



NATIONAL RIVERS AUTHORITY

ANGLIAN REGION

LOUTH COASTAL CATCHMENT MANAGEMENT PLAN

The Information Centre
National Rivers Authority
Waterside Drive
Aztec West
Almondsbury
Bristol BS12 4UD

Due for return

17 MAR 1994	
11 FEB 98	

July 1992

National Rivers Authority
Information Centre
Head Office

Class No

Accession No AEWD.12



Louth Coastal Catchment Management Plan

*National Rivers Authority
Anglian Region*

FOREWORD

July 1992

Established in 1989 the National Rivers Authority has as its 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 second 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.

Clive Mason
Regional General Manager

~~SECRET~~

Regional General Manager

Kingfisher House
Goldhay Way
Orton Goldhay
Peterborough
PE2 5ZR
Tel: 0733 371811
Fax: 0733 231840

LOUTH COASTAL CATCHMENT MANAGEMENT PLAN

CONTENTS

	<u>P A G E</u> <u>NO</u>
Foreword	
1.0 Concept	1
2.0 Overview	
2.1 Introduction	3
2.2 Hydrology	3
2.3 Hydrogeology	4
2.4 Hydrometric Network	4
2.5 Water Quality	5
2.6 Land Use	5
2.7 Infrastructure	6
Key Details	7
3.0 Catchment Uses	
3.1 Development	9
3.2 Potable Water Supply – Groundwater	12
3.3 Potable Water Supply – Surface Water	15
3.4 Agricultural Abstraction	17
3.5 Industrial Abstraction	19
3.6 Resource Usage	20
3.7 Sewage Treatment Works	23
3.8 Industrial Discharges and Trout Farms	25
3.9 Landfill Sites	27
3.10 Mineral Extraction	29
3.11 Livestock Watering	30
3.12 Groundwater Protection	31
3.13 Flood Defence	34
3.14 Flood Water Storage	37
3.15 Water Power	39
3.16 Conservation/Ecology	40
3.17 Conservation – Landscape and Archaeology	44
3.18 Amenity	45
3.19 Fisheries	46
3.20 Angling and Commercial Exploitation of Eels	48
3.21 Navigation	50
3.22 Boating	51
3.23 Immersion Sports	53

4.0	Catchment Targets	
4.1	Water Quality	54
4.2	Water Quantity	57
4.3	Physical Features	59
5.0	Current State of Catchment	
5.1	Water Quality	62
5.2	Water Quantity	64
5.3	Physical Features	66
6.0	Issues and Options	
6.1	General	67
6.2	Issues and Options	68
7.0	Conflicts	
7.1	General	81
7.2	Summary of General Conflicts	82
Appendices		
Appendix 1	Development	83
Appendix 2	Levels of Service: Minimum Standards of Flood Protection	85
Appendix 3	Protecting and Improving the Water Environment – Model Policies	87

INDEX OF MAPS

<u>Map No</u>	<u>Title</u>	<u>Facing Page Number</u>
1.	The Louth Catchment	3
2.	Hydrology and Hydrogeology	4
3.	Infrastructure and Population	9
4.	Potable Water Supply	12
5.	Agricultural Abstraction	17
6.	Industrial Water Supply	19
7.	Resource Usage	20
8.	Sewage Treatment Works	23
9.	Industrial Discharges and Fish Farms	25
10.	Landfill Sites	27
11.	Mineral Extraction	29
12.	Livestock Watering	30
13.	Groundwater Protection Zones	31
14.	Flood Defence	34
15.	Flood Water Storage	37
16.	Water Power	39
17.	Habitat, Gradient and Sites of Conservation Importance	40
18.	Ancient Monuments and Landscape	44
19.	Basic Amenity	45
20.	Fish Biomass	46
21.	Fisheries - Richness	47
22.	Angling	48
23.	Navigation	50
24.	Boating	51
25.	Immersion Sports	53
26.	Future Targets - Water Quality	54
27.	Future Targets - Water Quantity	57
28.	Future Targets - Physical Features	59
29.	State of the Catchment - Water Quality	62
30.	State of the Catchment - Water Quantity	64
31.	State of the Catchment - Physical Features	66

NOTE: Boygrift Drain is not designated main river but is included on the maps because of monitoring activities.

1.0 CONCEPT

The National Rivers Authority 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 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 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 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) Maintain existing and invest in new assets to provide flood protection, develop water resources and provide other NRA services.
- iv) Determine, police, enforce and review the conditions in water abstraction licences, discharge consents and land drainage consents to achieve operational objectives.

- v) Develop fisheries, promote recreation, navigation and conservation.
- vi) Influence planning authorities to control development so as to avoid conflict with NRA objectives and initiatives through Town and Country planning liaison.
- vii) To assess, manage, plan and conserve water resources.

This draft catchment management plan consolidates the policies, objectives and options for the Louth Coastal catchment for the overall improvement of the water environment. The plan is drawn up as follows: -

1. Uses of the Catchment

For the identified uses of the water environment up to two 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 State 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 future 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 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 Anglian Region of the NRA and do not constitute policy statements. Following the consultation period all comments will be drawn together and considered in drawing up the Action Plan.



The Louth Catchment

Map No. 01
March 1992

NRA
National Rivers Authority
Anglian Region

Reproduced from Ordnance
Survey maps under licence
granted by the controller of
Her Majesty's Stationary Office.
Crown copyright reserved.

2.0 OVERVIEW

2.1 Introduction

The Louth Coastal Catchment is a combination of small parallel sub - catchments each with markedly different upland and lowland areas.

The upland areas are drained by natural rivers and streams whilst the lowland drainage systems have been modified by man to enable him to use what would otherwise be a tidal marsh. The lowland is protected from tidal inundation by a combination of natural dunes and man made defences.

In the north the sea defences are protected by a rapidly accreting foreshore, whilst in the south the beaches are eroding. Consequently, in the north the accretion is impeding gravity discharges which has negative impacts on both flood defence and water quality, and in the south it is necessary to embark on beach nourishment to prevent the eventual destruction of the sea defences.

2.2 Hydrology

The surface water hydrology of the catchment is controlled by the topography and surface geology.

The western boundary of the catchment is marked by a chalk escarpment rising to 137m AOD which trends NW - SE. From the escarpment the land surface falls east to the North Sea coast. Adjacent to the coast is an extensive low - lying plain most of which lies below sea level. The inland area requires pumping for effective land drainage.

There are 7 subcatchments in the Louth Coastal Catchment area. In the south the River Lymn, which drains a predominantly Sandstone catchment, lies to the west of the Chalk escarpment and discharges to the sea to the south of Skegness. The remaining 6 subcatchments, (the Louth, North East, Sullfleet, Great Eau, Wold Grift and Willoughby) consist of Chalk upper catchments, including springfed tributaries and Clay lower catchments where both gravity and pumped drainage occurs.

Annual average rainfall on the catchment is around 625 mm of which around 450 mm is lost as evaporation and transpiration.

2.3 Hydrogeology

The principal aquifer is the Chalk which outcrops over much of the western part of the catchment. From its outcrop the Chalk dips gently eastwards. In the central and eastern part of the catchment it is confined/covered by glacial drift deposits (principally boulder clay) and alluvium.

To the north of Louth rainfall recharging the Chalk moves eastwards, down the hydraulic gradient, with some spring discharge to the Waithe Beck. To the south of Louth, the outcrop Chalk is dislocated from the area to the east by the buried cliffline which once marked the coastline.

As a consequence virtually all the Chalk recharge water discharges via springs to the surface water system. Groundwater abstracted from the Chalk to the east and south – east of Louth is derived from the Chalk outcrop north of Louth.

Below the Chalk there are a number of thin layers of limestones and sandstone of which the Spilsby Sandstone is the most significant. The Sandstone is present beneath the whole of the catchment but outcrops only along a narrow area to the west of the Louth catchment boundary and on the valley sides of the Lymn catchment. The hydraulic gradient in the Sandstone is principally from west to east (except in the Lymn Catchment) and it is recharged entirely from vertical leakage from the Chalk. All the water directly recharging the Sandstone is discharged via springs to the surface water system.

In the central and eastern parts of the catchment groundwater levels are artesian in the north and sub – artesian in the south.

2.4 Hydrometric Network

There is an extensive network of hydrometric monitoring stations within the catchment covering rainfall, riverflows (primary gauging stations and current metered sites), groundwater levels, tide levels, soil moisture, climate wave height and wind speed and ground and surface water quality.

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

Rainfall is measured at telemetered stations within the catchment and daily records are maintained by numerous private observers for which the data is available one month in arrears. At Ulceby Cross the full suite of climatological data is monitored.

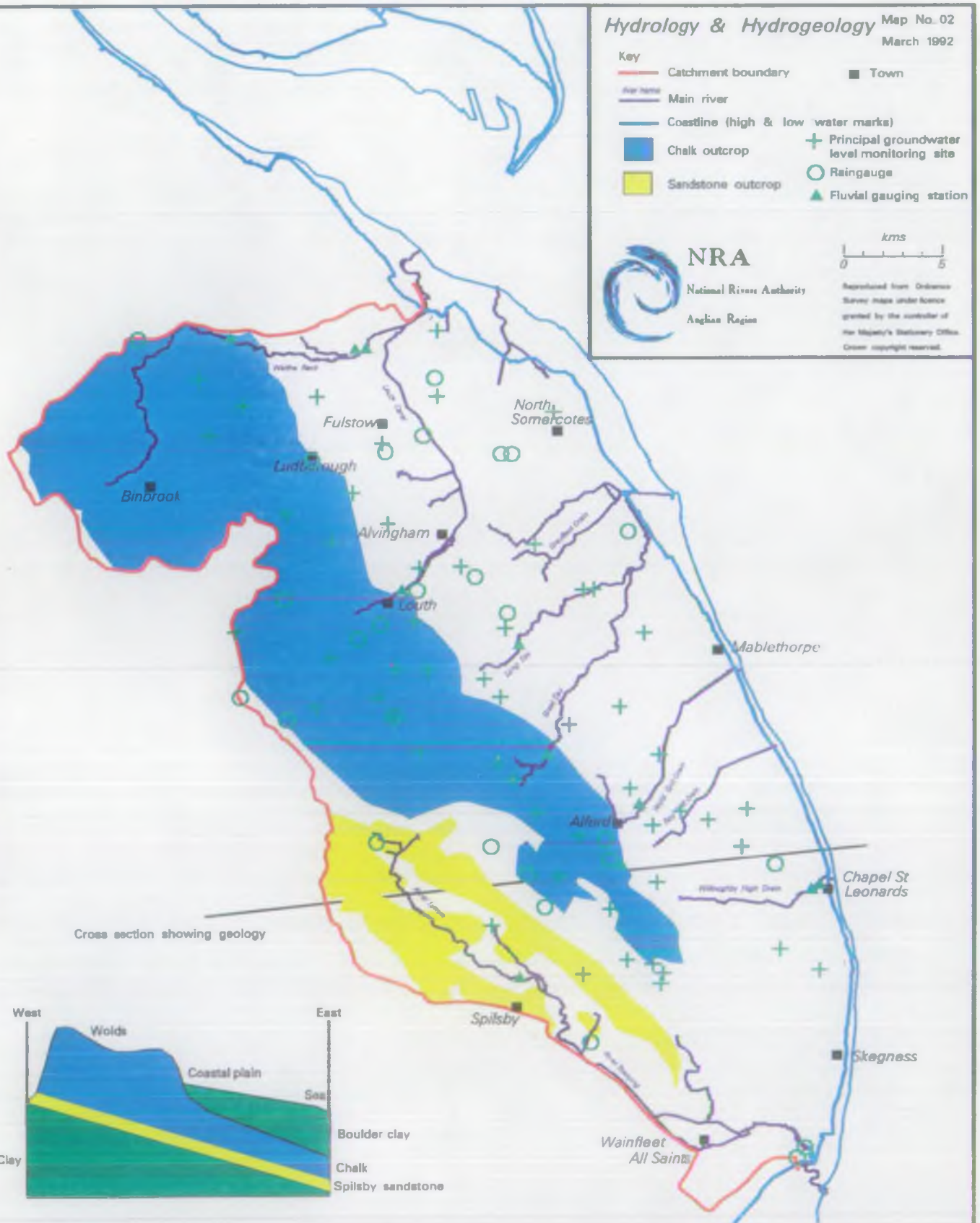
Hydrology & Hydrogeology Map No. 02 March 1992

- Key**
- Catchment boundary
 - Main river
 - Coastline (high & low water marks)
 - Chalk outcrop
 - Sandstone outcrop
 - Town
 - + Principal groundwater level monitoring site
 - Raingauge
 - ▲ Fluvial gauging station

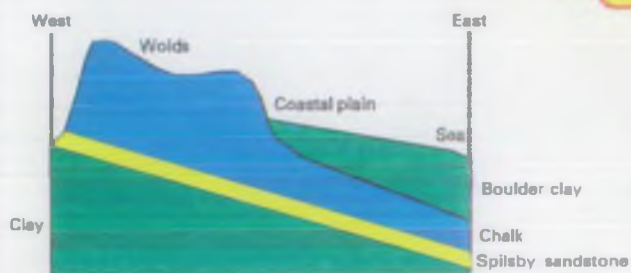


NRA
National Rivers Authority
Anglian Region

kms
0 1 2 3 4 5
Reproduced from Ordnance Survey maps under licence granted by the controller of Her Majesty's Stationary Office. Crown copyright reserved.



Cross section showing geology



There are a number of telemetered flow gauging stations in the catchment used for flood warning purposes and two further stations provide continuous records for later retrieval. There is a telemetered wind/wave recorder at Boygrift and two other telemetered tide level recorders on the coast.

2.5 Water Quality

The major surface water abstraction point for drinking water, from the Louth Canal, must be adequately protected against the effect of pollution. Groundwater is also extensively used for public supply, these valuable resources must also be protected. This is a major objective for the NRA in the area covered by this plan.

With agriculture being the dominant industry within the catchment, it is essential that adequate pollution prevention measures are in place. Farmers may consult local representatives of the NRA as to how this can be achieved. Tourism is also of great significance – compliance with the EC Bathing directive is an important objective. Saline intrusion has caused significant water quality problems. Whilst partially related to the drought, should this trend continue more effective methods of dealing with the problem will have to be developed.

2.6 Land Use

The catchment is predominantly rural with population centred in a number of towns and main villages.

2.6.1 Agriculture

Agriculture is the most important land use in the catchment with good quality land – the majority being Grade 3 under the MAFF classification but with considerable areas of Grade 1 and Grade 2 land.

Arable farming is the primary use, with grazing limited to those areas with poorer soil types and less favourable topography.

2.6.2 Urbanisation

The total population in the catchment is approximately 88,000, with 65,000 being located in towns and main villages and the remainder in isolated farms, hamlets and minor villages. This can increase by a further 151,000 during the peak holiday season with an additional 33,000 day visitors.

Industry is limited within the catchment and is primarily associated with the main agricultural use.

Growth is identified in the structure plans covering the catchment but is generally limited to the towns and main villages.

2.7 Infrastructure

Rail transport is limited to the most southerly part of the catchment and is primarily passenger based.

The catchment is served by a reasonable road network of trunk and main A roads serving the main population centres with by – roads linking the rural settlements. There are no major road construction projects planned for the catchment, expenditure being limited to system maintenance and by – pass construction.

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

The infrastructure provides adequately for the identified catchment uses, although summer congestion is experienced with immigration to the coastal holiday resorts.

KEY DETAILS

Catchment Details

Area	1040 km ²	<u>Existing 1991</u>	<u>Predicted 2001</u>
Population		88,000	100,000
Holiday Influx (Peak Season)		151,000 (Additional) (Plus 33,000 day trippers)	

Topography

Ground Levels	Min level 0.0m ODN Max level 158m ODN	
Sea Levels	Mean High Water Springs 3.2m ODN Mean Low Water Springs - 2.0m ODN	

<u>Geology</u>	North/West - Chalk outcrop
	South - Sandstone
	East - Clays

Administrative Details

County Councils: -	Humberside	5%
	Lincolnshire	95%

District Councils: -	East Lindsey
	West Lindsey
	Cleethorpes

NRA: -	Anglian Region - Northern Area
	Manby District

Water Companies: -	AWS Ltd
--------------------	---------

Sewage Treatment Works: -	22 plus one long sea outfall.
---------------------------	-------------------------------

Internal Drainage Boards: -	Louth, Alford and Skegness District
-----------------------------	-------------------------------------

Main Towns and Populations

Louth - 14,500	Skegness - 16,800
Mablethorpe and Sutton - 9,500	

Water Quality

Length of River in National Water Council Class. December 1990 Survey

Class 1A (Very Good)	13.5 km	Class 3 (Poor)	6.2 km
Class 1B (Good)	106.1 km	Class 4 (Bad)	0
Class 2 (Fair)	34.7 km		

Note: - Minor main river tributaries not included above.

Water Resources

Availability: Chalk aquifer – none
Spilsby Sandstone – none
Southern Lincolnshire Limestone – none
Other Limestone areas and gravels – minor quantities only
Surface Water – Winter only except from supported watercourses

Flood Protection

Length of Designated Main River: (maintained by NRA)	225.4 km (including 13.4 km of tidal main river)		
Length of embanked Main River:	113.8 km		
Length of Sea Defences :	62.0 km		
(maintained by NRA)	comprising:	Hard Defences	20 km
		Clay Bank	27 km
		Dune Defences	15 km
Area at risk of tidal flooding	376 km ²		
Area at risk of fluvial flooding	468 km ²		

Fisheries

Length of salmonid fishery:	83.1 km
cyprinid :	108.1 km

Infrastructure and population

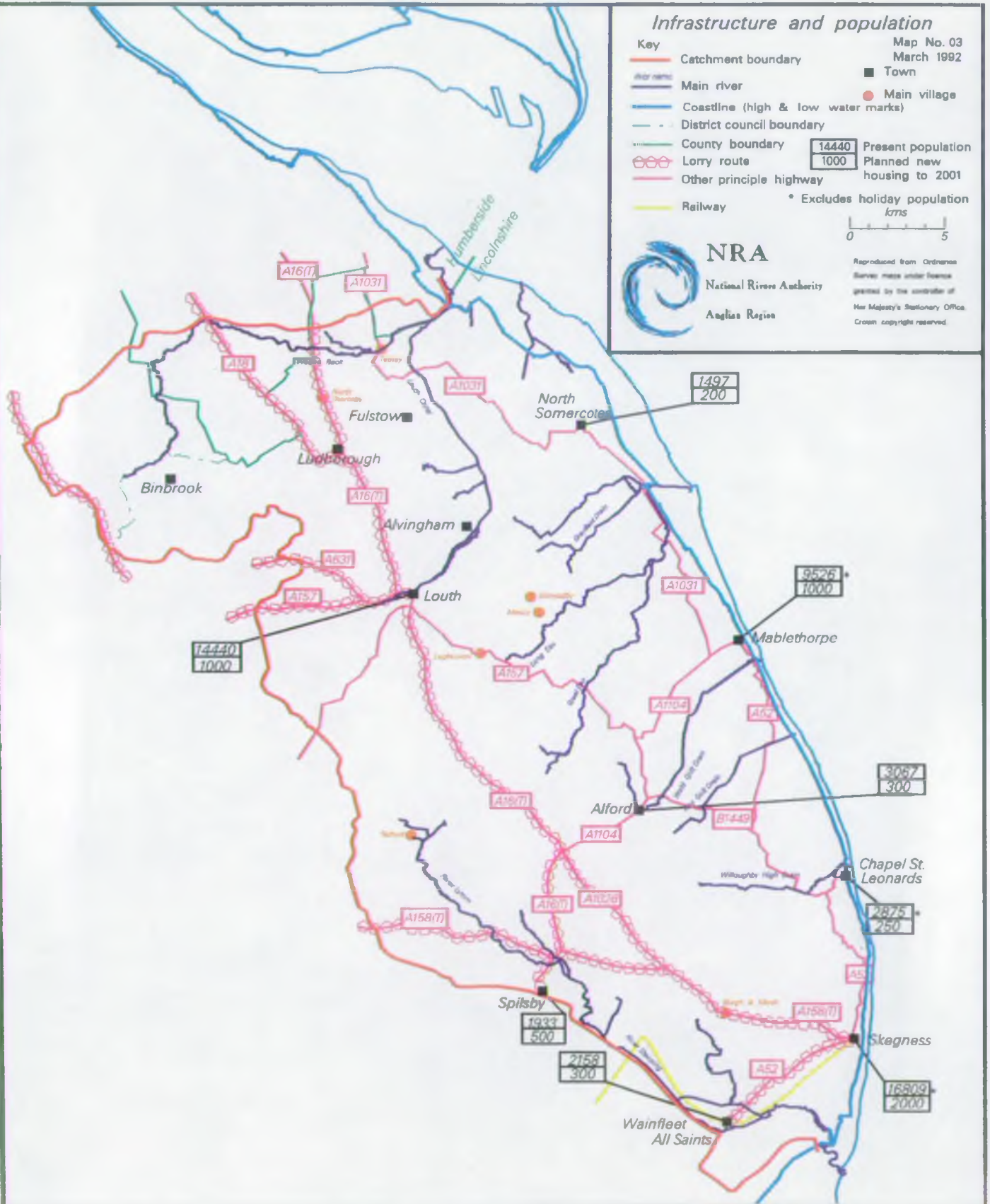
- Map No. 03
March 1992
- Key
- Catchment boundary
 - Main river
 - Coastline (high & low water marks)
 - District council boundary
 - County boundary
 - Lorry route
 - Other principle highway
 - Railway
 - Town
 - Main village
 - 14440 Present population
 - 1000 Planned new housing to 2001
 - * Excludes holiday population

0 5
kms



NRA
National Rivers Authority
Anglian Region

Reproduced from Ordnance Survey maps under license granted by the controller of Her Majesty's Stationary Office. Crown copyright reserved.



3.0 CATCHMENT USES

3.1 Development – Housing, Industry & 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

The catchment is situated mainly within the county of Lincolnshire, with its extreme northern boundary in the county of Humberside. The catchment covers parts of the districts of East Lindsey, West Lindsey and the Borough of Cleethorpes.

Amendment No. 1 on Population, Housing and Settlement of the Approved Lincolnshire County Structure Plan recognises a need for growth and provides for an additional 4,550 new homes to be built in the catchment within the Plan period up to the year 2001.

Much of this growth is likely to be accommodated in the existing towns* and main villages* with limited infilling in existing rural villages.

Amendment No. 2 on Employment and Shopping of the Approved Lincolnshire County Structure Plan recognises a need for growth and provides for large scale industrial warehousing and office development to be built in the catchment at Skegness and Louth.

* Appendix 1

The Adopted Lincolnshire County Structure Plan Amendment No.1 refers to this Authority's aims and policies in respect of development and it is considered that such reference directs developers to take the policies into account in their plans.

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 and this plan will identify objectives.

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 protect inland and groundwaters from derogation arising from development.

