

- conserving existing areas of value within river corridors and, wherever possible, seeking to restore and enhance the natural elements of the river environment;
- supporting initiatives which will result in improvements to water quality;
- where appropriate promoting public access in river corridors;

and

- identifying appropriate locations for water related recreation along river corridors.

Policy 2/3 There will be a general presumption against any development which will have an adverse environmental impact on the water environment, particularly in relation to rivers, ponds, wetlands, public access in river corridors, and appropriate water-related recreation.

Environmental Assessment

All types of works in, under, over and adjacent to watercourses and sea defences need to be properly evaluated since uncontrolled works may lead to effects such as an increased risk of flooding, erosion of the watercourse or defence, increased danger to the public, restricted access for maintenance purposes, and damage to the water environment. The particular sensitivity of watercourses to drainage works is recognised by Statutory Instrument No. 1217 'The Land Drainage Improvement Works (Assessment of Environmental Effects) Regulations 1988'. This SI states that the drainage authority – NRA on main river and the District Council on non-main river – should not carry out any improvement works unless they have first completed the procedure prescribed by these regulations.

Policy 2/4 The planning authority, in consultation with the NRA, will seek to ensure that all works in, under, over and adjacent to watercourses and sea defences are appropriately designed and implemented. There will be a general presumption against the culverting of watercourses except those to enable reasonable access over a watercourse. When acting as the drainage authority, the planning authority, in consultation with the NRA, will consider the likely impacts of drainage proposals in accordance with the provisions of Statutory Instrument No. 1217 'The Land Drainage Improvement Works (Assessment of Environmental Effects) Regulations 1988'. Where works are proposed by an interested party which is not the drainage authority, the planning authority consultation with the interested party, will consider the likely impacts of drainage proposals in accordance with the same regulations.

3. WATER QUALITY AND WATER RESOURCES

AIM

To protect inland, coastal and groundwaters from pollution and derogation arising from development.

SUMMARY POLICY STATEMENT

Water Resources/Water Quality

Policy 3/1 There will be a presumption against development, including changes in land-use which in the opinion of the local planning authority after consultation with the NRA pose an unacceptable risk to the quality of ground or surface water.

KEY ISSUES AND POLICIES

Sewerage and Sewage Treatment Infrastructure

With increasing population and water use in the region, many sewerage systems and sewage treatment works are becoming overloaded. Where development continues despite overloading, pollution of watercourses will occur if additional infrastructure is not provided.

Policy 3/2 New development will only be permitted in locations where mains foul sewers, sewage treatment and surface water drainage of adequate capacity and design are available or can be provided in time to serve the development. Infill development where septic tanks are proposed will only be permitted where ground conditions are satisfactory and the plot is of adequate size to provide an adequate subsoil drainage system.

Surface Water Protection

The NRA has a duty to protect the quality and hence uses of inland and coastal waters. Currently recognised river uses are abstraction for potable supply, industrial water supply, fisheries, livestock watering, spray irrigation, and amenity and conservation. Statutory water quality objectives (use-related standards) are being introduced and the NRA will have a duty to ensure these are met. Discharge consents will not be granted where a proposed discharge is likely to cause a breach of the relevant standards.

Aquifer Protection

The groundwater reserves of the Anglian Region are an invaluable source for public water supply, industry and agriculture as well as sustaining base flows in the rivers. The clean up of contaminated groundwater is difficult, expensive and sometimes impossible. It is therefore better to prevent or reduce the risk of groundwater contamination, rather than deal with its consequences.

The NRA has published an aquifer protection policy which contains a statement of the policy adopted to minimise the risks of contamination of underground water resources from the effects of development or land use policy.

Policy 3/3 Development will not be permitted within areas around potable groundwater sources or over vulnerable areas of aquifers which, in the opinion of the local planning authority after consultation with the NRA, pose an unacceptable risk to the quality of the underlying groundwater.

Availability of Water Resources

The development of water resources for water supply is becoming increasingly difficult in the Anglian Region. The NRA has a duty to ensure that provision of water for new development does not have a detrimental impact on existing users, nature conservation or recreation. Abstraction licences will not be granted in areas where water resources are fully developed and further abstraction would affect existing users or damage the environment. Consequently there is a growing need to transport water over long distances.

Policy 3/4 The provision of water resources will be coordinated with development plans to prevent a detrimental impact on existing users, nature conservation and recreation.

Mineral Abstraction and Waste Disposal

Mineral abstraction and waste disposal activities can affect the water resources and the environment if appropriate measures are not taken. The NRA may specify measures which will help to preserve the water resources in the area, including ensuring protection to adjacent licensed sources, and preserve sites of conservation interest.

Policy 3/5 New mineral workings or waste disposal sites will not be permitted where, after consultation with the NRA, it is considered there would be adverse effects on water resources or rivers and other waters.