3.1.4 Development – Policy Summary

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 archeological 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 Supply

Map No. 04

March 1992

Key

- Catchment boundary
- - - Subcatchment boundary
- Main river
- Coastline
- Area of private potable supply sources
- Chalk PWS source
- Surface water source
- ▲ Sandstone PWS source
- ▲ Combined chalk / sandstone source
- Town



NRA

National Rivers Authority

Anglian Region

0 5
kms

Reproduced from Ordnance Survey maps under licence granted by the controller of Her Majesty's Stationery Office. Crown copyright reserved.



3.2 Potable (Drinking) Water Supply – Groundwater Sources

3.2.1 General

This use relates to the abstraction of water from groundwater sources (wells and boreholes into underground rocks termed aquifers) for potable supply use. The principal abstraction in the catchment is made by Anglian Water Services although there are many private groundwater supplies in the catchment used for potable supply.

Abstraction for other than private domestic use is controlled by licence. Groundwater sources developed before 1963 were granted licences of right under the Water Resources Act 1963. Licences granted since 1963 have been granted on the basis that abstraction does not derogate existing uses and users of both ground and surface waters. Licences may include control levels to protect resources from overcommitment.

The groundwater resources of the catchment are regarded by the water company as a valuable local resource, the use of which they intend to maximise.

The NRA have developed a National Groundwater Protection Policy to safeguard both individual potable sources and groundwater resources in general.

Public water supply from all sources constitutes 98% of all water abstraction in the catchment.

3.2.2 Local Perspective

The principal aquifers in the catchment are the chalk and the Spilsby sandstone.

The water company currently operate 8 Spilsby sandstone sources, 4 chalk sources, 2 combined Spilsby/chalk sources and a Carstone source in the catchment. Licensed abstraction from these sources total 23,153 tcma. Actual abstraction in 1990 was around 76% of the total licensed abstraction. The sandstone sources are located across the catchment whereas the chalk sources are located principally in the northern and southern parts of the catchment. The catchment forms part of the water company's coastal water supply zone. The water abstracted is used principally to meet demand within the catchment including the peak summer demands of the East Coast holiday resorts.

The water company's plan is to maximise the development of the local groundwater sources and to meet future resource shortfalls from Covenham reservoir and other sources outside the catchment.

The catchment is characterised by a large number (231) of private groundwater sources used for private domestic supply.

The abstractions are principally from the chalk, Carstone Roach and Spilsby sandstone aquifers, and depend upon the relatively high water table and good water quality conditions.

3.2.3 Supply Objectives and Standards

The NRA has yet to establish formal policy with regard to supply objectives, but the following are put forward for discussion:

- To manage water quality and water resources to safeguard potable water supply.
- To manage groundwater resources where possible to meet future demand.
- To protect aquifers from overcommitment and ensure groundwater abstraction does not have an unacceptable effect on environmental waters.
- To set minimum residual flows (MRF's) and minimum control levels (MCL's) to protect environmental river needs.
- To ensure compliance with existing MRF's and MCL's.
- To ensure the best utilisation of water resources in the catchment.
- To augment and/or redistribute water resources, where appropriate to meet potable water demands to appropriate standards of reliability.
- To encourage efficient water use including leakage reduction.
- To implement groundwater protection policies.

3.2.4 Customer Supply Requirements

Water Quantity - availability of resources within the terms specified in the licence.

Water Quality - Within values set in EC Directive 75/440/EC and Water Quality Objectives.

3.3 Potable Water Supply – Surface Water Sources

3.3.1 General

This use relates to the abstraction of water from surface water sources for potable supply use. The principal abstractor is the statutory water company (Anglian Water Services Ltd), though there are also small domestic abstractions. Abstractions other than for private domestic use are controlled by a licence which stipulates the total daily and annual quantities authorised for abstraction, and may include conditions to require a minimum residual flow to pass a point on the river to protect existing uses and users of water.

Public water supply from all sources constitutes 98% of all water abstraction in the catchment.

3.3.2 Local Perspective

The surface water resources of the River Lud/Louth Canal and the Rivers Great and Long Eau have been substantially developed for Public Water Supply (PWS) which is the principal abstractive use in the catchment.

The PWS system, called the Great Eau Scheme involves a major reservoir at Covenham which is filled by a surface water intake on the adjacent Louth Canal. The intake at Covenham is fed by water from the River Lud (including effluent discharges at Louth), the Waithe Beck (involving backflow up the Louth Canal by utilising Tetney Weir) and the River Great Eau (via an intake on the Great Eau at Cloves Bridge and a pipeline to the Louth Canal upstream of Covenham intake).

The PWS abstraction system is based on the total reliable resource of the surface water system. The licences authorise abstraction of 46,460 tcma from the Louth Canal and 18,000 tcma from the River Great Eau. Actual abstraction in 1990 was around 45% of the total licensed abstraction. The licences also include conditions requiring minimum levels and minimum flows to be maintained (MRF's are 2.4 tcmd in respect of both watercourses at points just downstream of Tetney Weir and Cloves Bridge).

The catchment forms part of the water company's coastal water supply zone. Water from Covenham supplies some water to the Louth Catchment but principally meets industrial demand on the Humberbank to the north.

The water company's plan is to fully develop the yield of Covenham Reservoir. There is no proposal to develop any other surface water sources in the catchment.

There are a small number of spring sources within the catchment which are used for private domestic supplies. These are not significant in quantity terms.

3.3.3 Supply Objectives and Standards

The NRA has yet to establish formal policy with regard to supply objectives, but the following are put forward for discussion:

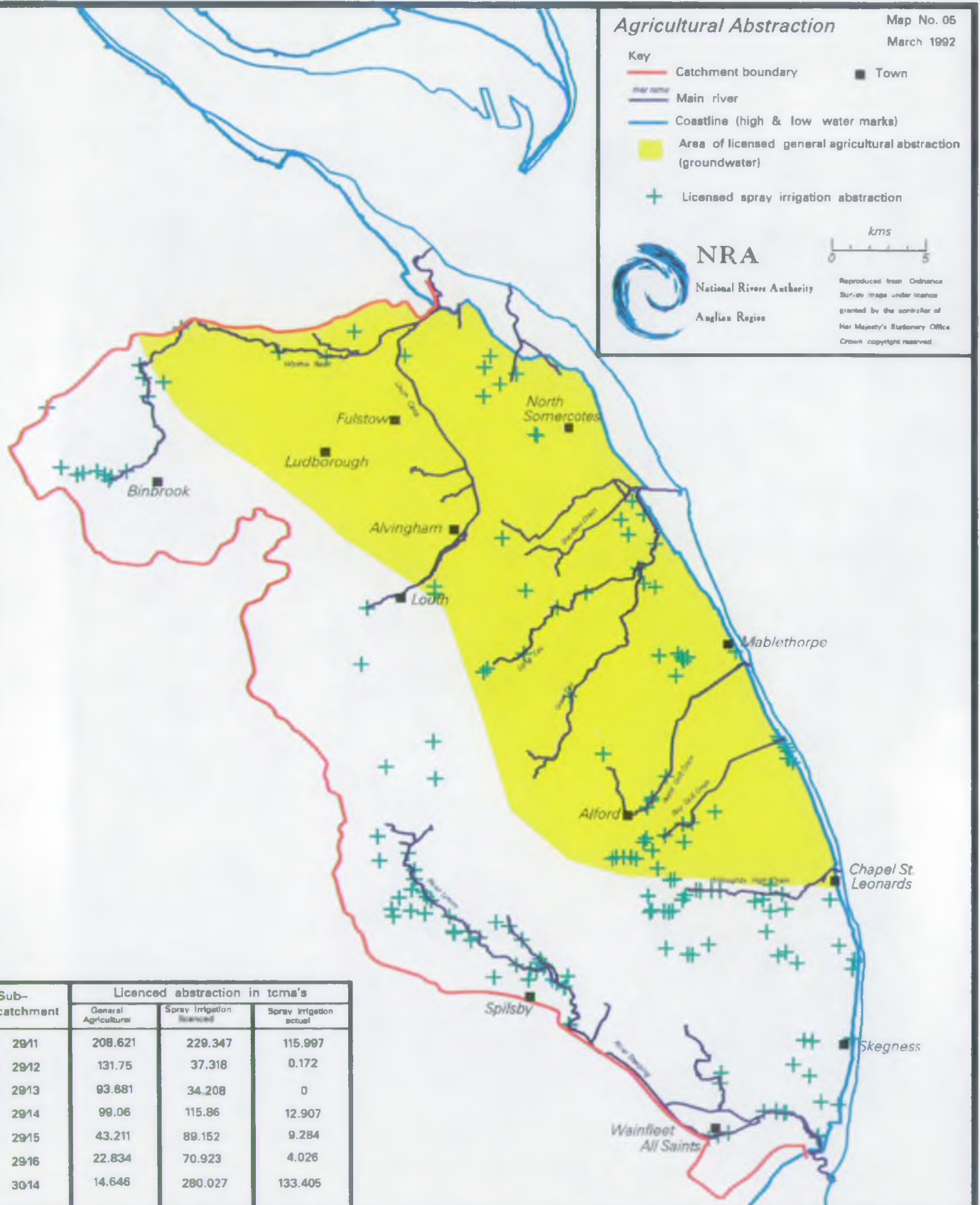
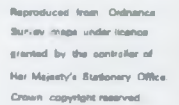
- To manage water quality and water resources to safeguard potable water supply.
- To manage surface water resources to meet future demand.
- To set minimum residual flows (MRF's) and minimum control flows (MCL's) to protect environmental river needs.
- To ensure compliance with existing MRF's and MCL's.
- To ensure the best utilisation of water resources in the catchment.
- To augment and/or redistribute water resources where appropriate to meet potable water demands to appropriate standards of reliability.
- To encourage efficient water use, including leakage reduction.

3.3.4 Customer Supply Requirements

- | | | |
|----------------|---|---|
| Water Quantity | - | availability of resources within the terms specified in the licence. |
| Water Quality | - | within values set in EC Council Directive 75/440/EC and Water Quality Objectives. |

Map No. 05
March 1992

- + Licensed spray irrigation abstraction



Sub-catchment	Licenced abstraction in tcm's		
	General Agriculture	Spray irrigation (actual)	Spray irrigation actual
2911	208.621	229.347	115.997
2912	131.75	37.318	0.172
2913	93.681	34.208	0
2914	99.06	115.86	12.907
2915	43.211	89.152	9.284
2916	22.834	70.923	4.026
3014	14.646	280.027	133.405

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 general agricultural use (e.g. stock watering, crop spraying), fish farms and spray irrigation. All uses excepting very small general agricultural uses from surface waters require a licence.

With a rural character there are a large number of agricultural uses which represent the second largest abstraction demand in the catchment.

3.4.2 Local Perspective

General Agriculture:

There are 460 licensed abstractors for this purpose in the catchment all from groundwater sources, although many small surface water abstractions (not licensable) do occur. Licensed abstraction totals 620 tcma which is around 0.7% of the total licensed abstraction in the catchment. The 'most likely' forecast for demand for this use is for an increase of around 13% in the next 10 years.

Spray Irrigation:

There is some licensed spray irrigation abstraction across the catchment as a whole, though the main active abstraction zone is in the Rivers Lud and Steeping catchments, abstraction being from surface water sources. Some of these licences have cessation conditions preventing abstraction under low flow conditions.

There are currently 63 licensed abstractions for this use authorising abstraction up to 826 tcma, which is around 0.9% of the total licensed abstraction in the catchment. Actual abstraction in 1990 was around 33% of licensed quantity.

There is likely to be an increase in future demand for water for this use which is estimated to be around 40% in the next 10 years.

Fish Farms:

The catchment is characterised by a number of reliable good quality springs and watercourses. This has encouraged the development of a significant number of fish farms. Whilst such use is essentially non – consumptive it is now a licensable one. There are currently 4 licensed abstractions for this use though a further 10 will be licensed shortly.

3.4.3 Supply Objectives and Standards

- To manage water quality and water resources to safeguard agricultural abstraction.
- To manage water resources where possible in such a way as to meet all reasonable agricultural demand.
- In respect of spray irrigation to protect river flows from excessive abstraction.

3.4.4 Customer Supply Requirements

- Water Quantity – Availability of water within the terms specified in the licence.
- Water Quality – To maintain and improve water quality in accordance with Water Quality Objectives.

Industrial Water Supply

Map No. 06
March 1992

Key

- Catchment boundary
- - - Subcatchment boundary
- Main river
- Coastline (high & low water marks)
- ▲ Industrial Water Supply
- Town



NRA
National Rivers Authority
Anglian Region

0 5
kms

Reproduced from Ordnance Survey maps under license granted by the controller of Her Majesty's Stationary Office. Crown copyright reserved.



Sub-catchment	Industrial water supply		
	No. of licences	Licensed abstr'n (tcm)	Actual abstr'n 1990 (tcm)
2911	4	486	427
2912	0	-	
2913	0	-	
2914	1	20	5
2915	2	43	27
2916	1	61	47
3014	0	-	

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 uses for industrial process, cooling and sand and gravel washing. Such abstractions require an abstraction licence.

The catchment is essentially rural in character and there is relatively little industry. Some industry uses mains water. There are a small number of direct licensed abstractors.

3.5.2 Local Perspective

There are 8 licensed abstractors in the catchment principally located in the Louth and Skegness areas. All abstract from the Chalk or Spilsby sandstone aquifers. There are no licensed surface water abstractions in this category. Licensed abstraction totals 590 tcm which is around 0.7% of the total licensed abstraction in the catchment. Actual abstraction in 1990 was around 86% of licensed quantity.

Some abstractors in Skegness are located close to areas of saline water present in the aquifer.

Future growth in industrial demand is difficult to predict. The regional growth factor is 1% per annum. Given the nature of the catchment, actual future demand may be less than this.

3.5.3 Supply Objectives and Standards

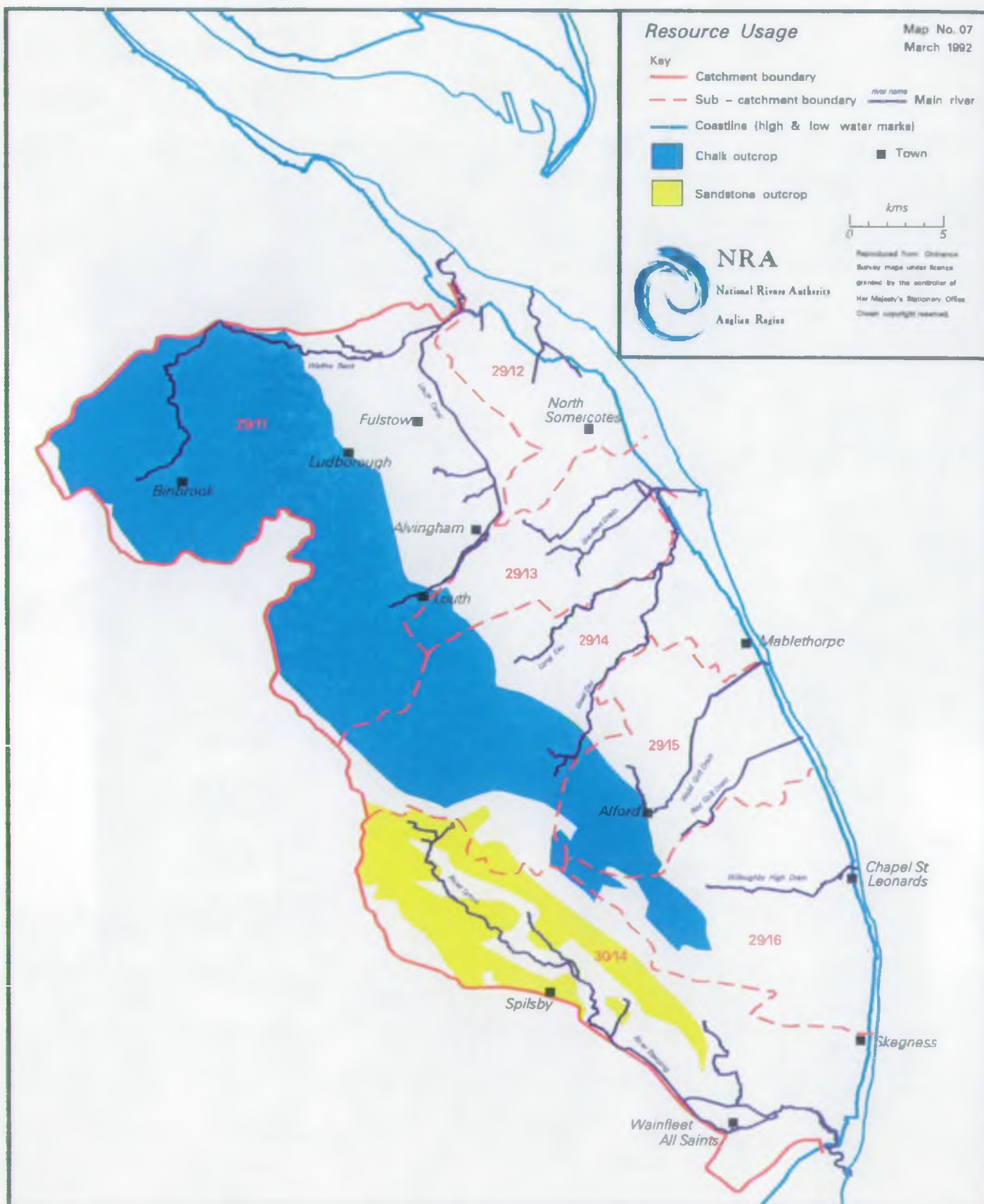
The NRA has yet to establish formal policy with regard to supply objectives, but the following are put forward for discussion:

- To manage water quality and water resources to safeguard direct industrial abstractions.
- To manage water resources where possible to meet reasonable industrial demand.
- To encourage efficient water use.

3.5.4 Customer Supply Requirements

Water Quantity - availability of resources within the terms specified in the licence.

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



3.6 Resource Usage

3.6.1 General

This section summarises the total licensed and actual abstraction within the catchment compared with the available resource. Licensed and current actual usage have been assessed for each surface and groundwater catchment.

The available resource is derived from effective rainfall (which contributes to surface water resources by surface run off or groundwater resources by recharge to the water table) and effluents returned to the surface water system. Both average and drought year available resources have been assessed/estimated. These totals are compared with the total annual licensed abstraction and the actual consumptive use in 1990.

The purpose of the comparison is to illustrate the scale of water resource development within the catchment.

Catchments	Available Resources in Average Year		Available Resources in 1:10 Year Drought		Licenced or Committed Abstraction	Actual Abstraction 1990
	Jan - Dec	July - Sept	Jan - Dec	July - Sept		
29/11 + 29/14	254	40	137	27	128	57
29/12	39	<4	18	<2	<1	<1
29/13	44	<4	20	<2	<1	<1
29/15	66	<6	42	<4	<1	<1
29/16	71	<7	41	<4	<1	<1
30/14	118	16	68	9	<1	<1
Chalk	178		143		210	142
Spilsby Sandstone	38		38		33	26

Note: Amounts relate to thousand cubic metres per day (tcmd).

3.6.2 Local Perspective

Surface Water:

The resources of the Waithe Beck, River Lud, Great and Long Eau are fully committed to existing licensed demands.

The natural summer resources of the Greyfleet Drain, Woldgrift Drain, Boygrift Drain, Main Drain and Welton Beck catchments are limited and are normally inadequate to meet other than small agricultural abstractions and in river needs (eg fisheries and conservation).

The average summer resources of the River Lymn and Steeping River are substantially but not wholly committed to existing demands. Some surplus summer resource is available.

Surplus water resource is available in the winter period (January to March) in all catchments.

Natural fluctuations in resource availability require that in dry/drought years (summers and winters) principal abstractions are subject to minimum residual flows (MRF's) and minimum control levels (MCL's) to protect existing lines and users of water, especially environmental uses. Several such controls are currently imposed. MRF's are reviewed in this plan.

Groundwater:

The Chalk aquifer in the catchment is part of a groundwater resource extending beyond the catchment boundary. However, in terms of resource commitment it is necessary to compare resource availability and resource usage for the whole resource.

The Chalk resource is currently overcommitted to existing licences, both for dry year and average year resource availability. Historically actual abstraction has exceeded resource availability at the expense of depletion of riverflows (principally Tetney Blowwells and Waithe Beck) and the promotion of saline intrusion (Mablethorpe and Skegness areas). This overcommitment is a principal resource issue in the catchment.

The Spilsby Sandstone aquifer in the catchment is similarly part of a resource extending beyond the catchment boundary, although the majority of the resource does lie within the catchment. The available resources of the sandstone are substantially committed to existing uses. Direct recharge to the Sandstone substantially goes to sustain summer springfed tributary flows feeding the Lymn catchment or adjacent catchments to the west. Any future development would deplete these flows which already recess to low levels in summer. Existing licensed abstraction principally draws upon indirect recharge from the overlying chalk aquifer. Historically actual abstraction has exceeded availability locally resulting in areas of severe water level reduction and some saline intrusion. (principally in the Skegness to Welton Le Marsh area)

The Spilsby Sandstone aquifer in the catchment is similarly part of a resource extending beyond the catchment boundary, although the majority of the resource does lie within the catchment. The available resources of the sandstone are substantially committed to existing uses. Direct recharge to the Sandstone substantially goes to sustain summer springfed tributary flows feeding the Lymn catchment or adjacent catchments to the west. Any future development would deplete these flows which already recess to low levels in summer. Existing licensed abstraction principally draws upon indirect recharge from the overlying chalk aquifer. Historically actual abstraction has exceeded availability locally resulting in areas of severe water level reduction and some saline intrusion. (principally in the Skegness to Welton Le Marsh area)

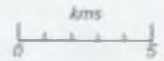
Natural variations in recharge to the groundwater resource require that in dry/drought periods principal abstractions are subject to minimum control levels for protection of other uses and users of water, especially environmental uses. Some such controls are currently imposed. MCL's are reviewed in this plan.

Sewage Treatment Works

Map No. 08
March 1992

Key

- Catchment boundary
- Main river
- Coastline (high & low water marks)
- Sewage Treatment Works
- Town



NRA
National Rivers Authority
Anglia Region

Reproduced from Ordnance Survey maps under licence granted by the controller of Her Majesty's Stationary Office. Crown copyright reserved.



3.7 Sewage Treatment Works

3.7.1 General

The criteria which must be complied with by discharges to controlled waters are stipulated in a consent granted by the National Rivers Authority. Consents are calculated 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

There are 22 sewage treatment works and 1 long sea outfall located within the catchment. All are monitored by the NRA. Details of the results of our monitoring programme are available from the Water Resources Act Register, enquiries should be directed to our Regional Headquarters in Peterborough - Tel: 0733 371811. The largest biochemical oxygen demand is discharged through the long sea outfall at Ingoldmells, where macerated sewage is discharged to coastal waters. Current monitoring indicates that the discharge does not affect compliance with the Bathing Waters Directive.

The largest inland sewage treatment works are located at Louth and Mablethorpe where full sewage treatment is provided. Both discharges are currently compliant with their discharge consent. Discharges of storm sewage have an adverse effect on water quality. This is a particular problem in the Louth Canal. Storm overflows have operated less frequently in recent years due to drought conditions, however this also has posed a number of water quality problems. When storm overflows operate the environmental impact of the discharge is more pronounced under drought conditions.

3.7.3 Current Objectives

- To ensure that river quality standards are complied with and requirements for discharge improvements are identified and pursued.

3.7.4 Environmental Requirements

Water Quality:

- To ensure consent conditions adequately safeguard water quality and prevent exceedance of EC Directives and Water Quality Objectives.
- Monitoring of surface waters and discharges to establish compliance.

Water Quantity:

- No diminution of the flow regime below that used in setting the consents. Consent conditions are derived, taking into account the upstream dilution flow which is available under average and dry weather conditions.

Industrial Discharges & Fish Farms

Key

Map No. 09

March 1992

— Catchment boundary

— Main river

— Coastline (high & low water marks)

● Industrial discharge

— Fish farm

■ Town

kms
0 5

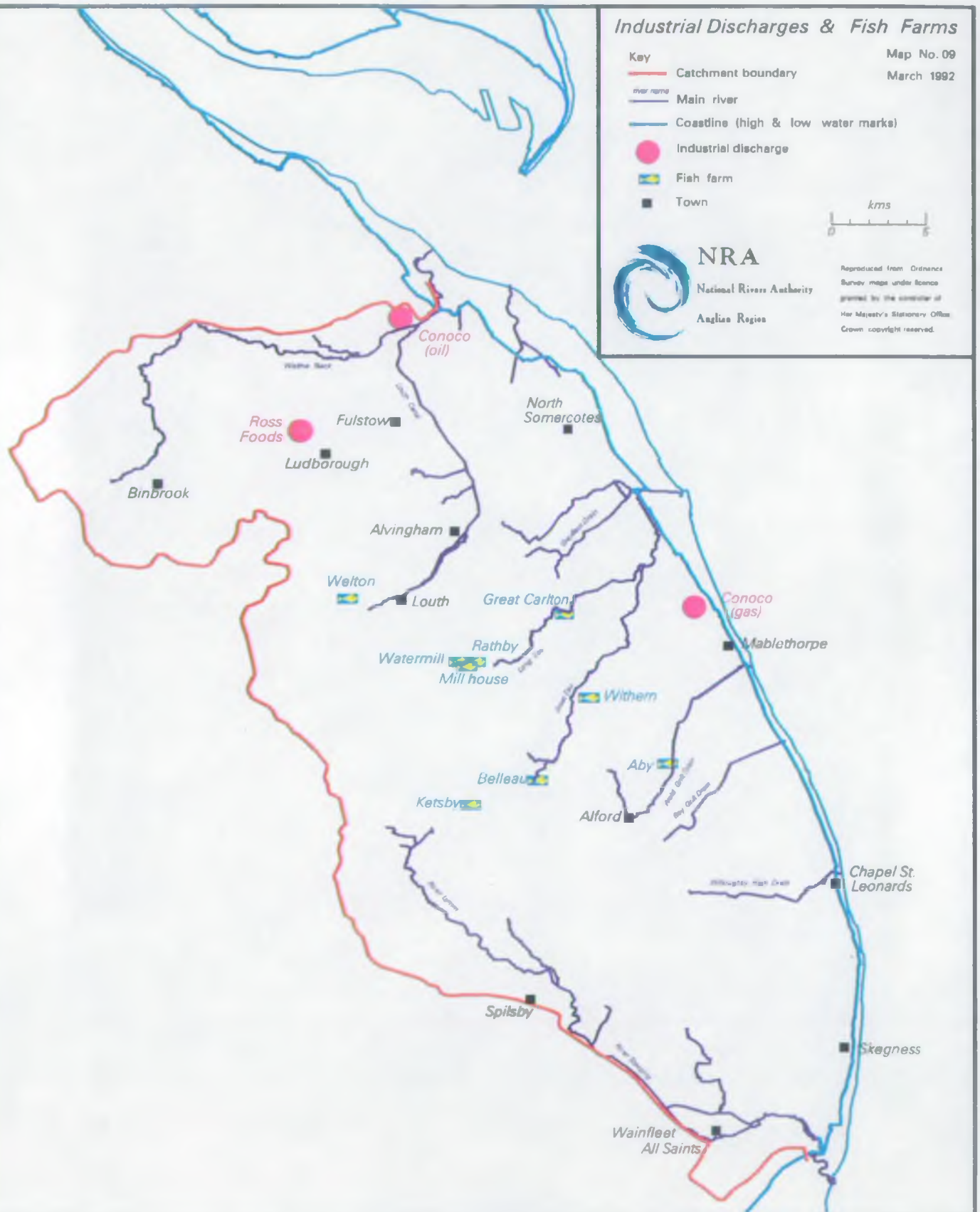


NRA

National Rivers Authority

Anglian Region

Reproduced from Ordnance
Survey maps under licence
granted by the controller of
Her Majesty's Stationery Office.
Crown copyright reserved.



3.8 Industrial Discharge and Trout Farms

3.8.1 General

Industrial discharges are controlled by ensuring compliance with consents granted by the National Rivers Authority. 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

Within the catchment there are three major industrial discharges, Ross Foods at North Thoresby, Conoco (Gas) north of Mablethorpe and Conoco at Tetney (Tank Farm).

There are a number of industrial areas near most of the principal towns, e.g. Louth, Mablethorpe, Alford and Skegness. Foul sewage and trade effluent discharges from these industrial areas are treated at Anglian Water Services treatment works. Surface water run off from industrial areas can have a significant impact on water quality. Developers and industrialists must be aware of this and provide adequate pollution prevention measures for surface water disposal systems.

There are a number of trout farms in the area, none of which pose significant water quality problems during normal flow conditions, but do however exert an oxygen demand upon the receiving waters. This matter is taken into consideration when calculating the consent conditions of these trade effluent discharges.

3.8.3 Objectives

- To ensure that industrial development does not compromise water quality in controlled water.
- To provide advice to developers and industrialists on measures to be taken to reduce the risk of pollution at their sites.

3.8.4 Environmental Requirements

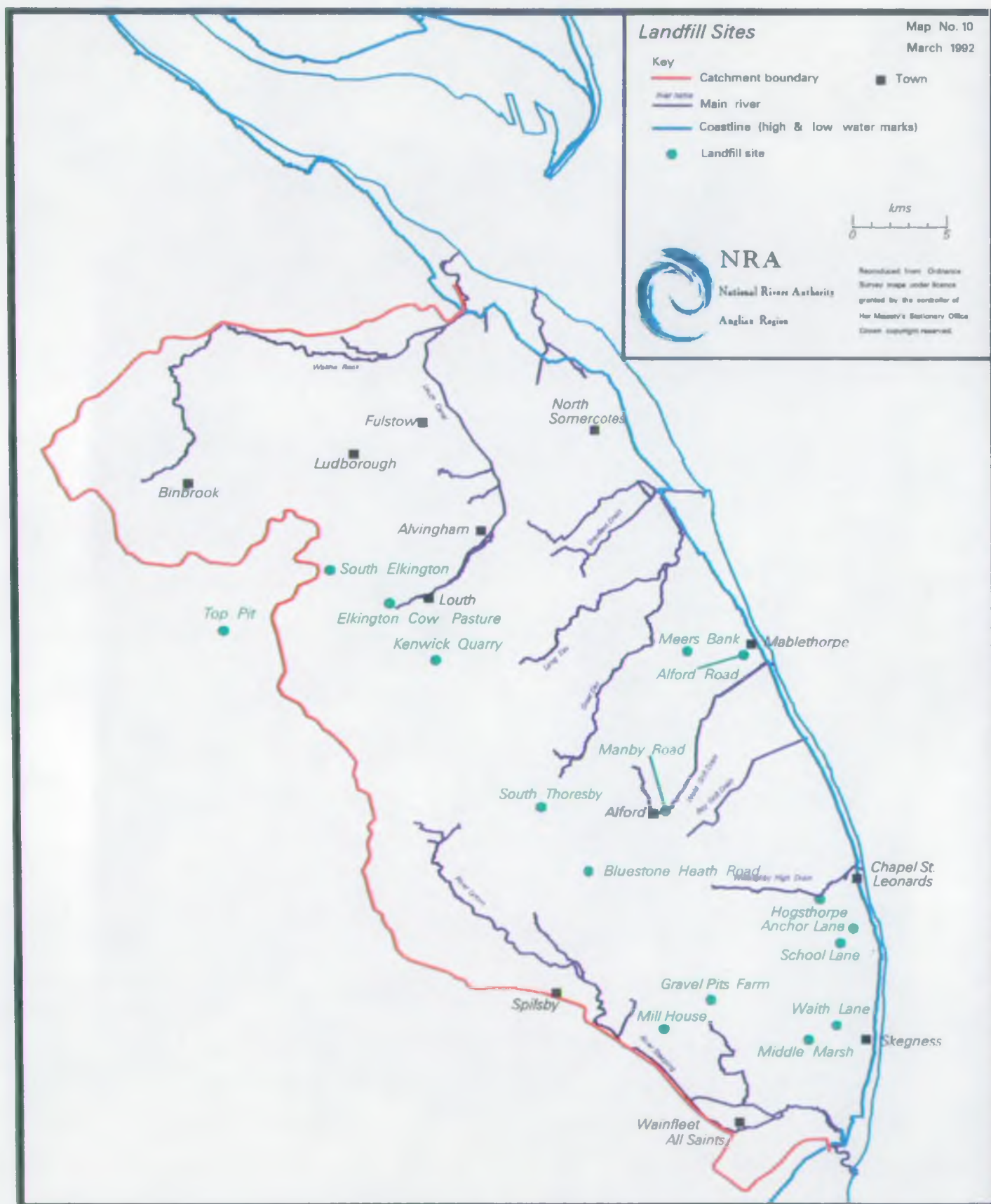
Water Quality:

- To ensure consent conditions adequately safeguard water quality and prevent exceedance of EC Directives and Water Quality Objectives.
- Monitoring of surface waters and discharges to establish compliance.

Water Quantity:

- No diminution of the flow regime below that used in setting the consents. Consent conditions are derived by taking into account the upstream dilution flow which is available under average and dry weather conditions.





3.9 Landfill Sites

3.9.1 General

The NRA is a statutory consultee on Waste Disposal matters. 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 can be issued. The planning permission is the means by which aftercare provisions on closed landfill sites can be regulated. The waste disposal licence relates to the operational phase of any site.

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 etc. Often the greatest threat to groundwater quality is posed by landfill activities.

3.9.2 Local Perspective

Each site is considered on a case by case basis, the location of a site must not pose an unacceptable risk to water resources.

The fate of incident rainfall and any leachate generated must be known and fully evaluated, especially if landfill is to proceed on a "dilute and disperse" principle. This assumes that any leachate generated is retained in close proximity to the landfill site for sufficient time to allow natural degradation and/or dilution to occur thereby ensuring that the environmental impact remains acceptable. Monitoring to confirm that "dilute and disperse" is working should be required by the Regulatory Authority.

Where it is likely that "dilute and disperse" is not acceptable, "containment landfill" practices must be followed. A waste disposal licence for a site must specify engineering measures to be taken so as to minimise the potential for any leachate generated to escape. In addition, a monitoring regime designed to confirm the integrity of the containment structure must be specified.

3.9.3 Objectives

- To ensure landfill activity does not compromise water quality or water resources and proceeds in accordance with advice given in the Groundwater Protection Policy.

3.9.4 Environmental Requirements

Water Quality:

- Compliance with EC Directives on dangerous substances discharged to groundwaters.
- Implementation of the NRA National Groundwater Protection Policy.
- Prevention of pollution of controlled waters.
- Appropriate monitoring of effects on surface and groundwater.

Physical Features:

- Restoration of all sites to an acceptable environmental standard.

Mineral Extraction

Map No. 11
March 1992

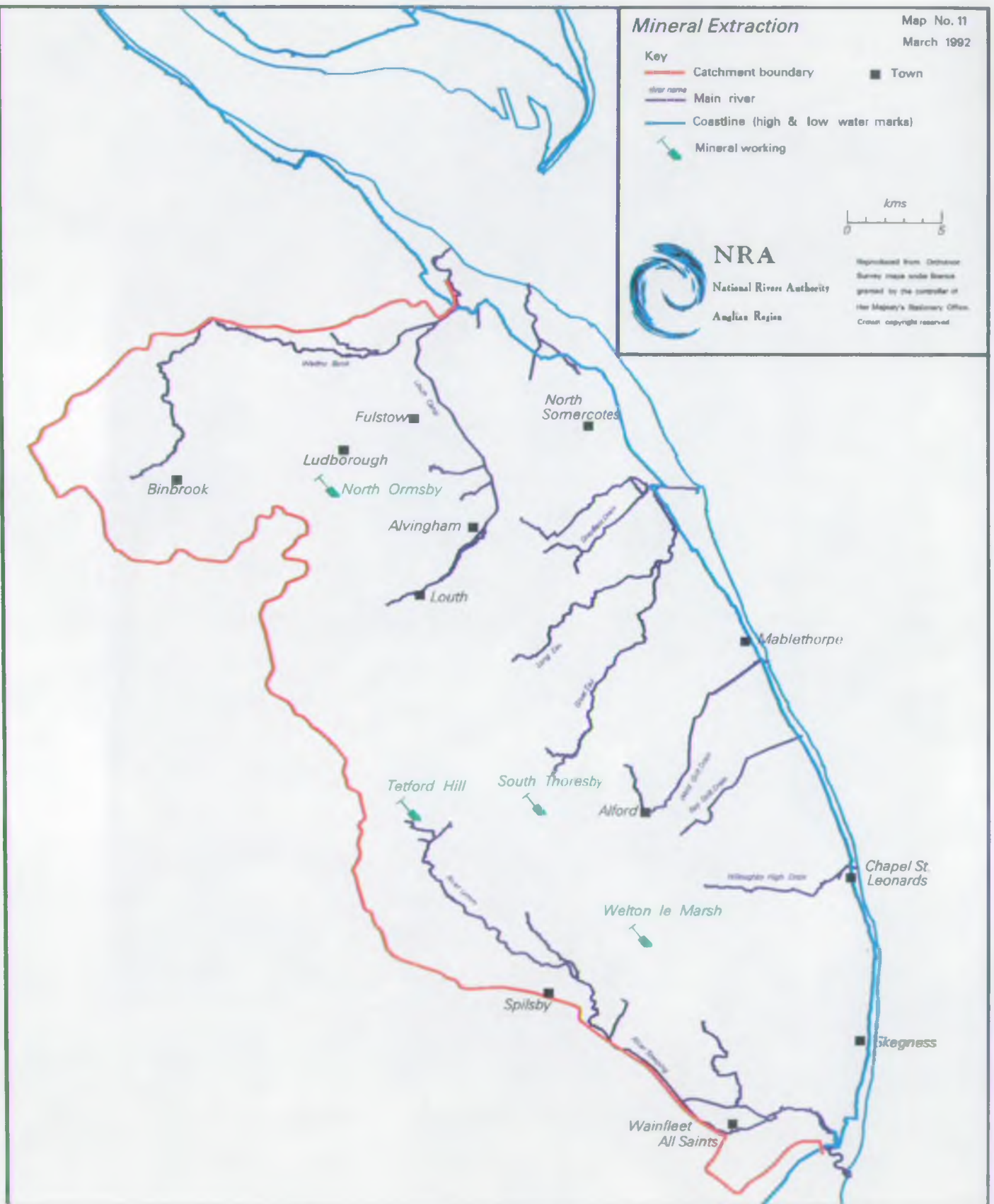
- Key**
- Catchment boundary
 - Main river
 - Coastline (high & low water marks)
 - T Mineral working
 - Town

kms
0 5



NRA
National Rivers Authority
Anglia Region

Reproduced from Ordnance
Survey maps under license
granted by the controller of
Her Majesty's Stationary Office.
Crown copyright reserved



3.10 Mineral Extraction

3.10.1 General

Mineral extraction can affect both groundwater quantity and quality. It can restrict recharge of 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 use of mineral extraction sites for landfill also poses a significant threat to groundwater quality.

3.10.2 Local Perspective

Lincolnshire is the only source of chalk in the East Midlands. The only extraction within the catchment are the four chalk works shown on the diagram opposite. At present these workings do not present the NRA with any problems.

3.10.3 Objectives

- 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 Requirements

Water Quality:

- No deterioration of groundwater or surface water quality.

Water Quantity:





- No detriment to the availability of water resources.

Physical Features:

- Minimise the occurrence of slipping.

Map No. 12
March 1992

Key

-  Catchment boundary
 River
 Coastline (high & low water marks)
 Stretch used for livestock watering
 Town

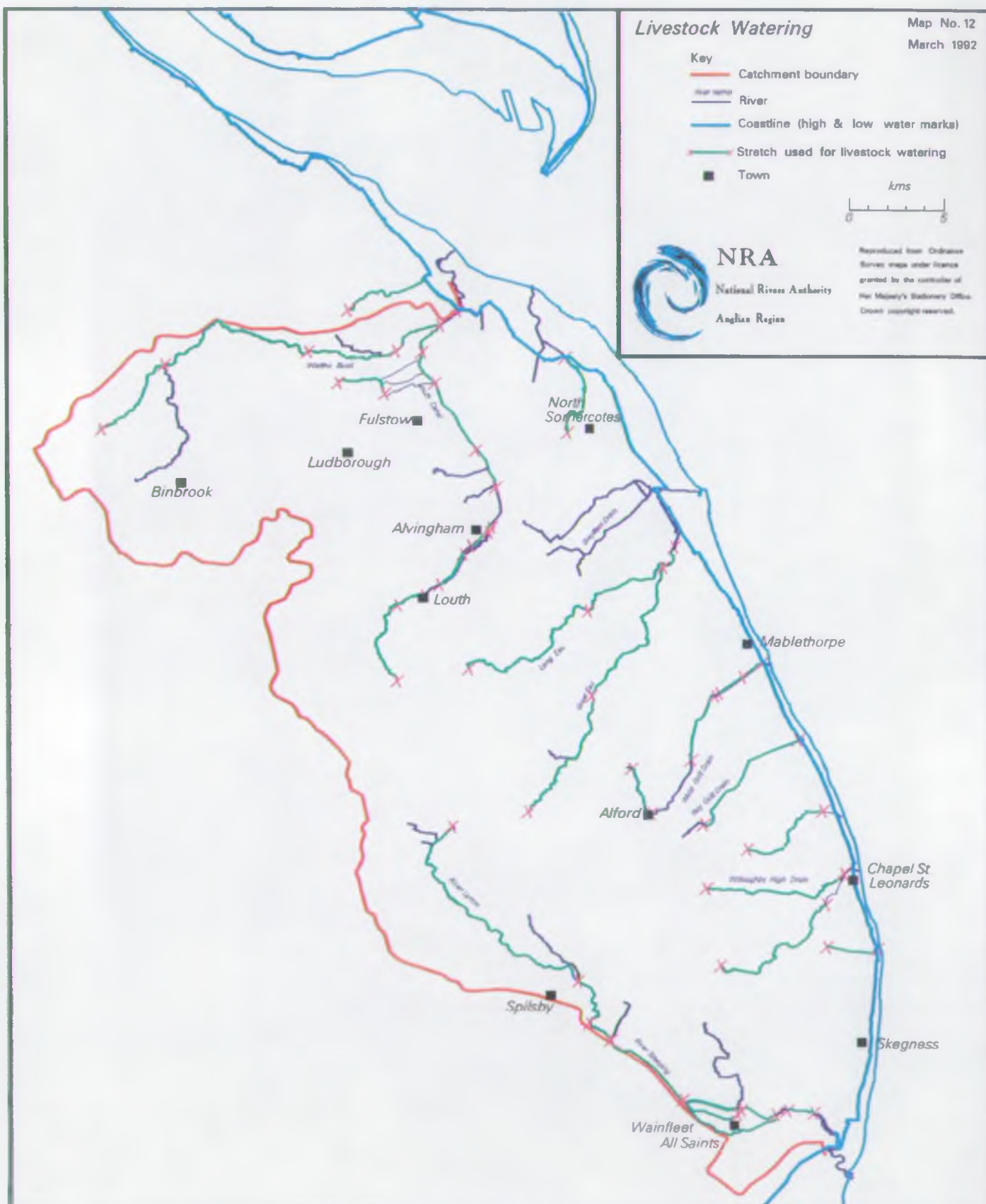
kms



NRA

National Rivers Authority
Anglian Region

Reproduced from Ordnance
Survey maps under licence
granted by the controller of
Her Majesty's Stationery Office.
Other copyright reserved.



3.11 Livestock Watering

3.11.1 General

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

3.11.2 Local Perspective

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

3.11.3 Objectives

- To meet the quality criteria laid down in the Statutory Water Quality objectives.