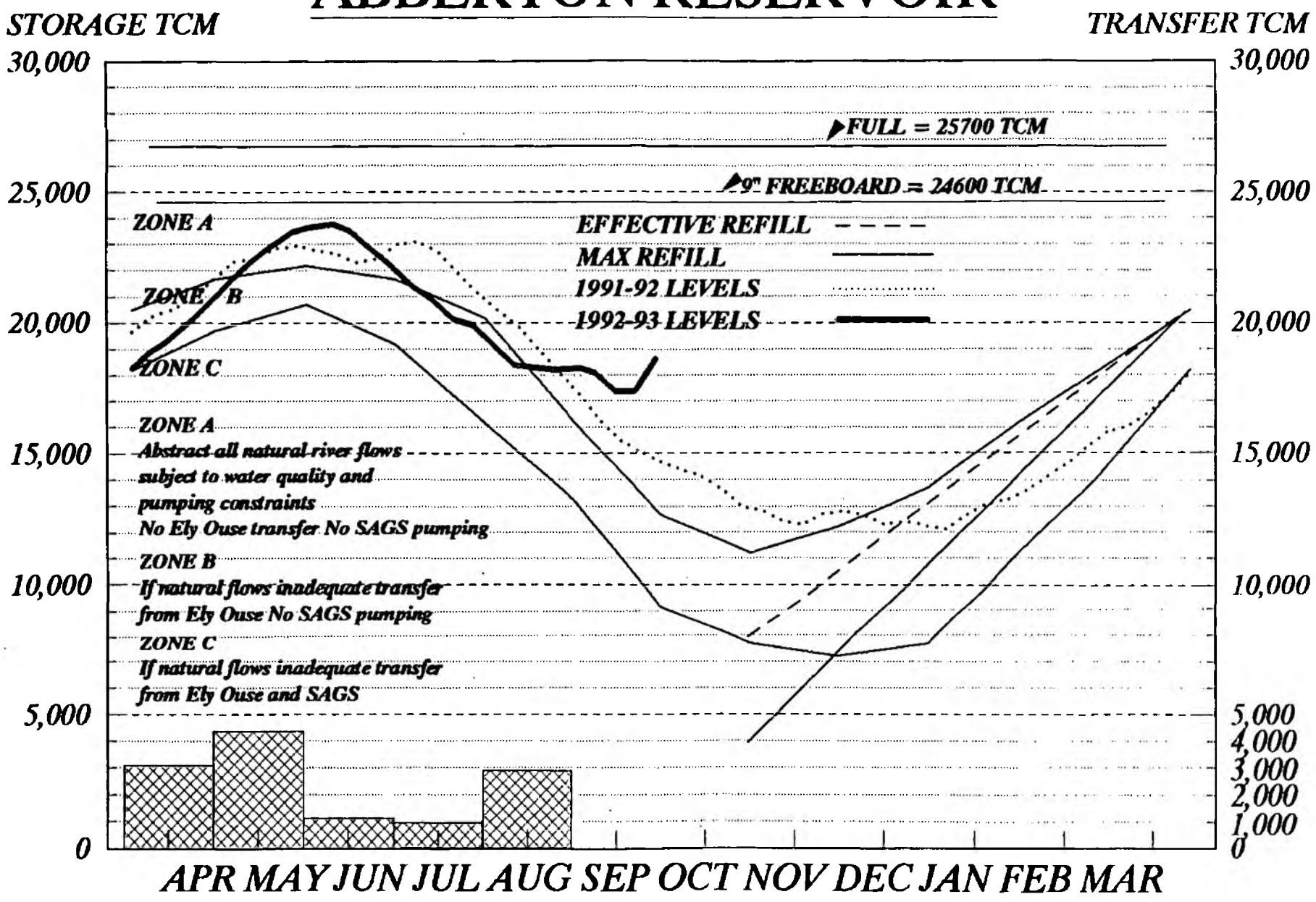
Large Coniferous Forests

Large coniferous forests situated on aquifer outcrops significantly reduce the amount of aquifer recharge. The result is a reduction in the available groundwater resource. The NRA discourages the planting of new large forests in such locations in order to protect and ensure maximum groundwater recharge.

Policy 3/6 The planting of new large coniferous forests on aquifer outcrops will be discouraged.

Produced by the Information Unit
National Rivers Authority, Anglian Region PR/PS3/4/92

ABBERTON RESERVOIR



APPENDIX 2

APPENDIX 3: SSSIs

NAME	GRID REF	AQUATIC INTEREST
The Naze	TM 266 237	Geological cliffs, good for bird fossils
Hamford Water (RAMSARSPA)	TM 235 255	Large shallow estuarine basin tidal creeks, inter-tidal mud and sand flats, saltmarshes, islands, beaches and marsh grasslands. Shingle spites. Important birds and plants.
Little Oakley Channel Deposit	TM 223 296	
Harwich Foreshore	TM 263 320	Geological, fossil flora
Stour Estuary (R SPA)	TM 180 330	Simply structured estuary with sandy outer section and muddy inner, good for birds. Saltmarshes. Cliffs geologically good.
Stour and Copperas Woods	TM 190 313	Coastal and woodland habitats meet small seasonal pools.
Cattawade Marshes	TM 090 329	Grazing for marshes with associated open water and fen habitats, important for birds. Marshy pools, dykes and dense riverside veg: - nesting habitats.
Arger Fen	TL 933 357	Wet Woodland with many small streams and seepage areas. Wet meadow and fen areas.