Groundwater Protection Zones

Map No. 13

March 1992

Key

— Catchment boundary

— Coastline (high & low water marks)

Aquifer protection zone

A

B

C

■ Town

X Aquifer borehole

0 1 2 3 4 5
kms

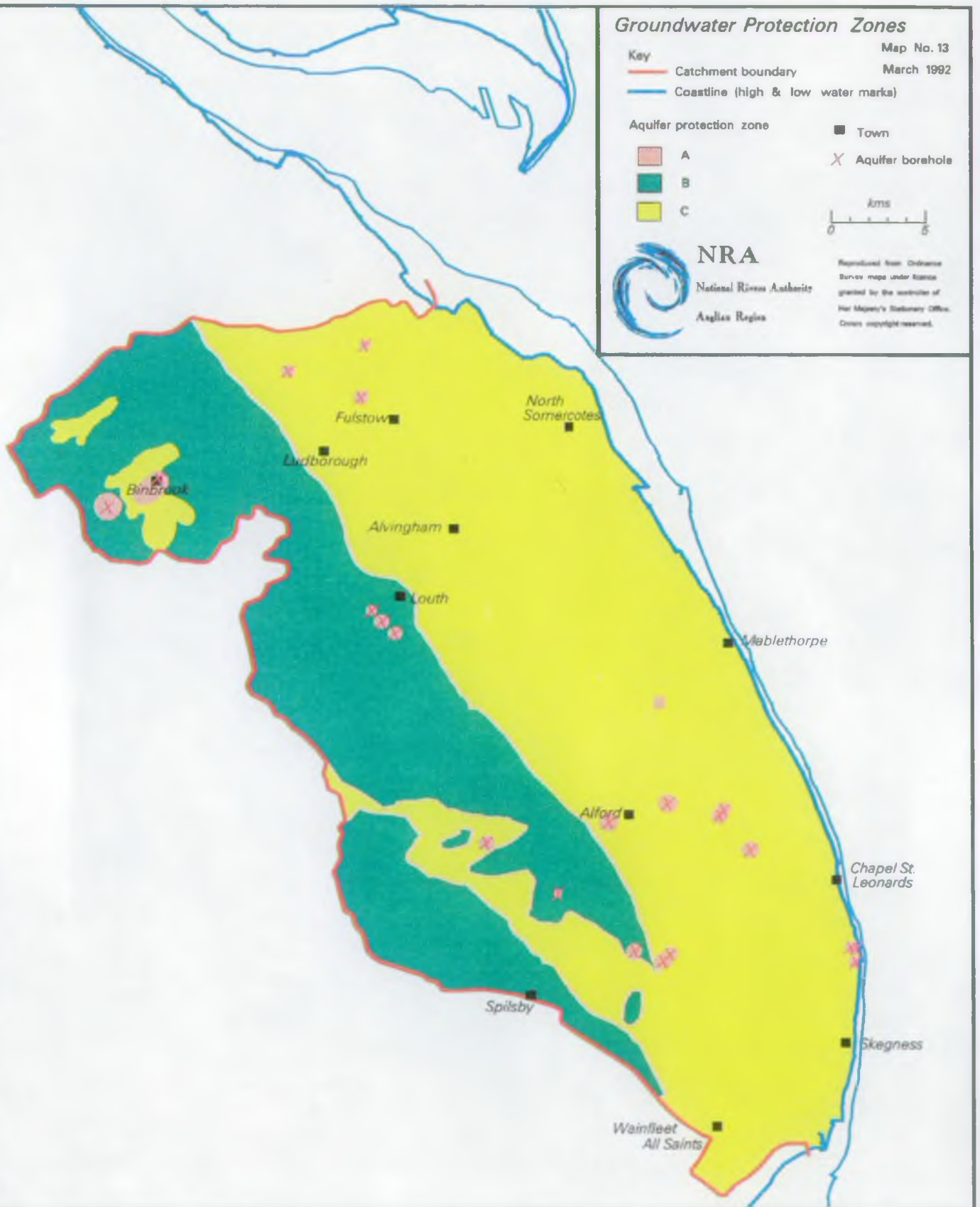


NRA

National Rivers Authority

Anglia Region

Reproduced from Ordnance
Survey maps under licence
granted by the controller of
Her Majesty's Stationary Office.
Crown copyright reserved.



3.12 Groundwater Protection

3.12.1 General

Water is vital to life. Making the best use of this essential resource, conserving it and balancing the competing needs of abstractors and of the water environment is a prime responsibility of the National Rivers Authority. Groundwater must be protected because it is an important part of the natural water cycle.

It accounts for a large proportion of our drinking water. There are many threats to groundwater quality, and once polluted, groundwater is difficult if not impossible to recover.

3.12.2 Local Perspective

There are a significant number of abstraction points within the Louth Catchment, some of which are used for drinking supplies.

The NRA Anglian Region has developed and is working to its draft Aquifer Protection Policy in order to minimise the risks of contamination of underground water resources from the effects of development or land use changes.

The policy has the following objectives:

- i) To enable the Authority to meet its statutory responsibilities for the protection of groundwater from pollution (as defined by the EC Directive 80/68/EEC).
- ii) To present a uniform regional approach whereby officers of the Authority can judge individual development land use change proposals.
- iii) To provide a guide to groundwater users, local authorities, the farming community and developers on the Authority's attitude to aquifer protection.

The policy recognises that the risk of groundwater contamination varies according to the type of development proposed and the vulnerability of the underlying aquifer to surface pollution. Within the Region, 3 categories of vulnerability have been defined. These are termed Protection Areas and the Authority will seek to control to varying degrees, the types of new development and activities, to minimise the risk of groundwater pollution.

The categories are:

Protection Area A: Around potable groundwater sources. NRA will oppose all development proposals or changes in land use which pose an unacceptable risk to groundwater quality or sources.

Protection Area B: Over the exposed parts of aquifer outcrop. NRA will oppose all development proposals which, either individually or in combination with similar developments, pose an unacceptable risk to the underlying groundwaters from degradable or non – degradable materials.

Protection Area C: Over the remaining aquifers covered by relatively impermeable deposits. NRA will oppose all development proposals that could potentially pollute the underlying groundwater and involve toxic, persistent or non – degradable materials.

3.12.3 Objectives

The preservation of groundwater quality and quantity is a major objective for the NRA. Limiting the risks from pollution and over abstraction must be dealt with in a structured methodical manner.

The NRA has therefore produced a National Groundwater Protection Policy which provides advice to all on measures which can be taken to reduce the risks of pollution. It specifically deals with the definition of vulnerability and source protection, waste disposal, mineral abstraction, diffuse pollution, discharges to underground strata and contaminated land. Implementation of this policy on these issues will effectively manage groundwater protection in the area of the Louth catchment.

This new policy which will supersede the Regional Aquifer Protection Policy incorporates two main concepts: resource protection (groundwater in general) and source protection (existing abstractions). The vulnerability of any groundwater contamination depends on the particular physical circumstances; principally: nature of the strata, nature of the overlying soil and the depth of the unsaturated zone.

There are three source protection zones proposed:

Zone I: Immediately adjacent to the source, up to 50 days travel time (based on biological contaminants).

Zone II: Up to 400 days travel time (based on slowly degrading pollutants).

Zone III: The complete catchment area of a source.

The controls to be exerted are more stringent the more vulnerable the groundwater and the nearer a source.

Flood Defence

Map No. 14

March 1992

Key

- Catchment boundary
 - Main river
 - Coastline (high & low water marks)
 - - - River embankment
 - Town
- Existing standards of flood protection (fluvial and tidal)
- > 100 years
 - 51 - 100 years
 - 21 - 50 years
 - 11 - 20 years
 - < 11 years

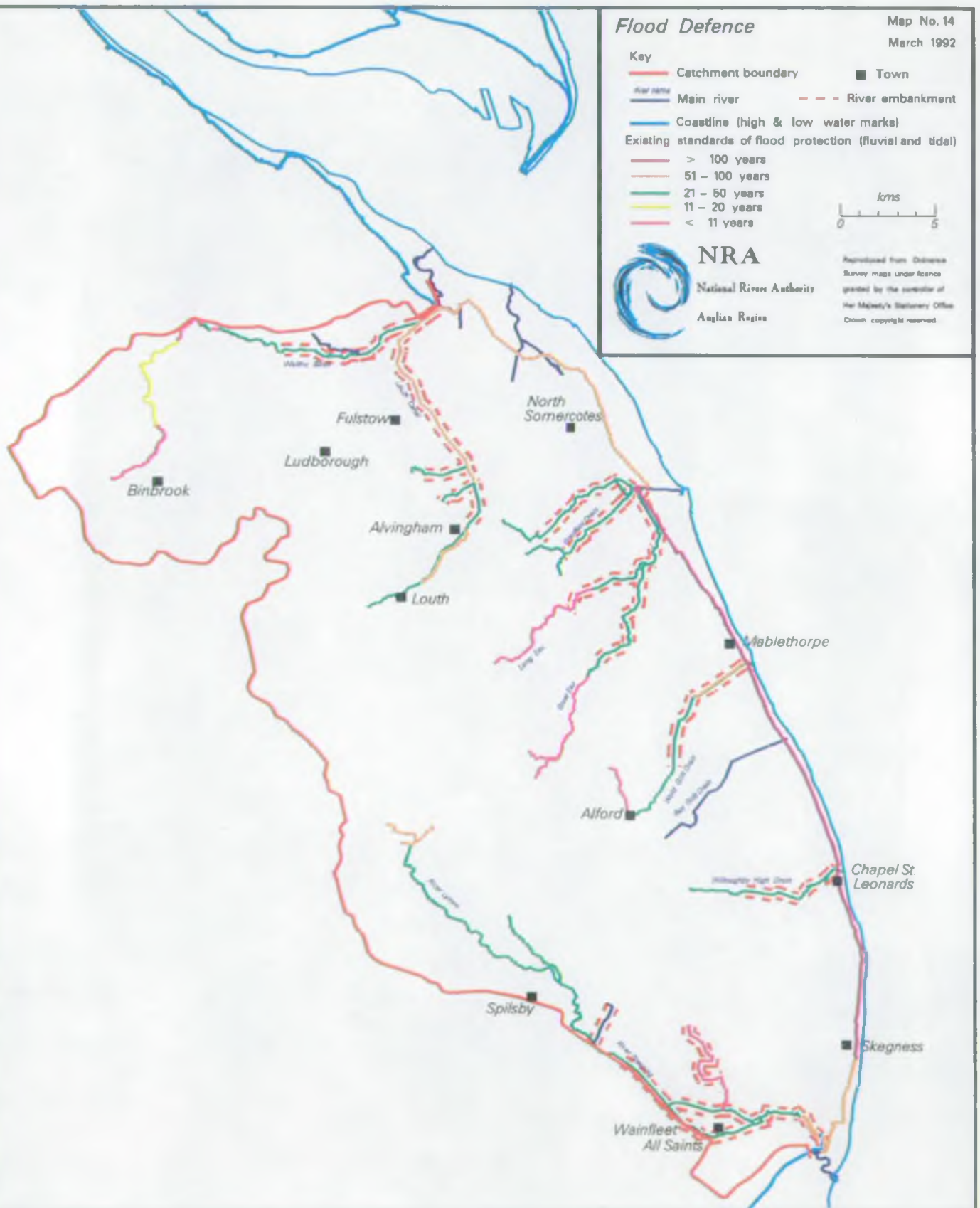


NRA

National Rivers Authority

Anglian Region

Reproduced from Ordnance Survey maps under licence granted by the controller of Her Majesty's Stationery Office. Crown copyright reserved.



3.13 Flood Defence

3.13.1 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 e.g. 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. The existing standards of flood protection are shown on the plan opposite.

Under the Water Resources Act 1991 the NRA have a general duty to oversee and have powers to control significantly obstructive works on any watercourse. Internal Drainage Boards have similar powers for watercourses within their areas.

For the purposes of management, certain reaches of the river are formally designated as the "Statutory Main River". On the Main River, the NRA have special powers to carry out works or control the actions of others. Any proposal that could interfere with the bed or banks or obstruct the flow in the river requires formal consent from the NRA.

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.

3.13.2 Local Perspective

The catchment is bounded by the Lincolnshire Wolds in the west and the North Sea to the east with a low – lying coastal strip up to 10 kms wide where ground levels are below normal high tide levels. Consequently the drainage regime which now exists has developed to minimise the impact of "highland flows" on the lowland strip and at the same time exclude tidal waters.

Sea defences are vital to the continued habitation of more than half of the catchment and depending on the level, gradient, aspect and exposure of the foreshore, the structures vary from natural dune defences to clay banks and from revetted banks to massive concrete and stone sea walls.

The "natural" highland rivers, when they reach the foot of the Wolds, are conducted across the lowland strip in embanked channels enabling total discharge by gravity to the sea when tides permit.

The lowland areas between the highland carriers are, in general, drained by separate systems and although each now benefits from pumped discharge, prior to the 1950's most relied on very restricted gravity discharge and consequently were wetlands for months on end, only useful as grazing land. These areas are now intensively drained and available for higher value cropping.

In 1987, following a review of Main River, the Authority demanded all the principally lowland watercourses and these were adopted by the Internal Drainage Boards who now operate and maintain the entire lowland systems.

The Authority maintains the sea defences, the highland rivers and their embanked channels. Following the East Coast Flood Disaster in January 1953, when much of the coastal strip was inundated and 41 people drowned, the sea defences were rapidly reconstructed to improved standards. More recently much of that work has reached the end of its useful life and a high cost reconstruction programme for the defences is now nearing completion. This is to be followed by an even bigger programme of beach recharge to protect and extend the life of the defences as well as to improve their effectiveness against rising tide levels.

Following investigations into climate change and rising sea levels a rise of 7mm per year for the next 50 years is built into all new coastal protection projects.

During the 1960's, 70's and early 80's improvement schemes were carried out on all the embanked channels but circumstances and standards have changed, some of these works have degraded and the next cycle of assessment/ improvement is now due. (Works identified will be included in the Action Plan to be produced as the next phase of this Plan).

The maintenance of the sea defences and the embanked 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.

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 flooding, both tidal and fluvial.

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 at 6, 4, 3, 2, and 1 hours before high water.







Fluvial events in this catchment, despite having a relatively short time of concentration, are substantially affected by the coincidence or otherwise of the peak flow and high tide. The objective is to provide reports on the developing situation and warnings by the colour phase system at the earliest opportunity.

Forecasts of flooding are compiled using tidal, rainfall and riverflow data collected from outstations by the regional telemetry system.

3.13.3 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. (See Appendix 2 for Anglian Region's Interim Levels of Service.)
- To provide adequate arrangements for flood forecasting and warning.
- Carry out weedcutting in the channels before the winter flood season where necessary to protect people and property to the appropriate standard.
- Ensure correct operation of relevant sluice gates.
- Carry out flood defence works with reference to environmental needs and requirements.

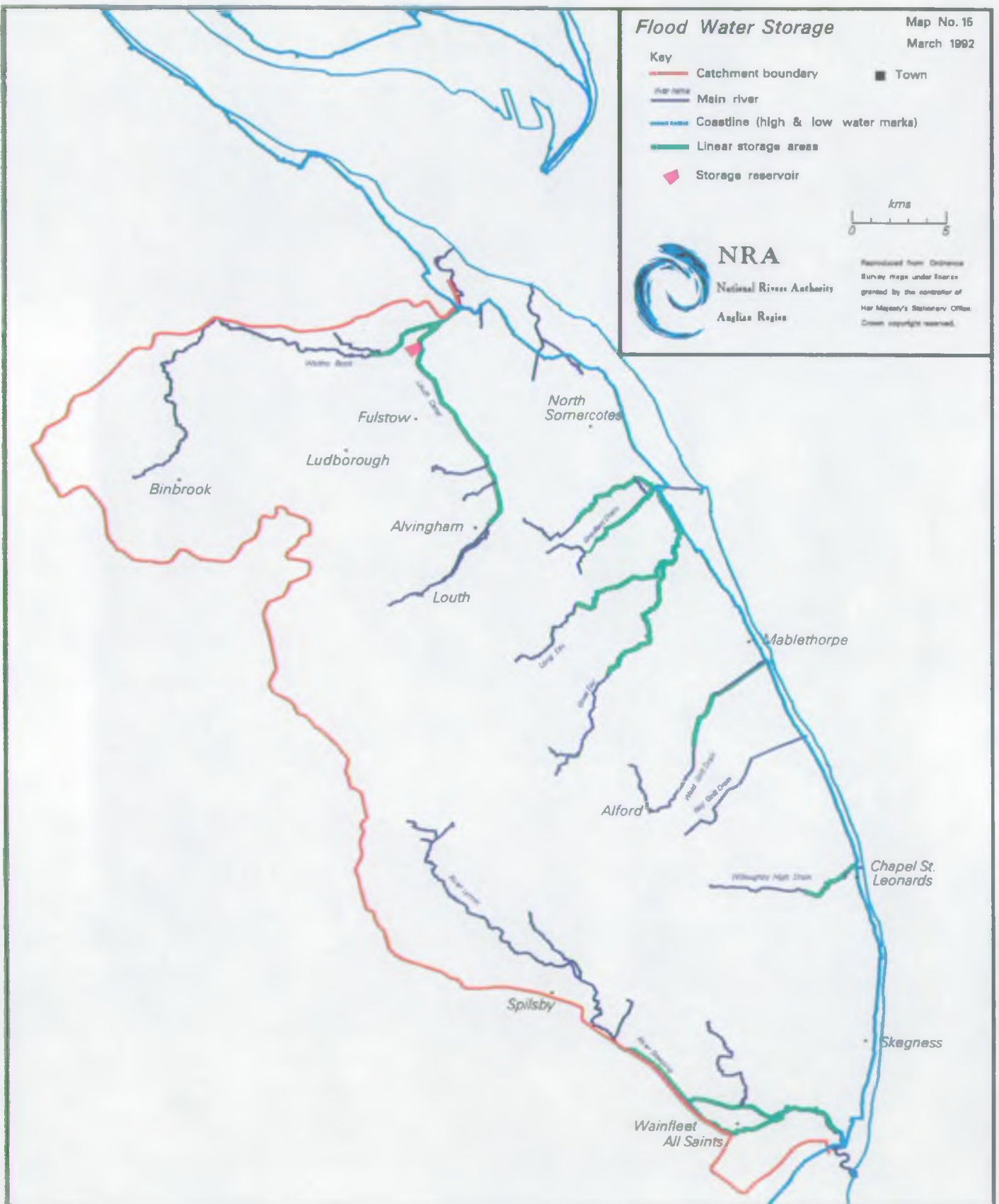
Map No. 16
March 1992

-  Catchment boundary
-  River name
-  Coastline (high & low water marks)
-  Linear storage areas
-  Storage reservoir
-  Town



NRA
National Rivers Authority
Anglia Region

Reproduced from Ordnance
Survey maps under license
granted by the controller of
Her Majesty's Stationery Office.
Crown copyright reserved.



3.14 Flood Water Storage

3.14.1 General

This use relates to the storage of flood waters both in the short and longer terms.

3.14.2 Local Perspective

Short Term Storage:

All of the embanked channels crossing the lowland coastal strip are in effect linear flood water storage areas during periods when discharge to the sea is interrupted by the rising tide. In total up to 100 kms of channel in the catchment are subject to this use.

At Thoresby there is an off - channel reservoir some 16 hectares in area which provides tide lock storage for the Louth Canal System. It is embanked to the same standard as the Canal and floods as an overspill when water levels rise to ground level.

To a much lesser extent, flood storage other than the above, relates to out of channel flow in the flood plains of the upland rivers and in cases where, as part of a development in areas susceptible to flooding, on site attenuation of flows has been provided to meet a pre - condition of the development.

Long Term Storage:

The paucity of summer flows during the recent series of very dry years has encouraged many agricultural landowners to construct retention ponds or reservoirs for the storage of winter flows for summer use. This use is expanding and is likely to accelerate further but it is unlikely to moderate peak flows significantly. This use could be augmented by pumping flood flows into depleted underlying aquifers or by using relatively unproductive or "set aside" land on a larger scale.

3.14.3 Environmental Objectives

Short Term Storage:

Water Quality and Quantity:

- In relation to this use the quality and quantity of flood water are a "fait accompli" but become a factor when the quantity exceeds available storage and, in "out of channel flow" situations in urban areas, poor quality may have an impact on public health.

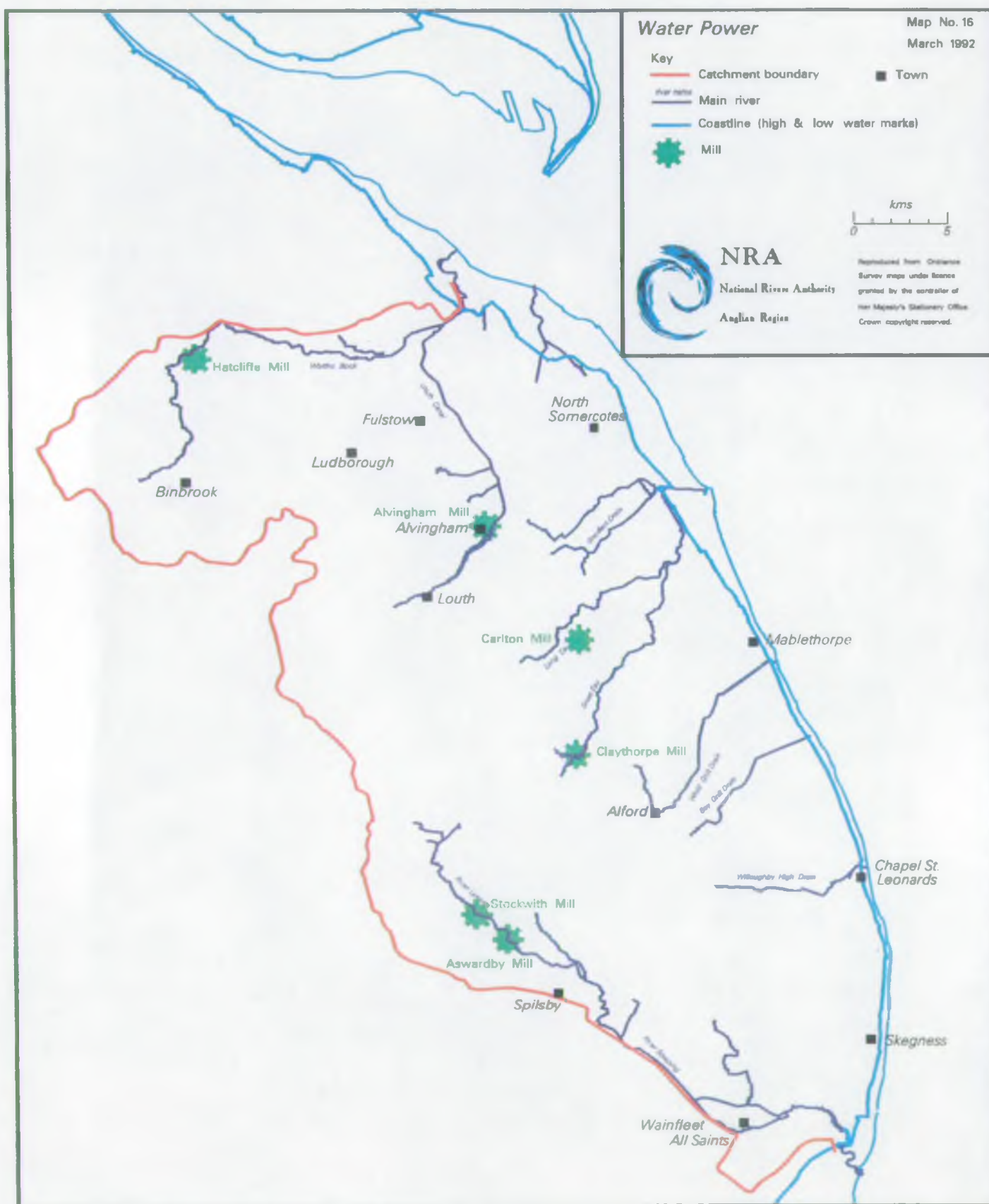
Physical Features:

- To maintain the capacity and integrity of embanked channels to prevent flooding.
- To maintain the effectiveness of structures at the fluvial/tidal interface to prevent tidal flooding and to facilitate maximum fluvial discharge.
- To maintain all other watercourses free of obstruction by weed or debris to minimise out of channel flow.
- To provide adequate flood defences in urban areas to the highest economic standard.

Long Term Storage:

Water Quality and Quantity:

- To store the maximum quantity of the highest available quality flood water for later flow augmentation.



3.15 Water Power (including Mill Rights)

3.15.1 General

This use deals with water power as the primary motive force in energy generation and also with its appeal as a tourist attraction or its amenity value.

3.15.2 Local Perspective

At present water power is or could be used at the following sites in the catchment: –

Hatcliffe Mill, Orford Beck: Originally a traditional water wheel now defunct but the owner has recently installed a modern turbine driving a generator supplying power to his intensive pig rearing business.

Alvingham Mill, River Lud: A traditional wheel mill still able to produce flour, but used infrequently and generally as a tourist attraction.

Claythorpe Mill, Great Eau and Carlton Mill, Long Eau: Both mills have the potential for domestic power generation.

Stockwith Mill, River Lymn: Now a craft centre/cafe but the water power can still be used to generate electricity for domestic use.

Aswardby Mill, River Lymn: Converted to a private dwelling with the water wheel retained as an internal feature which could/may be used for domestic power generation.

3.15.3 Environmental Objectives

Water Quality:

- To maintain water quality to the standard necessary to permit continued use of the mills.

Water Quantity:

- To maintain sufficient quantity of water to enable the prescribed use to continue.

Physical Features:

- To maintain millstreams free of silt, obstructions and weedgrowth sufficient to enable continued use.

Habitat, Gradient & Sites of Conservation Importance

Map No. 17
March 1992

Key

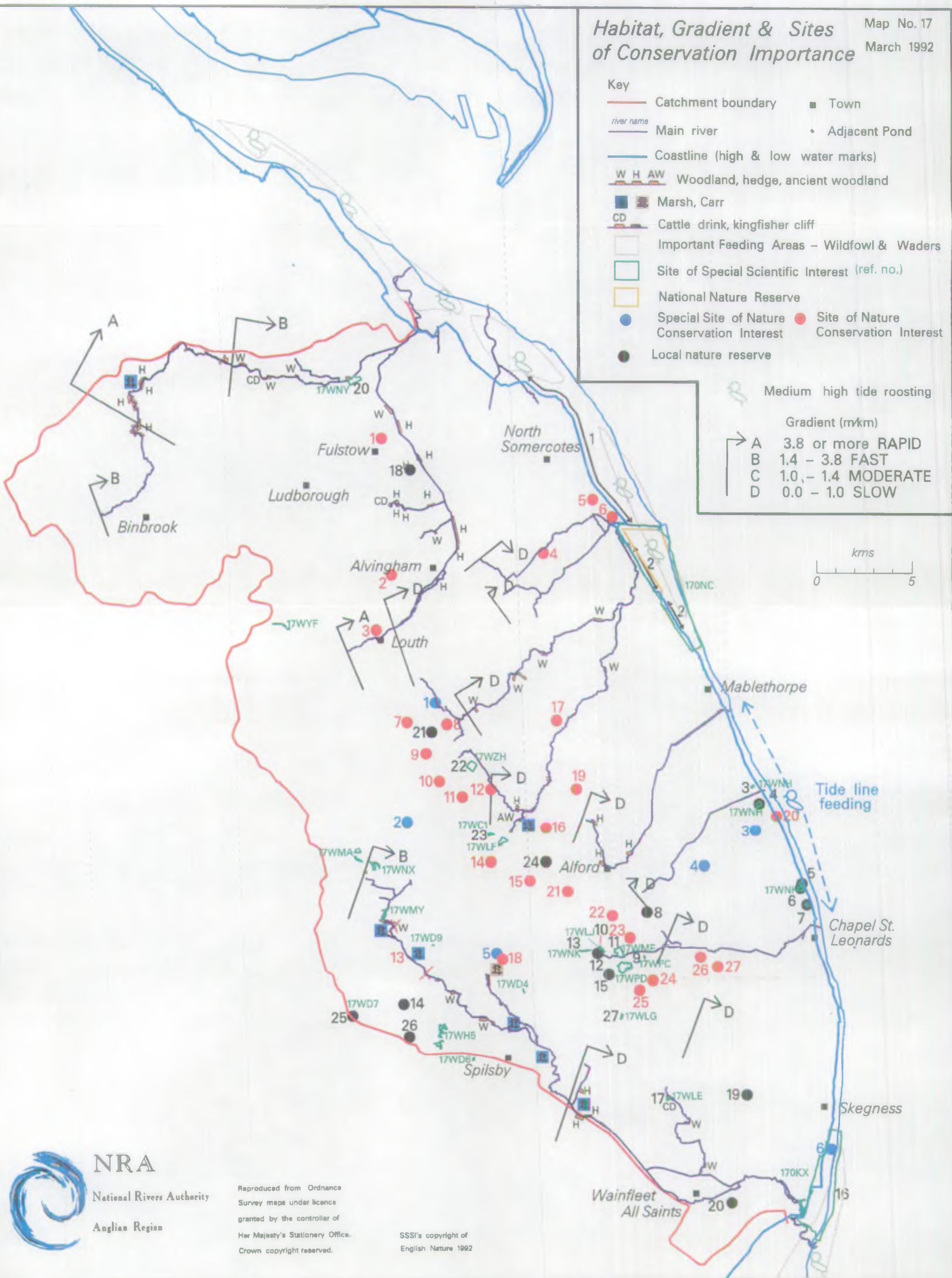
- Catchment boundary
- Main river
- Coastline (high & low water marks)
- W H AW Woodland, hedge, ancient woodland
- Marsh, Carr
- CD Cattle drink, kingfisher cliff
- Important Feeding Areas – Wildfowl & Waders
- Site of Special Scientific Interest (ref. no.)
- National Nature Reserve
- Special Site of Nature Conservation Interest
- Site of Nature Conservation Interest
- Local nature reserve
- Town
- Adjacent Pond

Medium high tide roosting

Gradient (m/km)

- A 3.8 or more RAPID
- B 1.4 – 3.8 FAST
- C 1.0 – 1.4 MODERATE
- D 0.0 – 1.0 SLOW

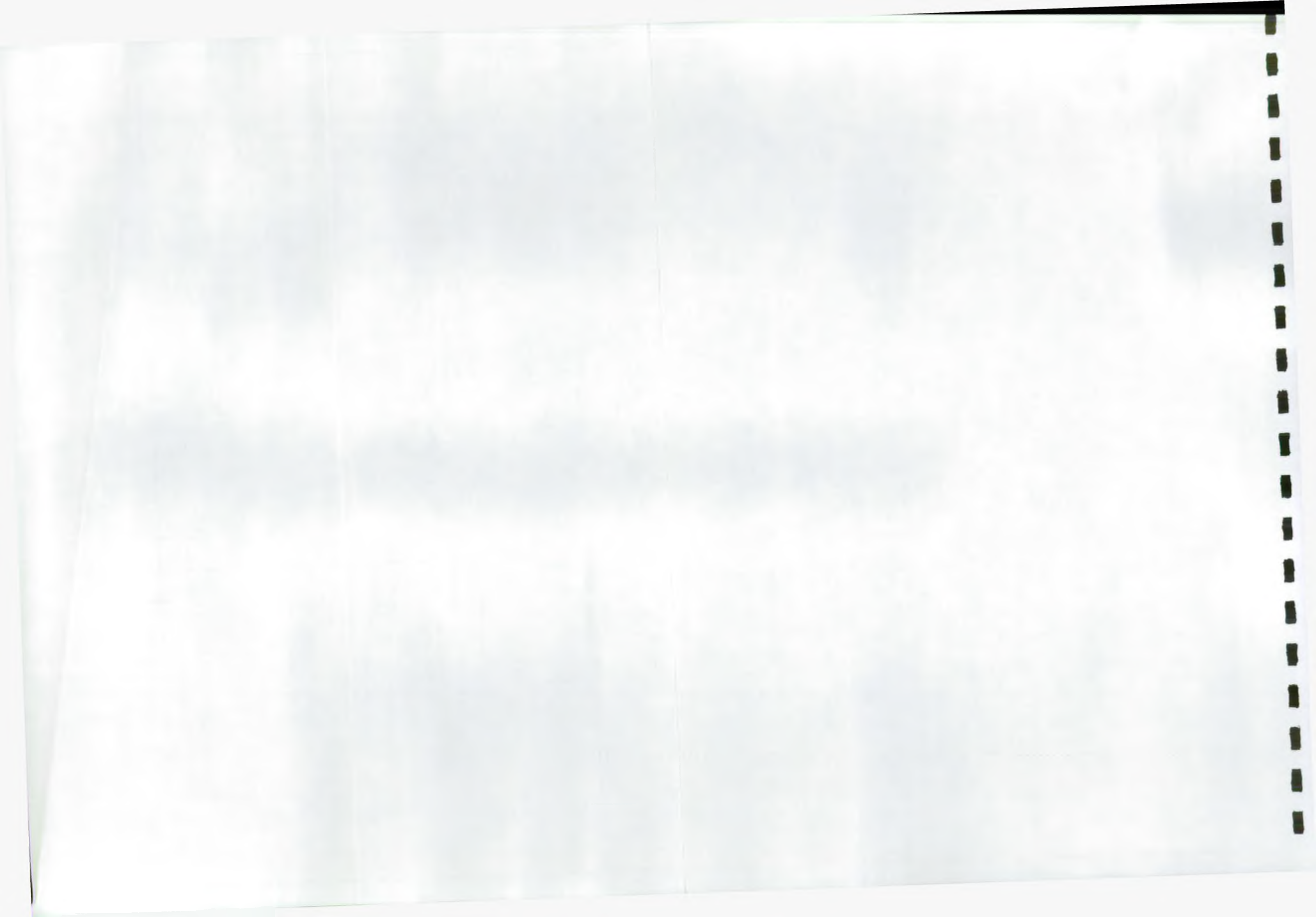
kms
0 5



NRA
National Rivers Authority
Anglian Region

Reproduced from Ordnance
Survey maps under licence
granted by the controller of
Her Majesty's Stationery Office.
Crown copyright reserved.

SSSI's copyright of
English Nature 1992



3.16 Conservation – Ecology

3.16.1 General

This use covers: –

- The protection of flora and fauna in the river corridor. This includes wildlife such as Kingfishers, May – flies and Water violets which are truly dependent upon the river for their existence, to those that simply exploit the river corridor.
- The protection of areas formally designated as being of particularly high conservation value which includes National Nature Reserves (NNR) and Sites of Special Scientific Interest (SSSIs).
- The protection of sites which although valuable in ecological terms are not formally protected e.g. Natural Reserves and County Trust Sites of Nature Conservation Interest.
- The NRA, whilst carrying out its functions or dealing with proposals by others has the duty to further the conservation of flora and fauna. The NRA also has the duty to protect the designated sites.

3.16.2 Local Perspective

The stretch of coastline associated with the catchment falls between two recognised internationally important wildfowl and wader wintering sites, namely the Humber and the Wash. Consequently, the coastline adjoining these estuaries is important, with the RSPB reserve at Tetney, a County Trust Reserve at Donna Nook, an NNR at Saltfleetby/ Theddlethorpe, and in the south the Gibraltar Point NNR. The NRA undertook a survey in 1990 of the use of the coastal zone by wintering wildfowl and waders and important feeding areas and roosting sites were identified (See map opposite). Feeding is generally concentrated in areas of semi – stable silts found in the seaward basins/river outlets in the northern half of the catchment and around Gibraltar Point.

The NRA has also undertaken river corridor surveys on main rivers throughout the Anglian Region under a system known as the Rivers Environmental Database (RED). For every 500m length of river, habitats are mapped and plant and bird species recorded. This data showed the Waithe Beck, the River Lymn and the Upper Great Eau and Long Eau as containing a varied and valuable range of habitats. In addition, the aquatic invertebrate sampling by the NRA (for water quality purposes) has also identified these stretches plus the River Lud as having a high quality diverse fauna. Also, the majority of the freshwater wetland sites occur on these stretches.

Several spring sites have also been recognised as being particularly valuable. Tetney Blow Wells SSSI, Ketsby Beck (spring fed tributary of the Great Eau) and Claxby Spring/Burlands Beck (tributary of the Willoughby High Drain) all contain a very specialised invertebrate community with notable rarities.

The River Lymn (Partney to Mill Bridge) is also a very valuable site as it supports low numbers of locally rare and nationally notable aquatic invertebrates.

The Greyfleet Drain, Woldgrift Drain, Boygrift Drain, Main Drain (lower) and the Welton Beck all showed low habitat diversity.

3.16.3 Environmental Objectives

- To protect and further the conservation of river corridors and to safeguard the special conservation interest for which sites have been designated.

3.16.4 Environmental Requirements

Water Quality:

- All rivers to comply with the standards for amenity protection and aesthetic criteria and with the levels of List I and II substances in the EEC Directive 76/464.

Special Ecosystems:

- Water quality not to deteriorate to a level such that the notable aquatic invertebrates at the following sites are lost:

Tetney Blow Wells (SSSI)
Claxby Spring (CTF) and Burlands Beck
Ketsby Beck
River Lymn (Partney to Mill Bridge)

- Water quality not to deteriorate to a level such that the following sites lose their general aquatic interest:

Waithe Beck upstream of Holton le Clay
Louth Canal upstream of Louth
Long Eau upstream of Little Carlton
Great Eau upstream of Tothill
Main Drain upstream of Willoughby
River Lymn upstream of Partney

- In addition the water, both fresh and marine, that inundates the important wildfowl and wader feeding areas on the coast to be of a quality to maintain these areas as valuable sites.

Water Quantity:

- A variable flow regime where the monthly average flow reflects the natural (historic) flow conditions in the river. The natural mean monthly flow not to decline below the historic monthly Q90 except during drought conditions. In addition, spring flows at Tetney Blow Wells, Ketsby Beck and Claxby Spring/Burlands Beck to be sufficient to guarantee the survival of the valuable aquatic invertebrate community.
- The water table to be maintained at a high level where possible but particularly where wetlands occur. Spate flows should inundate wetlands.
- Spate flows to naturally cleanse the river channel.

River Physical Features:

- The maintenance and enhancement of the diversity of natural river features such as meanders, pool/riffle sequences and the presence of aquatic vegetation.

Also, the maintenance and enhancement of a diversity of river corridor habitats including marsh, fringe/overhanging vegetation, bankside trees and hedges, grassland. In addition the preservation of the features which contribute towards or give rise to the specific features of the designated conservation areas.

- The channel cross section to be appropriate for the river flow regime.

Ancient Monuments & Landscape

Map No. 18

March 1992

Key

- Catchment boundary
- Main river
- Coastline (high & low water marks)
- Scheduled ancient monument
- + Non-statutory archaeological site
- Area of Outstanding Natural Beauty
- Town



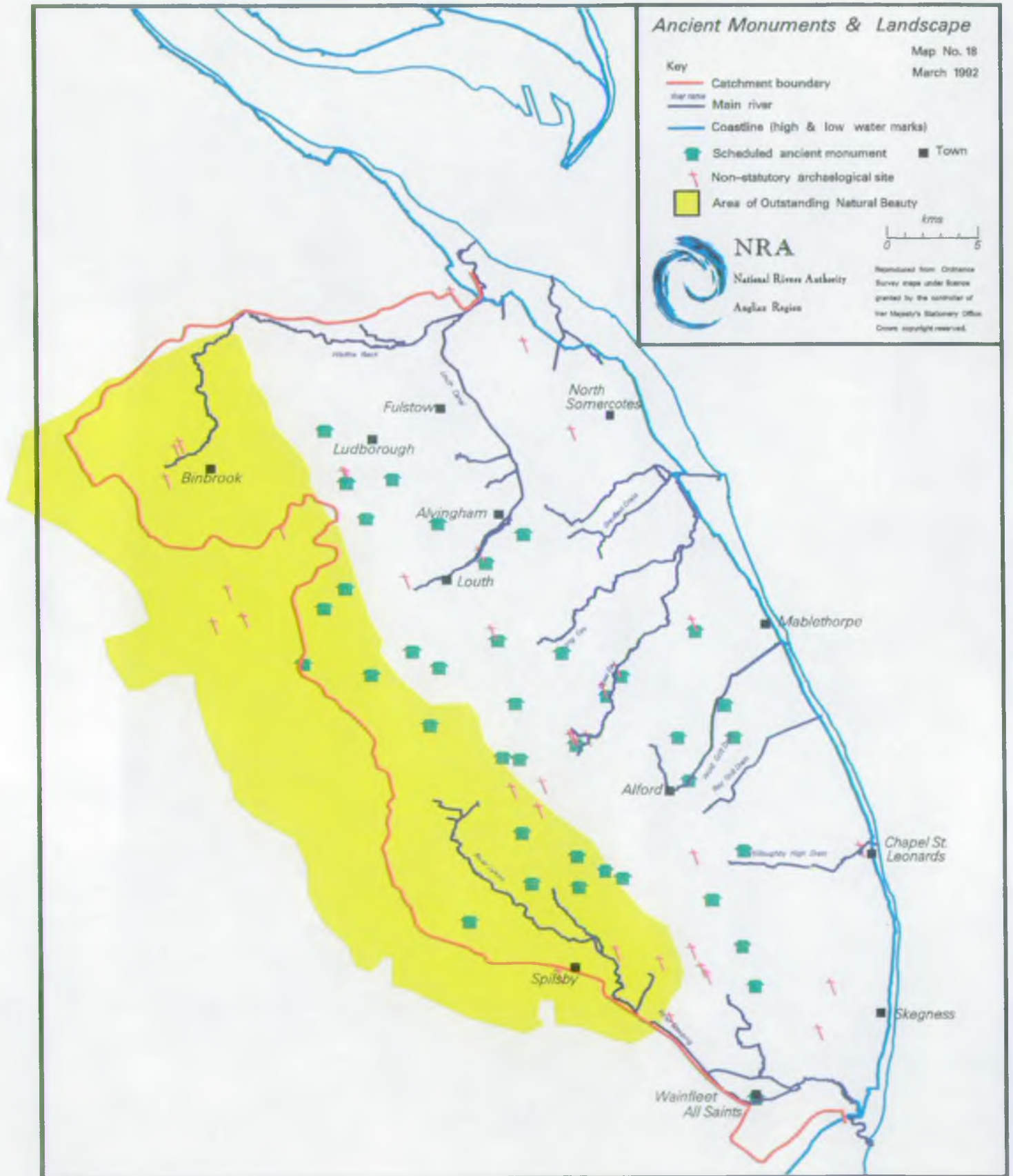
NRA

National Rivers Authority

Anglia Region

0 1 2 3 4 5
kms

Reproduced from Ordnance
Survey maps under license
granted by the controller of
Her Majesty's Stationery Office.
Crown copyright reserved.



3.17 Conservation – Landscape and Archaeology

3.17.1 General

This use covers: –

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

3.17.2 Local Perspective

41 Scheduled Ancient Monuments (SAMs) occur within the catchment and these are deemed to be of national importance. In addition, 38 non – statutory sites have been identified which are valuable or potentially valuable. Apart from sites which could be physically damaged by NRA operations, the most sensitive sites are those on wetland/marshland areas.

These sites could be damaged by the lowering of the water table and the drying out of the site.

3.17.3 Environmental Objectives

- To protect the landscape and archaeological features associated with rivers in the catchment and to safeguard the special interest for which sites have been designated.

3.17.4 Environmental Requirements

Water Quantity:

- The water table to be maintained at a high level in wetland/marshland areas.

Basic Amenity

Map No. 19
March 1992

Key

- Catchment boundary
- River
- Coastline (high & low water marks)
- Stretch used for basic amenity
- Town

kms



NRA
National Rivers Authority
Anglian Region

Reproduced from Ordnance
Survey maps under license
granted by the controller of
Her Majesty's Stationary Office.
Crown copyright reserved.



3.18 Amenity

3.18.1 General

Amenity relates to the aesthetic aspects of the water body.

3.18.2 Local Perspective

Many people live adjacent to water courses in the catchment and many more come to visit them for recreational activities such as walking and fishing. The visual appearance and colour of waters is therefore of particular importance. The amenity value of most watercourses must therefore not be underestimated or overlooked. 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.

3.18.3 Objectives and Standards

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

3.18.4 Environmental Requirements

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 to minimise detriment to recreation and basic amenity.

Physical Features:

- Maintenance of existing footpaths.
- Maintenance of existing access points.

Fish biomass

Map No. 20
March 1992

Key

- Catchment boundary
- Main river
- Coastline (high & low water marks)
- Biomass class a
- Biomass class b
- Biomass class c
- Biomass class d

■ Town

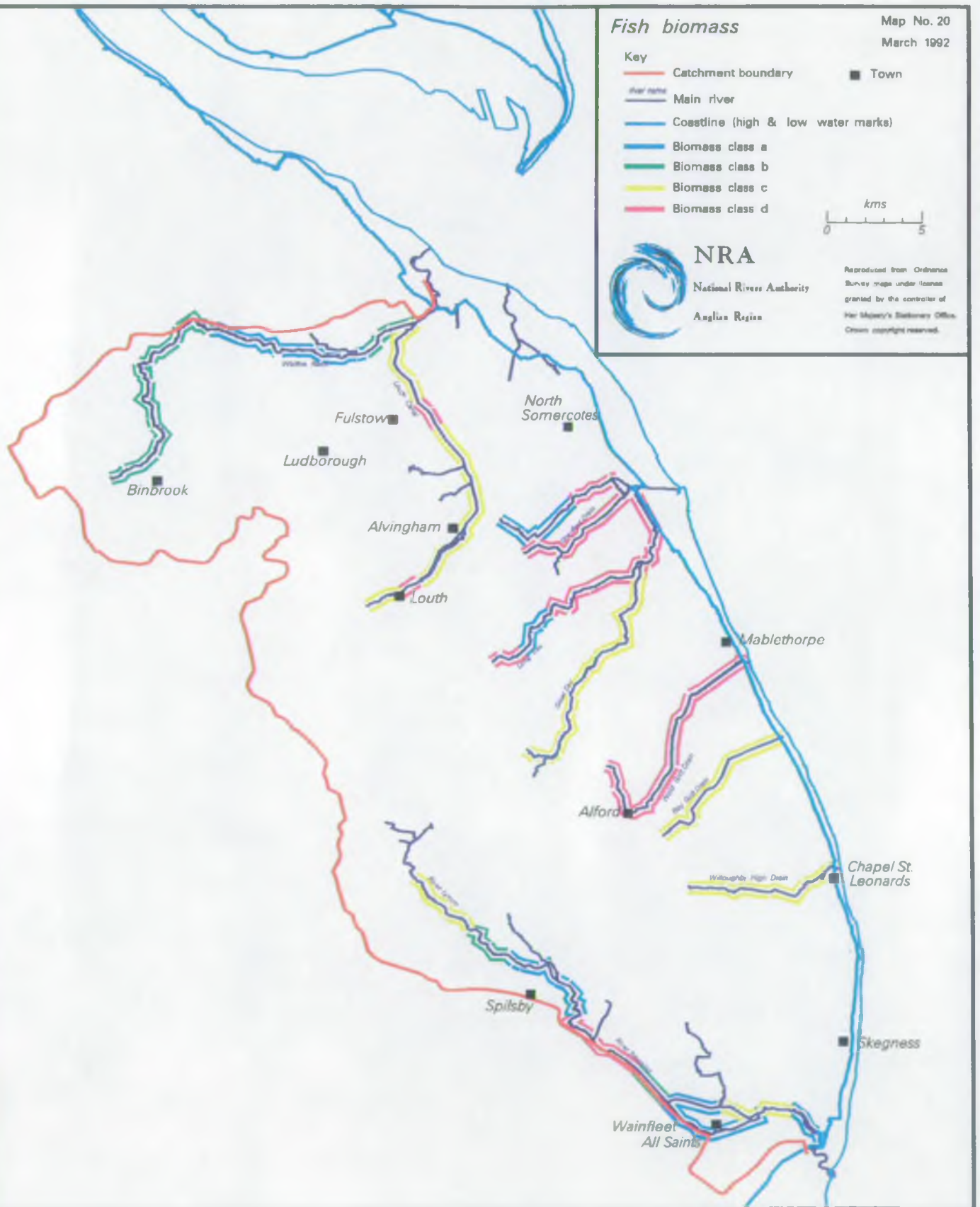


NRA

National Rivers Authority

Anglian Region

Reproduced from Ordnance
Survey maps under license
granted by the controller of
Her Majesty's Stationary Office.
Crown copyright reserved.