NAME	GRID REF	AQUATIC INTEREST
Cornard Mere	TL 888 389	Seasonally flooded fen, sprich natural herb veg; woodland, scrub and neutral grassland. Springs much reduced by nearby abstraction.
Lineage Wood	TL 885 480	Rich ancient woodland.
Kentwell Woods	TL 858 484	15 woods mainly wet ash/maple Lively wood shows transition to Fenn Carr. Scotchford Aveley.
Milden Thicks	TL 912 452 TL 955 442 TL 946 448 TL 946 444	Species rich ancient woodlands
Edwardstone Woods	TL 928 425	Stallington wood on steep valley side of R. Box.
Brent Eleigh Woods	TL 935 465	Spraggs, Landley and Camps Woods, wet ash-maple/ pedunculate oak - hornbears, with ponds in Langley and Corps Woods.
Groton Wood	TL 978 431	Species rich ancient woodland or boulder clay plateau overlain by loess.
Glemsford Pits	TL 840 464	Waterfilled disused gravel workings on the Stour, outstanding for dragon and damsel flies.
Cavendish Woods	TL 780 500	
Trundley and Wadgell Wood	TL 694 500 TL 698 515	Ancient woodlands on loess and sand over boulder clay.

NAME	GRID REF	AQUATIC INTEREST
Frithy and Chadacre Woods	TL 860 535	Ancient woodland.
Thorpe Morieux Woods	TL 925 547 TL 950 551	Three ancient woodlands on poorly drained boulder clay. Wet hollows and rides support rich flora.
Gipping Great Wood	TM 075 625	Wet rides, small pond associated streams (Gipping) becomes MR d/s
Bradfield Woods	TL 925 577	Ancient woodland with pond, small streams and temporary wet hollows.
Barking Woods	TM 080 530	Ancient woodlands, wet areas provide particularly rich flora.
Gt Blakenham Pit	TM 113 500	Geological.
Combs Wood	TM 055 568	Ancient woodland.
Creeting St Mary Pits	TM 097 555	Geological.
Gosbeck Wood	TM 147 5578	Ancient woodland on plateau of boulder clay.
Hascot Hill Pit	TM 061 538	Geological.
Middle Wood Offton	TM 060 498	Species rich ancient woodland on wet boulder clay.
Bobbits Hole, Belstead	TM 149 413	Geological.
Little Blakenham Pit	TM 109 491 TM 112 485	Chalk grassland and bat roost.

NAME	GRID REF	AQUATIC INTEREST
Elmsett Park Wood	TM 065 465	Small ancient wood over boulder clay.
Hintlesham Woods	TM 055 440	Ancient woodlands on boulder clay plateau.
Wolves Wood	TM 068 430	
Orwell Estuary	TM 170 415 TM 260 343	Long narrow estuary with mudflat, grazing marsh and salt marsh.
Stoke Tunnel Cutting	TM 160 434	Geological containing rich vertebrate fossil fauna.
Freston and Cutlers Wood with Holbrook Park	TM 150 386	Woodland typical of light sandy soil and spring fed valleys with rich ground flora.
Landguard Common	TM 285 315	Loose shingle foreshore backed by vegetated shingle beach with rare plant communities.

APPENDIX 4: ANGLIAN REGION INTERIM LEVELS OF SERVICE

Land Classification Band	Minimum target standard of flood protection expressed as flood return period (years)	
	Fluvial	Tidal and Sea Defences
A	100	200
B	50	100
C	20	50
D	10	20
E	--	--

Band A

Areas of dense conurbations where widespread flooding would cause serious infrastructure failure and endanger life. Major trunk roads and/or motorways and railways may be included in this band.

Band B

Predominantly urban areas, including housing, industry and commerce. The flood plain will include 'A' and 'B' class roads. Little agricultural land is likely to be present.

Band C

High grade agricultural land suitable for cereal and cash crops. Residential and industrial property, as well as roads, amenity and/or navigation interests may also be prominent.

Band D

Typical land use incorporating average gross - margin crops, and permanent pasture. Little residential or industrial property will be present. Conservation and water ecology interests may significantly influence the standard of service to be applied.

Band E

This covers areas which are generally of low grade land use. Residential or industrial property is unlikely to be present. Agricultural use is likely to be limited to horse paddocks, forestry and scrubby grazing land. Land within this category may have a high conservation value requiring a lower standard of service than would be expected otherwise. Flood storage washlands or land which is deliberately allowed to flood may fall into this band.