3.19 Fisheries

3.19.1 General

This use covers: –

1. Game fisheries i.e. the maintenance of breeding populations of salmonid fish species, namely brown trout in this catchment.
2. Coarse fisheries i.e. the maintenance of breeding populations of coarse fish species.

The NRA has duties to maintain, improve and develop 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.

3.19.2 Local Perspective

The NRA undertake fish population surveys on major rivers on a 3 years rolling programme. Extensive data on fish populations is collected and this has been used to calculate 2 fisheries classification systems (see maps). Traditionally fisheries classification has been based purely on fish biomass but this has been extended to include physical river features, namely width and gradient. The diagrams grade rivers on a A to D scale for biomass (diagram 1) and species richness (diagram 2). In general terms the Waithe Beck and the River Steeping contain a relatively rich fish fauna at a good (A/B) biomass. The remaining rivers generally show an impoverished fish fauna except for reaches on the Great Eau and Louth Canal.

The presence of brook lamprey on the River Lymn is notable as is the occurrence of grayling on the Upper Great Eau which is a section of river that also experiences occasional stocking with brown trout. Rainbow trout, a non – native species occurs on the upper reaches of the Louth Canal, Great Eau and the River Lymn. This species does not breed in these waters and its occurrence is attributable to either escapees from fish farms and/or illegal stockings.

3.19.3 Environmental Objectives

- The overall objective is to sustain a natural fish population appropriate to the catchment and achieve class A on both classification systems.

3.19.4 Environmental Requirements

Water Quality:

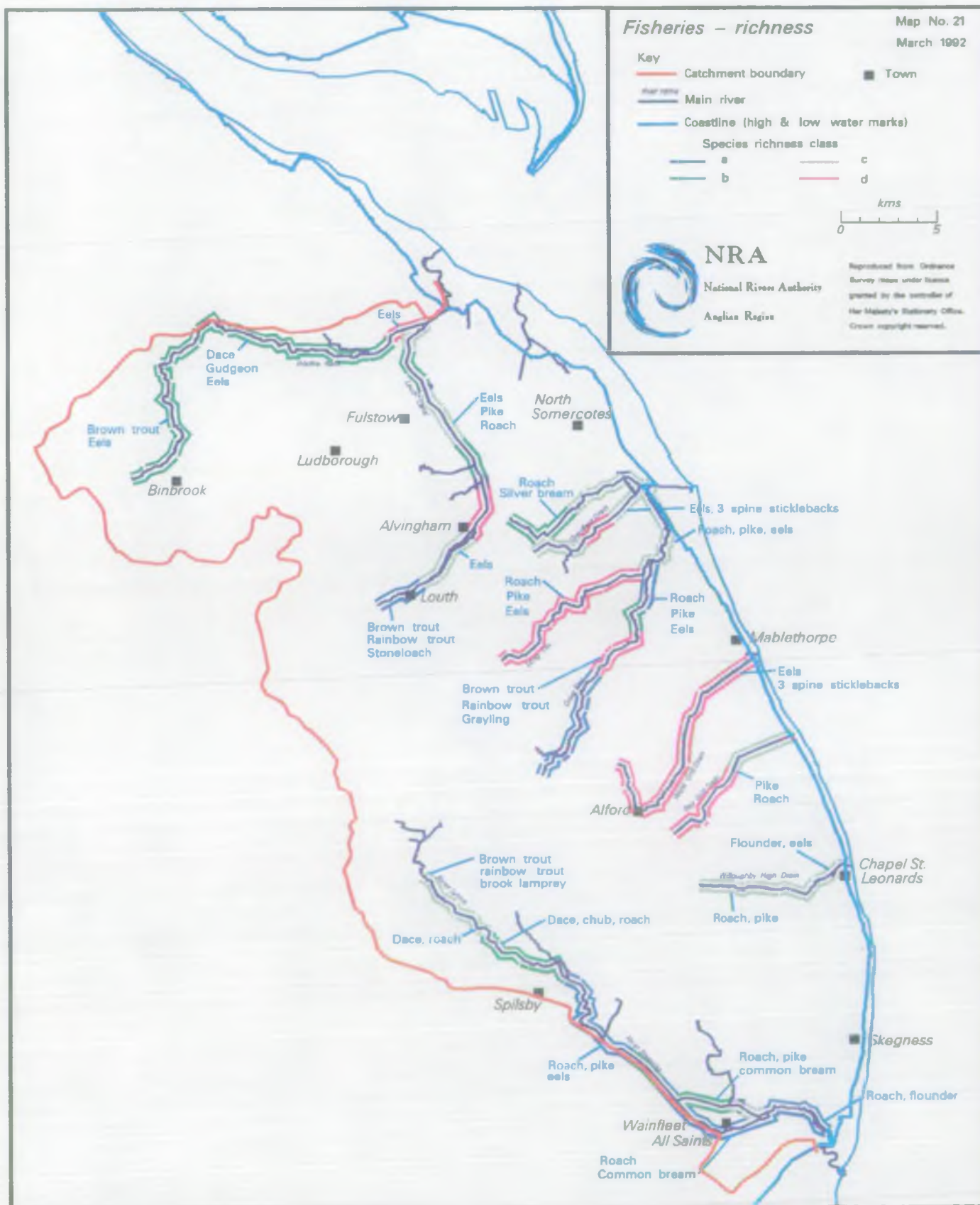
- River stretches suitable for brown trout are not to deteriorate below the limits for pollutants as specified in the EC Fisheries Directive (78/659/EC) for salmonid fish.
- The remaining river stretches downstream to the demarkation points not to deteriorate below the limits for pollutants as specified in the same EC Directive but for coarse fish species.
- Compliance with appropriate NRA Statutory Water Quality Objectives for fisheries.

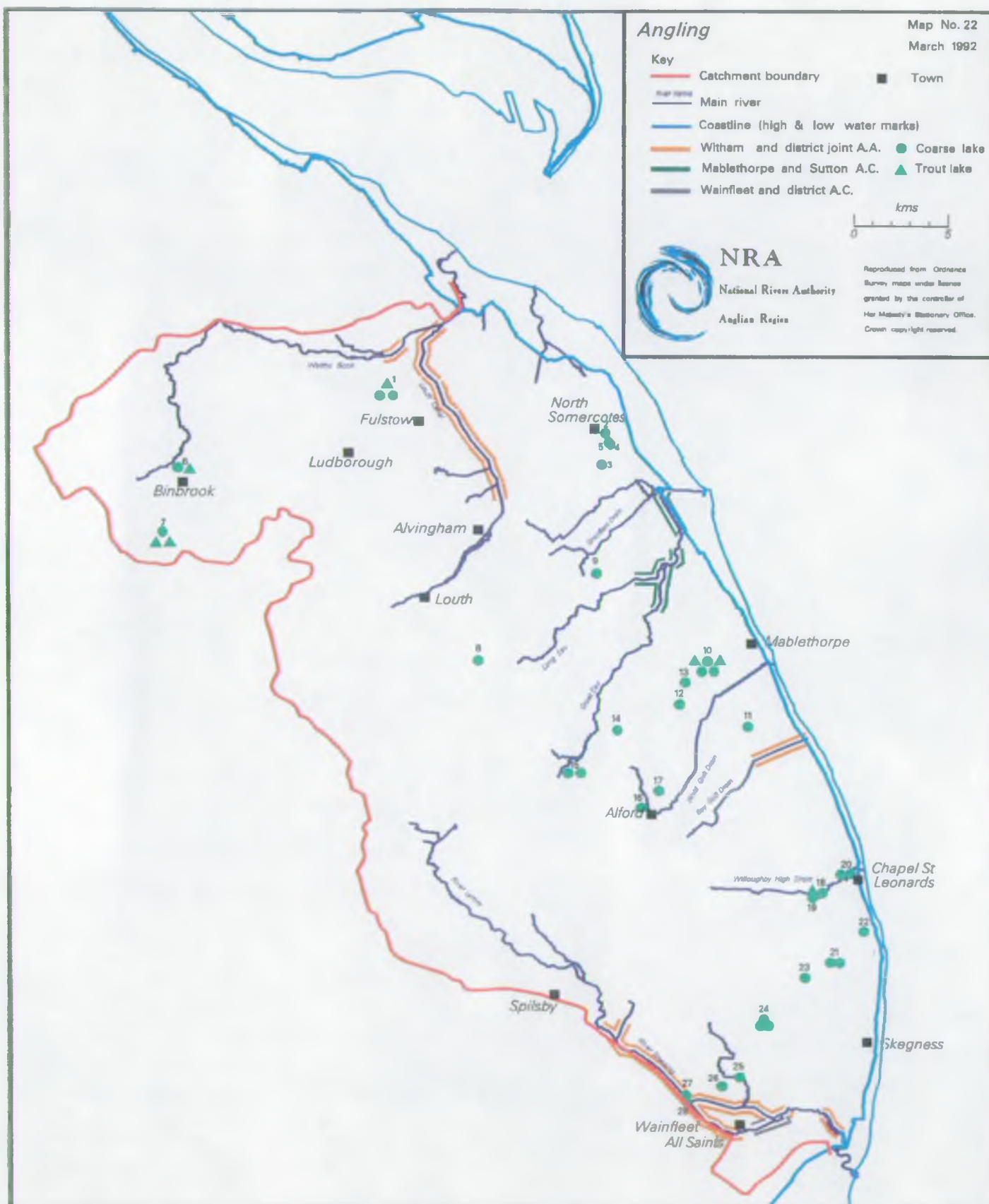
Water Quantity:

- A variable flow regime where the monthly average reflects the natural flow conditions in the river. The natural mean monthly flow not to decline below the historic monthly Q90 except during drought conditions. Under spate conditions the release of water through sea doors to be gradually increased in order to minimise the sudden flushing of fish out of the river system.

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 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 diversity where practical.





3.20 Angling and Commercial Exploitation of Eels

3.20.1 General

The use specifically relates to the use of the catchment by anglers and commercial eel fishermen.

3.20.2 Local Perspective

Angling for brown and rainbow trout and grayling on the Upper Great Eau and some exploitation for trout occurs on the Waithe Beck. Commercial fishing for trout also occurs on 7 lake fisheries in the catchment. Coarse fishing occurs in varying degrees on all rivers in the catchment. The principal coarse fisheries and their lessees are shown and they occur on the lowland reaches of the catchment. Coarse anglers often carry large quantities of fishing tackle and tend not to walk great distances along river banks. Consequently, coarse angling is usually concentrated around bridges and other access points where car parking is available. Additionally sea angling takes place along the whole of the coastline.

Commercial eel fishing also occurs on the lowland reaches of the catchment. Several waters within the catchment are leased to specific fishermen. Eel fishing is undertaken with a variety of licensed traps but principally with a fyke net, which is a conical net (with inscales) that has 1 or 2 leaders. Fyke nets are set on the bed of the river, generally in deep water. The season of eel fishing is from spring to late autumn, and in autumn 'silver' eels (i.e. eels migrating back to sea) are caught in addition to 'brown' eels.

The fishing for sea fish, crabs, lobsters and shellfish comes under the jurisdiction of the North Eastern Sea Fisheries Committee. They are responsible for enforcing parts of the sea fishery legislation, including the Sea Fisheries Regulations. The NRA has a responsibility under the Salmon and Freshwater Fisheries Act for salmon, trout, freshwater fish or eels in tidal waters out to six nautical miles. A small number of net licences have been issued in the past to fish for salmon and sea trout.

3.20.3 Objectives & Standards

- To provide suitable and safe conditions for successful angling and commercial eel fishing.

3.20.4 Environmental Requirements

Water Quality:

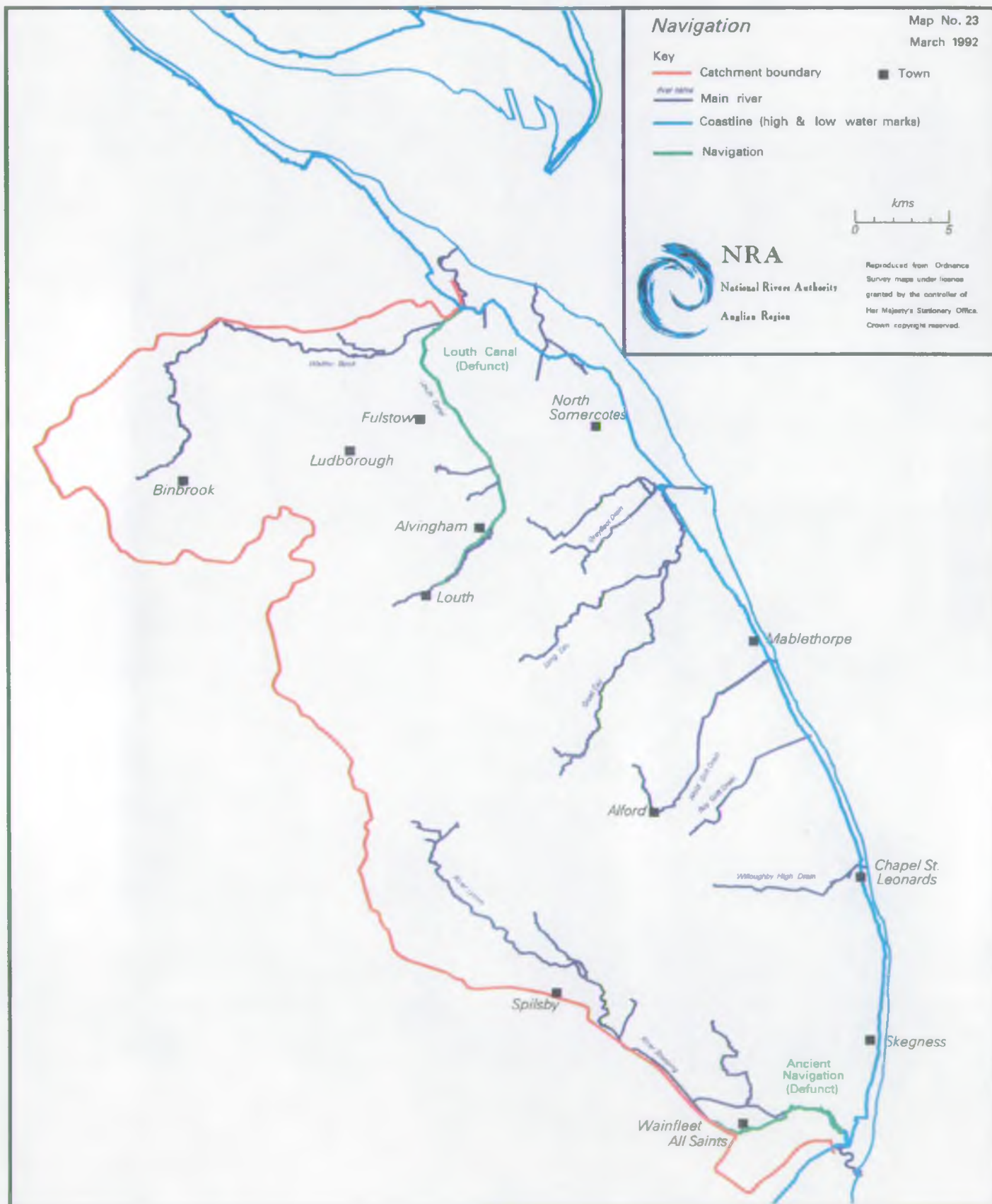
- To be of sufficient quality to comply with the basic amenity quality of the water body.
- To be aesthetically acceptable in order to enhance angling i.e. water to be free from surface films and extraneous floating material, discolouration and unpleasant odours.
- To comply with appropriate Water Quality Objectives for Fisheries.

Water Quantity:

- Requirements as in Fisheries including the gradual release of spate flows through sea doors to prevent the flushing of fyke nets out of the river system.

Physical Features:

- The maintenance of sufficient access points for angling and for eel fishermen.
- The maintenance of a mixture of open water as well as instream and bankside vegetation.



3.21 Navigation

3.21.1 General

This use relates to waterways providing navigation facilities.

3.21.2 Local Perspective

Louth Canal, constructed in the late 1700's, provided for navigation between Riverhead Louth and the River Humber. There were 7 no. locks, a sea lock at Tetney and 9 no. swing bridges.

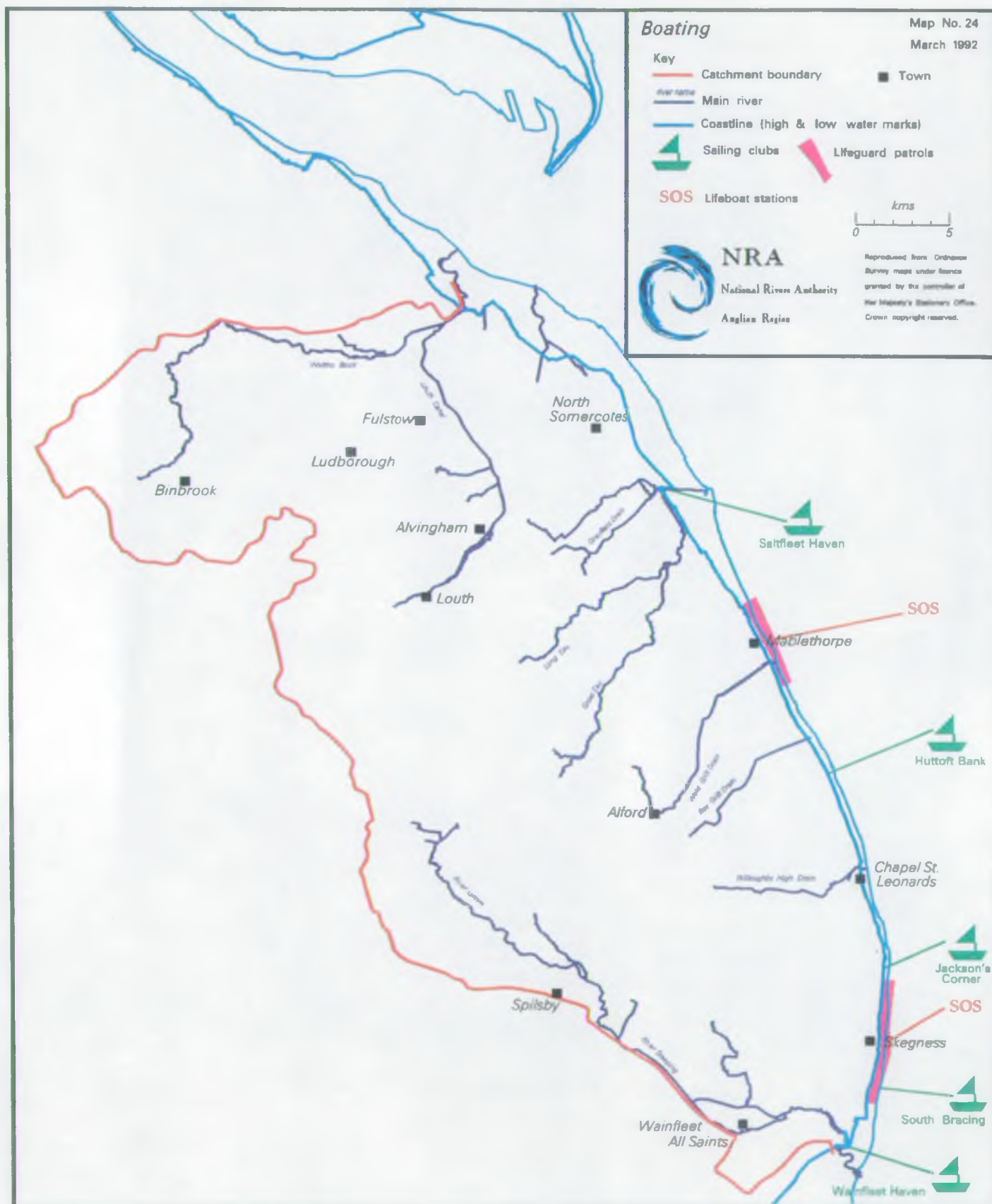
Having fallen into disuse the Canal has become the arterial watercourse for the whole catchment to the north and west, the locks survive but without lock gates and now act as weirs whilst all the bridges have been reconstructed as fixed spans.

There is evidence that Wainfleet Haven/Steeping River was used as a navigation between Gibraltar Point and Wainfleet Bank, but this facility no longer exists and the watercourse now functions as the arterial drain for its catchment.

3.21.3 Environmental Objectives

Louth Canal:

- 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.
- To restore the canal to full operational use as a navigation for amenity and commercial use.



3.22 Boating

3.22.1 General

This use deals with recreational boating, both sailing and powered craft in the rivers and tidal waters.

3.22.2 Local Perspective

Rivers:

The scope for sailing is limited because the river channels are generally too narrow and the headroom at bridges insufficient for other than very small boats. Small powered dinghies and inflatables are occasionally to be found on the Steeping River and on a very casual basis in other rivers, similarly rowing boats may be used in stretches of all the main rivers but they are usually a riparian owner's pastime.

Most of the wider waterways are embanked channels with limited or non existent facilities for launching boats and poor access.

There are no existing clubs or life - saving facilities available to this use.

Tidal Waters:

There are five established Sailing Clubs on the coast at Saltfleet Haven, Huttoft Bank, Jackson's Corner Ingoldmells, South Bracing Skegness and Wainfleet Haven. The Haven clubs have permanent moorings within the channel whilst the other three clubs beach launch and retrieve the boats on each occasion. Consequently the size of craft is distinctly different between the two types of use.

The tide dictates the ability to leave the moorings, whereas launching from the beach is not similarly restricted. The coastal waters are also used seasonally by holiday - makers and day visitors with a great variety of craft, from inflatables to high powered speed boats launched from the beach.

There are numerous points of access for this use, some frontages are patrolled by lifeguards provided by ELDC and the coastguard have a presence. The RNLI operates inshore life boats from Skegness and Mablethorpe.

3.22.3 Environmental Objectives

Water Quality:

Rivers and Tidal Waters:

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

Water Quantity:

Rivers:

To maintain sufficient depth of water to permit the use of suitable boats.

Tidal Waters:

To maintain sufficient residual flows to ensure that tidal havens do not silt up thereby limiting the period of use of sea – going boats.

Physical Features:

Rivers:

To maintain havens free of silt and beaches with sufficient sand cover to enable boat trailers to reach the water's edge.

3.23 Immersion Sports

3.23.1 General

This use deals with those sports such as canoeing, water – skiing and swimming where intimate contact with the water occurs.

3.23.2 Local Perspective

Rivers:

The NRA discourages swimming in all rivers primarily because of the risk of drowning but also because of the possibility of swimmers catching water borne diseases.

There are no specific sites where canoeing takes place and it is discouraged at weirs and sluices. However, the Sea Scouts have purpose built facilities at Riverhead Louth and some novice canoeing takes place along the Louth Canal. Covenham Reservoir is used for water skiing, sailing and sub – aqua and there is provision for cable water skiing at a new site near Skegness.

Tidal Waters:

This use is regularly enjoyed during the months of May to September along the coast between Mablethorpe and Skegness, concentrated at holiday resorts and principal access points.

3.23.3 Environmental Objectives

Rivers:

To maintain water quality, water resources and river conditions so as to:

- protect those involved in immersion sports
- provide suitable conditions for these activities

Tidal Waters:

To maintain quality to standards set down for bathing waters in accordance with the EC Bathing Waters Directive. To provide safe stable beaches and organise the use to ensure safety for multiple use in confined areas.

Map No. 26
March 1992

■ Town

river name

— Coastline (high & low water marks)

X End of stretch

kms

A horizontal number line with arrows at both ends. It has major tick marks labeled 0, 1, 2, 3, 4, and 5. Between each pair of consecutive integers, there is a smaller tick mark representing the midpoint (e.g., 0.5, 1.5, etc.).



NRA

National Rivers Authority

Anglian Region

Reproduced from Ordnance
Survey maps under licence
granted by the controller of
Her Majesty's Stationery Office.
Crown copyright reserved.

Key

SI – Spray irrigation
GE – General ecosystem
F1 – Salmonid fishery
F2 – Cyprinid fishery
LW – Livestock watering
LA – Low amenity
MA – Moderate amenity
HA – High amenity
PI – Potable water supply via impoundment

4.0 CATCHMENT TARGETS

4.1 Future Targets – Water Quality

4.1.1 Water Quality

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

- i) Compliance with River Quality Objectives (RQO's)
- ii) National Water Council (NWC) target classes.
- iii) Biological target classes.
- iv) Compliance with relevant EC Directives.

River Quality Objectives are based upon water quality requirements for different river uses. These include potable water supply (PWS), fisheries supporting a breeding population of trout (F1), fisheries supporting a breeding population of non – salmonid fish (F2), industrial water supply (IWS), spray irrigation (SI), livestock watering (LW), high amenity (HA), moderate amenity (MA) and low amenity (LA).

National Water Council target classes 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 and X.

Biological classification, by reference to the presence and abundance of species, provides a better indication of subject water quality than sampling and analysis for some chemical parameters.

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

During 1992, the NRA will be producing a series of statutory Water Quality Objectives. These objectives will encompass all the control measures previously indicated and provide a clear indication of the desired water quality in a given length of watercourse. Excluding natural features, the degree to which each watercourse complies with its objectives could be regarded as a measure of the effectiveness of the NRA in controlling pollution.

4.1.2 Special and General Ecosystems

Biological monitoring is to be undertaken on the following waters:

Special Ecosystem:

Tetney Blow Wells (SSSI)
Claxby Spring (CTF) and Burlands Beck
Ketsby Beck
River Lymn (Partney to Mill Bridge)

Other Waters of more General Interest:

Waithe Beck upstream of Holton le Clay
Louth Canal upstream of Louth
Long Eau upstream of Little Carlton
Great Eau upstream of Tothill
Main Drain upstream of Willoughby
River Lymn upstream of Partney

4.1.3 Change of Use

- 1) Sykes Drain, The Cut and The South Dyke – extend use to include F2. Quality to be monitored.
- 2) Lower Great Eau downstream of Cloves Bridge – extend use to include F2 fishery. Quality to be monitored.
- 3) Upper reaches of Wold Grift Drain – extend use to include F2 fishery.

4.1.4 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 recover. 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. Therefore statutory Quality Objectives for groundwaters will be developed by the NRA during 1992.

Future Targets Water Quantity

Map No. 27
March 1992

Key

— Catchment boundary

river name

— Main river

■ Town

— Coastline

Area where sandstone fed springflows depleted by reduced groundwater level

Area where chalk fed springflows depleted by reduced groundwater levels

Area where cone of depression formed by abstraction from sandstone

Area where saline water present in chalk



NRA

National Rivers Authority

Anglian Region

0 5
kms

Reproduced from Ordnance Survey maps under licence granted by the controller of Her Majesty's Stationery Office. Crown copyright reserved.

X MRF and /or control structure required

Tetney Blow Wells
MRF: 5 tcmd
(Q95)

Brigsley
MRF: 7.5 tcmd
(Q90)

Tetney Weir
MRF: 18 tcmd (Q95)
MCL: 0.0 MODN

Walthe Beck

Fulstow
Covenham Reservoir
Ludborough

Binbrook

North Somercotes

Increase in water level

Alvingham
MRF: 14 tcmd
(Q90)

Louth

Little Carlton
MRF: 2 tcmd
(Q90)

Long River

Claythorpe
MRF: 27 tcmd
(Q90)

Alford

Wald Gull Drain
Bay Gull Drain

Mablethorpe

Chapel St. Leonards

Partney
MRF: 27 tcmd
(Q90)

Spilsby

Wainfleet
All Saints

Skegness

Wroughton High Drain

River Lutter

Louth Canal

4.2 Water Quantity Target

4.2.1 General

This section considers the requirements for both meeting existing and future abstraction water demand in the catchment and for minimum residual flows (MRF's) and minimum control levels (MCL's) to protect in - river needs of environmental waters.

4.2.2 Local Perspective

Water Abstraction Targets:

The NRA has yet to establish formal policy with regard to supply objectives, but the following are put forward for discussion:

The target for all current and future abstractive uses is: -

- 1) to meet all reasonable demands to the Authority's stated levels of service (ie reliability) within quality criteria described in the Authority's Water Quality Objectives.

The use - related levels of service are as follows:

Public Water Supply

- risk of hosepipe ban restrictions not greater than 1 year in 10.
- need for voluntary savings of water not greater than 1 year in 20.
- risk of standpipes not greater than 1 year in 100.

Spray Irrigation - risk of restrictions not greater than 1 year in 12.

- 2) To set MRF's and MCL's to protect the in - river needs of environmental waters.
- 3) To ensure the best utilisation of water resources and the efficient use of water within the catchment.

4.2.3 In – River Needs of Environmental Waters

Surface Waters:

In sub – catchments where there is significant water abstraction (Waithe Beck, Lud, Great and Long Eau, Lymn/Steeping) minimum flow and level controls are necessary to ensure the resource is not overcommitted in dry or drought years at the expense of other water uses. Provisionally a general MRF equivalent to the 90 percentile (Q90) flow (that flow which is exceeded 90% of the time) may be used as a target flow at key points on the river. In retained water level reaches MCL's are also set to ensure minimum depths of water. Additional structures may be required to achieve MCL's.

In some sub – catchments MRF's at specific locations are required to provide dilution for effluent discharges.

In all sub – catchments MRF's and/or control structures are required at the tidal limit to protect the rivers from saline intrusion. MRF's equivalent to the 95 percentile (Q95) flow may be used as the target flow at these locations.

Groundwaters:

In dry/drought summer conditions, springflow discharges from groundwater reservoirs to sustain surface water flows. Those areas of the Chalk and Spilsby Sandstone which require particular protection from any long term groundwater level decline are specified. Other areas requiring similar protection to prevent migration of saline waters are also specified. General protection from long term level decline is required over the whole area to protect existing uses and users of groundwater.

Future Targets Physical Features

Map No. 28
March 1992

Key

- Catchment boundary
- Main river
- Coastline (high & low water marks)

Fluvial Features

- Floodwall reconstruction
- Embankment improvement
- Improve instream and bankside habitat diversity



NRA
National Rivers Authority
Anglian Region

0 5
kms

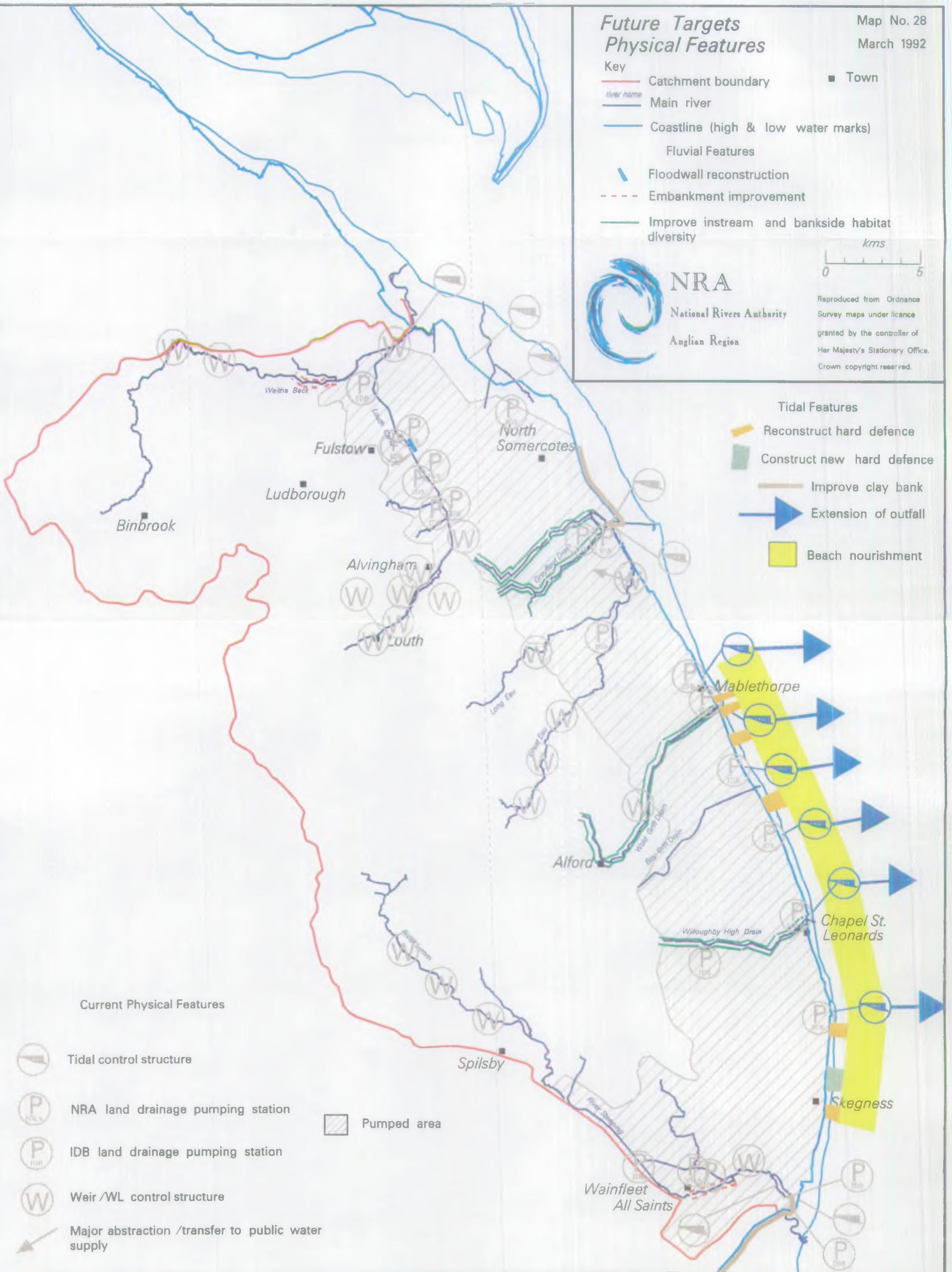
Reproduced from Ordnance
Survey maps under licence
granted by the controller of
Her Majesty's Stationery Office.
Crown copyright reserved.

Tidal Features

- Reconstruct hard defence
- Construct new hard defence
- Improve clay bank
- Extension of outfall
- Beach nourishment

Current Physical Features

- Tidal control structure
- NRA land drainage pumping station
- IDB land drainage pumping station
- Weir /WL control structure
- Major abstraction /transfer to public water supply
- Pumped area



4.3 Physical Features Targets

4.3.1 General

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

The intention is not to identify specific requirements at particular locations but to indicate the major physical features, requirements for various reaches in relation to the uses concerned.

4.3.2 Local Perspective

There are a large number of uses in the catchment with their own physical features requirements. The map shows the areas where for a particular use, a specific requirement exists.

In addition to the requirements identified on the map the following general requirements are also considered targets for the catchment:

- No increase in flood risk as a result of development.
- No new development in an area where the existing level of service is considered below the standard required for the type of development proposed.
- Presence of uncultivated vegetation along the river/ sea defence to provide habitats, shade and cover for wildlife/fish, a buffer against diffuse pollution and to enhance the quality of the river corridor landscape.
- Control access to the river to minimise damage.
- Ensure provision of suitable access for maintenance of the river/channel and sea defences.
- No development that would reduce the conservation value of the river corridor.
- Promote initiatives through routine maintenance that would increase the conservation value of the river corridor.

- Presence of natural features such as emergent vegetation, meanders, pools and riffles for conversation of the river corridors and to enhance the landscape quality.
- River flow area/profile should be appropriate to the flow regime of the particular reach.
- Maintenance and ditch clearance regime which encourages and not destroys ecological diversity, whilst maintaining flood defence level of service.
- Co – operation with others responsible to ensure river corridors are free from litter and other imported debris.
- Operation of flood defence structures to ensure protection of all identified uses.

The requirements for the specific uses shown on the map are detailed in the following table.

<u>Uses</u>	<u>Requirements</u>
Development	<ul style="list-style-type: none"> - Provide appropriate flood defence level of protection. - Provide anti – pollution infrastructure as part of development.
Boating Immersion Sports	<ul style="list-style-type: none"> - Maintain havens free from silt and beaches with sufficient cover to enable access to the waters edge.
Water Power	<ul style="list-style-type: none"> - Maintain millstreams free from silt, weed and obstructions to enable continued use.
Flood Water - Storage	<ul style="list-style-type: none"> - Create flood storage areas, designed wetlands and water meadows.
Flood Defence	<ul style="list-style-type: none"> - Maintain and improve appropriately, flood defences to provide adequate level of service.
P.W.S (Surface) (Agricultural) (Industrial Abstraction)	<ul style="list-style-type: none"> - Provide control structures and flow monitoring facilities to ensure efficient resource management. Promote winter storage facilities.

- | | | |
|-------------------------|---|--|
| Amenity | - | Maintain and appropriately improve access and associated facilities. |
| Mineral
Abstraction | - | Promote creation of water areas in restoration programmes. |
| Livestock
Watering | - | Restrict access to minimise trampling erosion. |
| P.W.S. -
Groundwater | - | Promote the use of soakaway/recharge drainage systems for proposed development. |
| Angling | - | Endeavour to provide sufficient access and maintain mixture of open water together with instream and drainable bankside vegetation. Provide adequate level control. |
| Fisheries | - | Endeavour to provide and maintain a diversity of natural river features to ensure variety of habitat to maximise production of fish populations. Provide and maintain bankside vegetation to provide adequate shade and cover. |
| Conservation | - | Provide wetland; meadowland habitat and instream and bankside habitat. Co-operate with Countryside Commission for the development of wetland habitat under the Stewardship Scheme. |

State of the Catchment Water Quality

Map No. 29
March 1992

Key

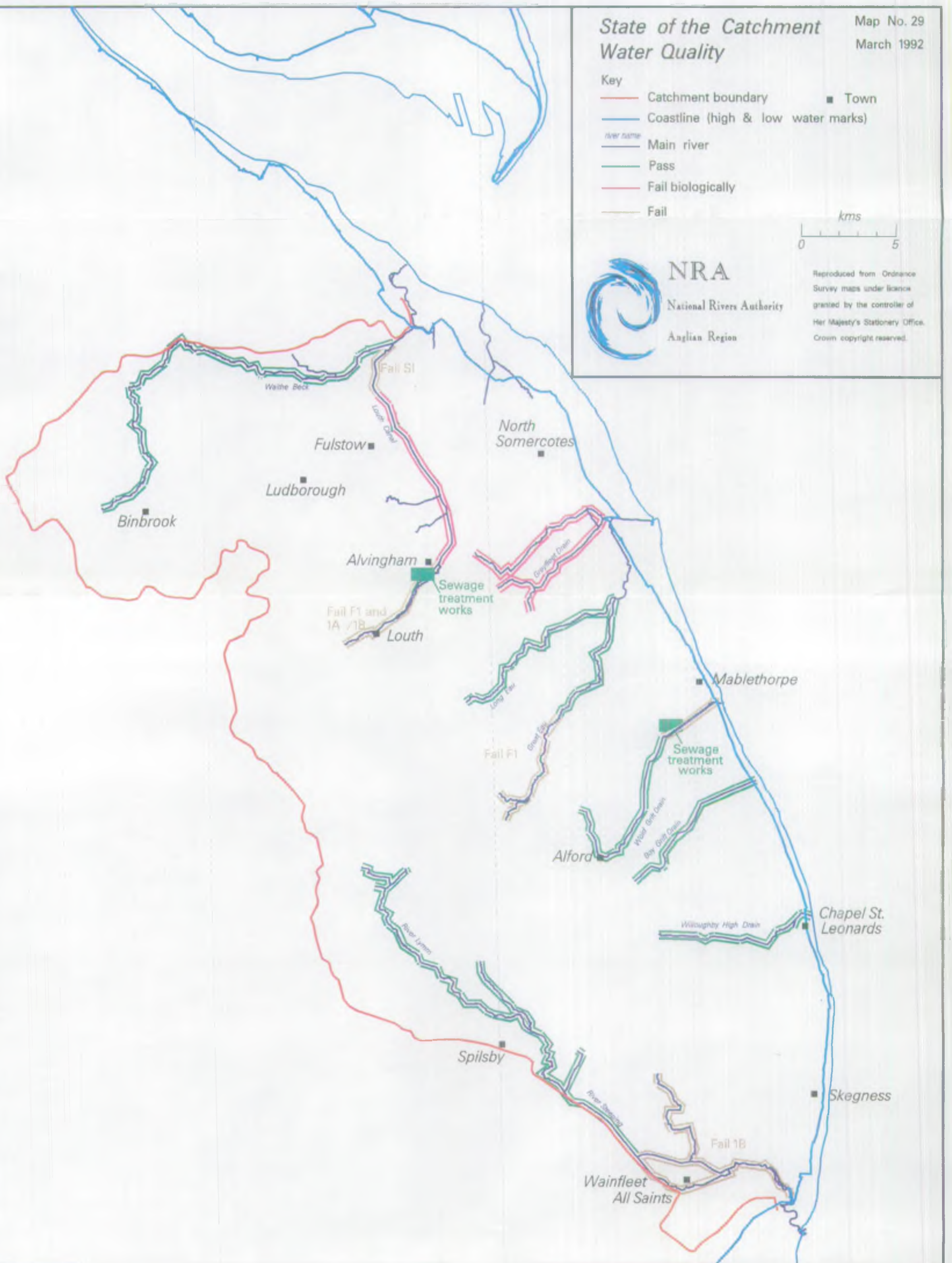
- Catchment boundary
- Coastline (high & low water marks)
- Main river
- Pass
- Fail biologically
- Fail
- Town

kms
0 5



NRA
National Rivers Authority
Anglian Region

Reproduced from Ordnance Survey maps under licence granted by the controller of Her Majesty's Stationery Office. Crown copyright reserved.





5.0 CURRENT STATE OF THE CATCHMENT

5.1 State of Catchment – 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 quality sampling has been used to facilitate this comparison.

The map identifies failures to both meet the use related targets and failures to meet the NWC river classification.

5.1.2 Issues Identified

Several issues have been identified with respect to water quality and are shown on the map.

- 1) River Lud – Headwaters to Ticklepenny Lock – this stretch is designated as a F1 fishery but consistently fails to achieve this. Upstream of Louth no significant discharges occur and failure has been attributed to low flows. Through Louth and downstream to Louth STW, failure has been related to low flows combined with overflows from the town's sewerage system, ie storm overflows.
- 2) Louth Canal downstream of Louth STW – the drought conditions of recent years has reduced the dilution available for STW effluent. This has had a detrimental impact on the biology of the river, the discharge currently complies with its consent.
- 3) Louth Canal – Saline Intrusion – 2 sources of saline water entering the Canal have been identified. The most obvious source is via the tilting weir at Tetney, in addition saline water has been pumped into the canal via Louth IDB Biergate Pumping Station. Saline intrusion at Tetney is partially due to low flows associated with the drought. Flows in the canal are insufficient to flush saline water out of the freshwater system and to prevent siltations in Tetney Haven. Alternative drainage arrangements are being considered for the IDB system.

- 4) Greyfleet Drain/South Dyke System – low flows associated with the drought combined with saline intrusion has caused water quality to deteriorate in this system. This has had a serious impact on the general biology of the system resulting in the concentration of fish in the upper reaches.
- 5) Upper Great Eau – A combination of low flows associated with the drought and the impact of effluent from local trout farms, has resulted in this stretch failing to achieve its F1 status.
- 6) Lower Great Eau – downstream of Cloves Bridge – this section also suffers from saline intrusion.
- 7) Woldgrift Drain downstream of Mablethorpe STW – this stretch fails to achieve its target of F2. Failure is attributed to poor effluent quality from the STW. Recent improvement at STWs should improve conditions.
- 8) River Steeping – Although this stretch passed the F2 target it failed to achieve the NWC class 1B.
- 9) The catchment serving the Binbrook public water supply abstraction point is likely to be designated as a "polluted groundwater" as a consequence of implementation of the EC Nitrate Directive. Farming practice with respect to the application of Nitrate fertilizer will be required to conform to a code of good agricultural practice.
- 10) Waste Disposal Sites – Current monitoring is unable to demonstrate that Waste Disposal activity is not having a detrimental effect on water quality. Additional monitoring will be required in future for relevant waste disposal activity.

State of the Catchment Water Quantity

Map No. 30

March 1992

Key

- Catchment boundary
- Coastline (high & low water marks)
- river name Main river
- Town

- Area where sandstone fed springflows depleted by reduced groundwater level
- Area where chalk fed springflows depleted by reduced groundwater levels
- Area where cone of depression formed by abstraction from sandstone
- Area where saline water present in chalk



NRA

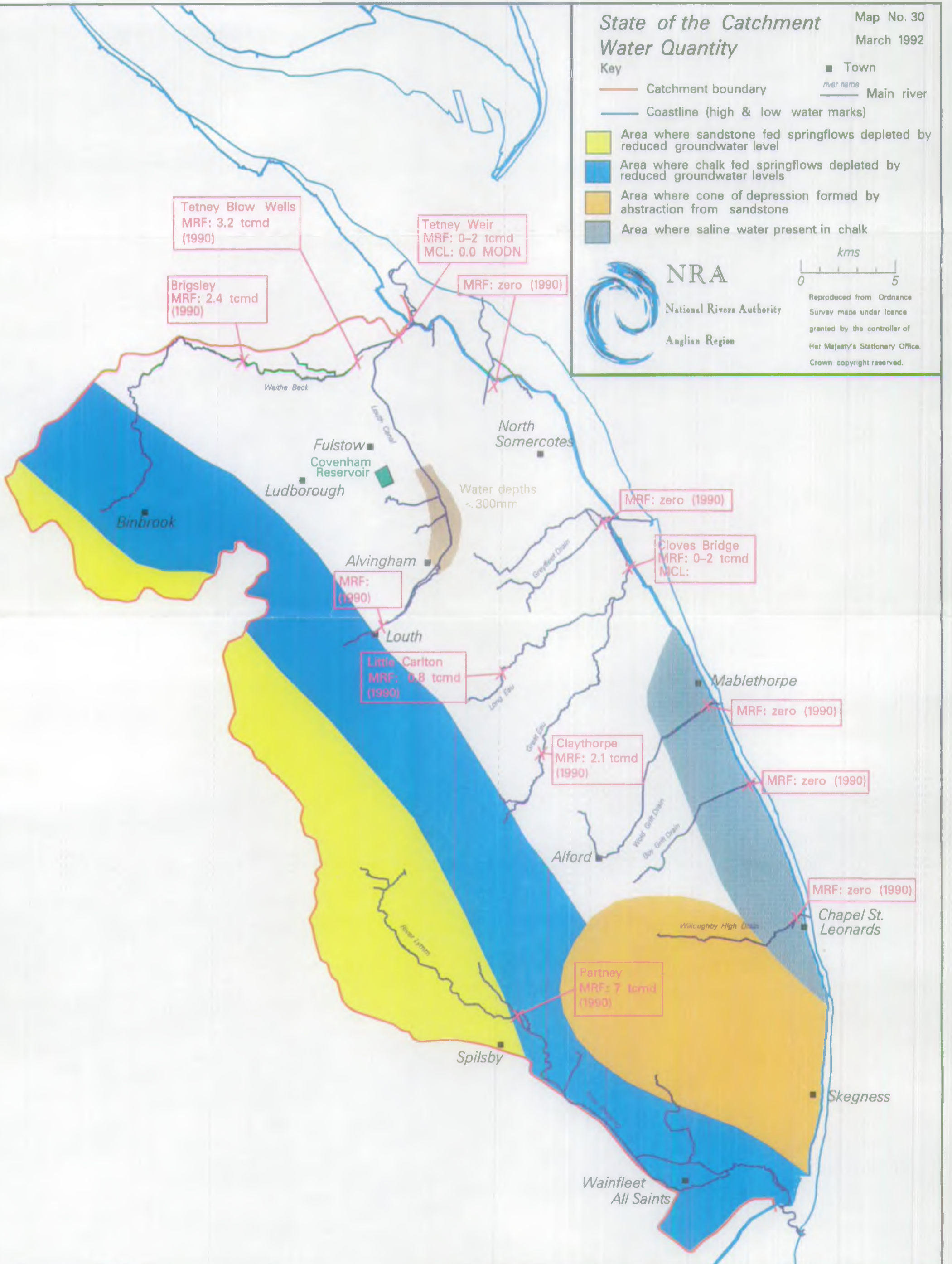
National Rivers Authority

Anglian Region

kms

0 5

Reproduced from Ordnance
Survey maps under licence
granted by the controller of
Her Majesty's Stationary Office.
Crown copyright reserved.



5.2 State of Catchment – Water Quantity

5.2.1 General

Objectives and targets have been set in relation to meeting future demand for water abstraction in the catchment for potable water supply, industrial and agricultural uses. In addition targets have been set for minimum residual river flows and minimum control levels to protect other water uses and users within the catchment.

The present conditions in the catchment are assessed by considering the resource usage and river flow/river level conditions already described.

The current status of the catchment is then obtained by comparison of present conditions with use – related targets.

5.2.2 Issues identified

i) Water Abstraction

- Available water resources in the catchment are inadequate to meet current PWS licensed demand from the Chalk aquifer.
- Available water resources in the catchment are inadequate to meet future PWS demands.
- Available water resources in the catchment are inadequate to meet future industrial demands.
- Available water resources in the catchment are inadequate to reliably meet direct abstraction for spray irrigation in summer.
- Making best use of groundwater resources in the Chalk and Sandstone aquifers south of Louth is limited by the lack of detailed understanding of how the aquifers work and interact.
- Over – abstraction from the Chalk aquifer may lead to depleted spring flows in the west or saline intrusion in the east or derogation of protected rights.
- Over – abstraction from the Spilsby Sandstone aquifer may lead to depleted springflows in the west or saline intrusion in the east or derogation of protected rights.

- The estimated resource potential of the Spilsby Sandstone and the Chalk is based upon groundwater models of the aquifers. The performance of these models need to be monitored.
- ii) Riverflows Models are a good but not perfect representation of the aquifer structures.
- Actual minimum flows in dry/drought years (and/or water retention) are inadequate to prevent widespread saline intrusion into the lower reaches of all rivers and as far upstream as Covenham intake on the Louth Canal.
 - Actual minimum flows in dry/drought years, in the middle and upper reaches of many rivers, are inadequate to meet in - river needs.
 - Actual minimum river levels in the Louth Canal in the Tetney to Alvingham stretch are inadequate to meet in - river needs.
 - Water abstraction from the Chalk seriously depletes springflows in dry/drought years (principally Waithe Beck, Tetney Blow Wells).

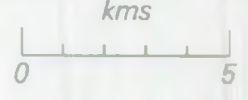
State of the Catchment Physical Features

Map No. 31
March 1992

- Key**
- Catchment boundary
 - Main river
 - Coastline (high & low water marks)
 - Tidal control structure
 - IDB land drainage pumping station
 - Weir/WL control structure
 - Major abstraction / transfer to public water supply
 - Town
 - River embankment
 - Pumped area



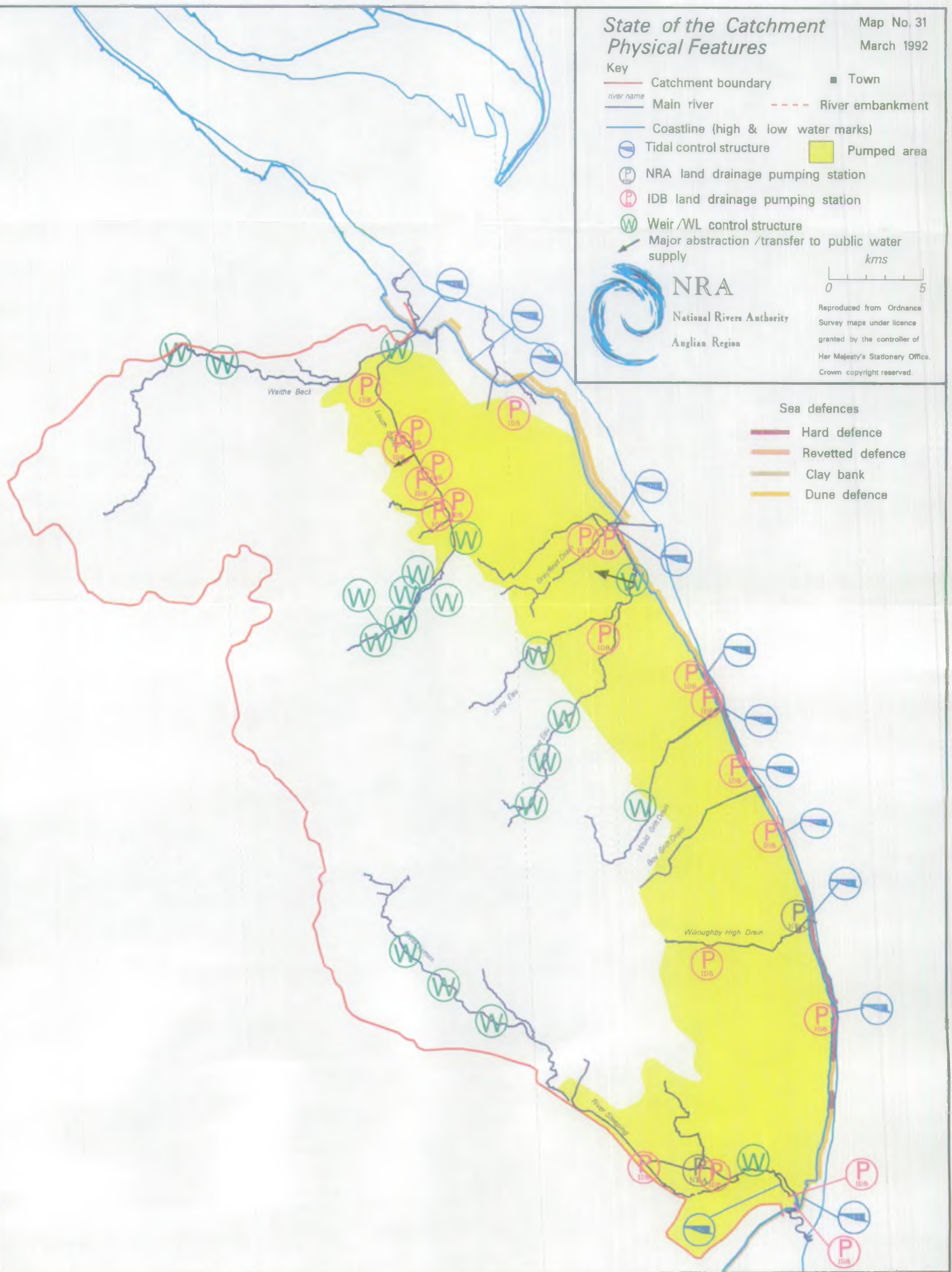
NRA
National Rivers Authority
Anglian Region



Reproduced from Ordnance Survey maps under licence granted by the controller of Her Majesty's Stationery Office. Crown copyright reserved.

Sea defences

- Hard defence
- Revetted defence
- Clay bank
- Dune defence



5.3 State of Catchment – Physical Features

5.3.1 General

Having assessed the requirements for physical features for the future and stated the individual use requirements assessing the current status for this area is difficult. The map opposite identifies current levels of features within the catchment but no direct comparison can be made to identify issues. However, in addition to the requirements identified, in Section 4.3.2, several issues have emerged.

5.3.2 Issues Identified

1. The impact that development/developmental pressures can have upon the water environment on all NRA functions.
2. There are six rivers identified as requiring an increase in bankside and instream habitat diversity.
3. Maintaining an adequate outfall at river havens.

In addition to these issues is the requirement to continue to provide adequate flood protection to both people and property from flooding – both tidal and fluvial. This is provided through an ongoing programme of both new works and maintenance and future works programmed are highlighted on the map in Section 4.3.

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. Comments on the issues and options are 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 Lud – Headwaters to Ticklepenny Lock – Failure to achieve F1 status	
OPTIONS	Responsibility	Advantages	Disadvantages
Review Discharge Consents	NRA	Improved Water Quality	
AWS to uprate sewerage system in Louth Town to remove storm overflows.	AWS Ltd	Ditto	Cost of uprating systems including foul and surface water separation.
ISSUE NO: 2		Louth Canal – Downstream of Louth STW – Reduced dilution flow has affected biology of watercourses.	
Review Discharge Consent at Louth STW.	NRA	Improved Water Quality	Discharge currently meets legal requirements.
Partly included in Issue 1 – Uprating sewerage system/or works to Louth STW.	AWS Ltd	Ditto	Cost to AWS Ltd of uprating sewage treatment facility. (If Issue 1 adopted reduced storm flows may negate need for works at STW).

ISSUE NO: 3		Saline intrusion in Louth Canal affecting PWS, fisheries/conservation uses.	
OPTIONS	Responsibility	Advantages	Disadvantages
Permanent structures to replace clay dams. (Not required if pumping station at Grainthorpe is provided).	Louth IDB	Secure means of reducing saline input. Improved Water Quality.	Possible flood protection reduction.
Provision of pumping station at Grainthorpe Haven.	Louth IDB	See Above. Improve standard of flood protection.	
Ensure compliance with MRF at all times.	NRA	See Above.	
Improved operation of Tetney Weir.	AWS Ltd	See Above.	Reduction in quantity of water available to AWS.
Improvement of intake - Possibly by variable speed pumps.	AWS Ltd	More flexibility and control over water abstraction.	Costs to AWS.
Augment with raw water via pipeline from Toft Newton.	AWS Ltd/NRA	Maintain velocity at outfall.	Cost of transfer. Effects of transferred water on receiving systems ecology.

ISSUE NO: 3 (Continued)		Saline intrusion in Louth Canal affecting PWS, fisheries/conservation.	
OPTIONS	Responsibility	Advantages	Disadvantages
Sacrifice area of land to act as tidal storage to facilitate flushing of the channel.	NRA	Reduce saline intrusion. Conservation benefit from creation of wetland area.	Difficult to find area of land and the cost.
Improved monitoring of water levels and quality.	NRA	Improve Management information.	Cost.
Dredging the channel.	NRA	Maintain velocity through the haven removing siltation problem.	Cost of repeated dredging effects on SSSI.
Suitably designed weir above Tetney Weir on Louth Canal upstream of Waithe Beck confluence.	NRA	Reduce saline contamination. Reduce Covenham intake effects on Waithe Beck.	Cost. Interference with existing flood defences. Effects on AWS LTD licensed abstraction.
ISSUE NO: 4		Insufficient continuous water quality monitoring on Louth Canal.	
Provision of Automatic Water Quality Monitoring Station in the vicinity of Covenham intake. This work is planned to take place in the next 5 years, subject to Annual Appraisal.	NRA	Improve Management information.	Cost.

ISSUE NO: 5		Saline Intrusion in the Grayfleet Drain/South Dyke System.	
OPTIONS	Responsibility	Advantages	Disadvantages
Dredging the Haven	NRA	Maintaining velocity through the haven removing siltation problem.	Cost of repeated dredging. Effects on SSSI and NNR. Disruption of moorings.
Tilting plate weir to cut off ingress upstream of sea doors plus over pumping.		Reduce saline intrusion.	Noise pollution on Residents.
Augmentation of flow from borehole/remote surface water source.	NRA	Maintains minimum velocity and reduces saline intrusion.	Lack of resource from groundwater/cost.
ISSUE NO: 6		Upper Great Eau – Failure of F1 objective.	
Review consents for abstraction and discharges for all trout farms.	NRA/Trout Farms	Improves water quality.	Potential restriction on trout farm activities.
ISSUE NO: 7		Lower Great Eau – Saline intrusion, fails quality objective on chloride level only.	
Construct permanent structure upstream of sea doors.	NRA	Improves water quality.	Cost. Reduces standard of flood protection.
Reclassify as an F2 fishery.	NRA	Compliance with statutory objective for chloride.	Re – classification may not be acceptable.

ISSUE NO: 8		Woldgrift Drain – Failure to meet F2 classification.	
OPTIONS	Responsibility	Advantages	Disadvantages
Ensure compliance with discharge consent following improvement works to Mablethorpe STW.	NRA/AWS Ltd	Failure linked to historic problems which should be overcome by new works commissioned recently.	
Monitoring conditions of consent/review it necessary.	NRA		
Further improvement works at Mablethorpe STW to ensure compliance with EC Bathing Water Directive at haven.	AWS Ltd	Improve water quality.	Cost of works.
ISSUE NO: 9		River Steeping – Failure to achieve NWC classification 1B.	
Increase monitoring over the whole river to improve data.	NRA	Improve management information.	Cost
Reclassify as Class 2 but with no detriment to classification as F2 fishery and <u>no</u> deterioration to water quality.	NRA	Conforms with other similar water bodies.	Re – classification may not be acceptable.
Restrict application of agricultural nutrients and improve nutrient removal from STW effluent to reduce algal/weed growth.	NRA/AWS Ltd/Farmers	Improves water quality.	Requires revision of agricultural practice. Cost of improvement works by AWS Ltd.

ISSUE NO: 10		Binbrook – Likely to be designated as polluted groundwater under the Nitrate Directive.	
OPTIONS	Responsibility	Advantages	Disadvantages
Relinquish licence.	AWS Ltd		Cost.
Recommend as NSA/designate as Source Protection Zone.	NRA/Farmers	Improve water quality.	Requires revision of agricultural practice.
ISSUE NO: 11		Impact of Waste Disposal sites on Water Quality.	
Improve monitoring activities.	NRA/Site operators.	Improves management and identification of leachate effect on water quality.	Cost to NRA and site owners in manpower resources.
ISSUE NO: 12		Available water resources are inadequate to meet current PWS demand from chalk aquifer.	
Amend authorised abstractions to balance supply via negotiation. (Ongoing).	NRA/AWS Ltd	Co – operation can reduce demand on resources.	Cost to NRA/AWS in transfer of requirement from elsewhere.

ISSUE NO: 13		Available water resources in the catchment are inadequate to meet future PWS demands.	
OPTIONS	Responsibility	Advantages	Disadvantages
<p>Meet demand from outside the catchment, e.g. Trent – Witham – Ancholme Scheme.</p> <p>via 1. Piped treated water. 2. Raw water transfer.</p>	<p>1. AWS Ltd. 2. NRA/AWS Ltd.</p>	<p>Reduces pressure on catchment sources which has enormous environmental benefits.</p>	<p>Dependent on availability of outside resources.</p> <p>Cost of transfer to NRA/AWS Ltd. Effect on system ecology – inappropriate use of chalk streams for transferred waters.</p>
ISSUE NO: 14		Available water resources in the catchment are inadequate to meet future industrial demands.	
OPTIONS	Responsibility	Advantages	Disadvantages
<p>Take from PWS.</p> <p>Direct surface water abstraction from water transferred from outside the catchment.</p>	<p>AWS</p> <p>NRA</p>	<p>Reduces pressure on catchment sources which has enormous environmental benefits. Industrial demands can be met.</p>	<p>Cost to industry – depletion of scarce supply.</p> <p>Derogation of existing users. Cost of transfer to NRA. Effect on chalk river ecosystems.</p>

ISSUE NO: 15		Cannot reliably meet demand for spray irrigation in summer months.	
OPTIONS	Responsibility	Advantages	Disadvantages
Provide winter storage for summer use – subject to maintaining minimum flows.	Spray irrigators.	More reliable supply. Reduces summer demand on water courses.	Cost of construction. Subject to Planning Control. Monitoring storage facility integrity.
Augmentation of water courses.	NRA	See Issue 13.	See Issue 13.
Review licence controls and ensure minimum control levels are set.	NRA	Balance demand on summer resource.	Cost of compensation.
Introduce restrictions on usage to ensure environmental quality standards are maintained.	NRA	Maintains water quality. In severe drought years environmental damage is reduced.	Increased cost to NRA (Enforcement) Reduced profit to agricultural interests.
Provision of winter/flood water storage reservoirs.	NRA/Users/ IDB's.	Reduce demand on summer resource. Reservoirs have environmental benefits.	Cost of construction. Planning restrictions. Monitoring of integrity. Cost of monitoring release to negate environmental effects.

ISSUE NO: 15 (Continued)		Cannot reliably meet demand for spray irrigation in summer months.	
OPTIONS	Responsibility	Advantages	Disadvantages
Retention of higher levels during summer in IDB lowland system.	IDB's	Reduce demand on summer resource.	Reduction of flash flood capacity in lowland system. Increased cost of weed control.
ISSUE NO: 16		Lack of understanding of the workings of groundwater south of Louth.	
Develop plans/models to improve understanding.	NRA	Improved aquifer management.	Cost of investigations.
ISSUE NO: 17		Over abstraction from chalk aquifer leading to depleted spring flows.	
Cut back licensed abstraction to sustain spring flows and associated wetland areas in dry periods.	NRA/AWS Ltd	Secures environmental needs.	Effects on AWS Ltd requirements. Improper use of resource as reduction in abstraction required would be in excess of spring flow produced.
ISSUE NO: 18		Spilsby Sandstone – Over abstraction <u>may</u> lead to depleted spring flows or saline intrusion.	
Consider the redistribution of abstraction sources with time limited licences. (Being undertaken).	NRA/AWS Ltd	Increase/maintain outflows.	Impair AWS abstraction. Deplete aquifer where sources redistributed to.

ISSUE NO: 18 (Continued)		Spilsby Sandstone – Over abstraction <u>may</u> lead to depleted spring flows or saline intrusion.	
OPTIONS	Responsibility	Advantages	Disadvantages
Undertake enhanced monitoring and improved modelling.	NRA	Improve management of aquifers.	Investigation costs.
Control existing abstraction via licence controls to ensure no saline intrusion or spring flow depletion.	NRA	Reduce demand on Catchment Resource.	Possible disruption to AWS supply. Costs.
ISSUE NO: 19		Minimum flows are inadequate in dry periods to prevent saline intrusion in the lower reaches of the rivers.	
Augment flows to meet targets.	NRA	Reduce demand on catchment resource.	Cost.
Cut back licensed abstraction by AWS Ltd.	NRA/AWS Ltd	Reduce demand on catchment resource.	Severe reduction in Covenham yield.
Review Q95, Q90 basis for MRF's to fully establish in river needs.	NRA	Improved resource management. The impact of discharge during periods of low flow would remain acceptable.	Cost of investigations. No progress can be made until study is complete. Any reduction in MRF's would have serious implications on discharge consents.

ISSUE NO: 20		Actual minimum flows are inadequate in middle and upper reaches of many rivers to meet in river needs.	
OPTIONS	Responsibility	Advantages	Disadvantages
Cut back abstraction on Waithe Beck only.		Reduce demand on resource.	Reduction of yield to AWS Ltd supply.
Augment to meet Q90 flows.	NRA	Reduce demand on catchment resource.	Cost and possible environmental impact.
Review MRF's.	NRA	Improved resource management.	As Issue No.19.
Review licence conditions to ensure MRF is specified as cessation control.	NRA/ Abstractors.	Reduced demand during periods of low flow.	Effect on abstractors. Cost of compensation.
ISSUE NO: 21		Minimum river levels in the Louth Canal in the Covenham to Alvingham stretch are inadequate.	
Dredge river channel.	NRA	Provide adequate depth to maintain/improve ecology.	Cost. Environmental impacts of the dredging scheme.
Construct retention weirs.	NRA	Provide adequate flow and depth to maintain/improve ecology.	Cost. Effect on IDB gravity outfalls. Reduced flood protection standard.
Change profile of flow channel.	NRA	Provide adequate depth to maintain/improve ecology.	Cost. Potential for bank destabilisation. Effects on bankside vegetation.

ISSUE NO: 22		Development impacts upon the water environment.	
OPTIONS	Responsibility	Advantages	Disadvantages
To gain a direct influence in the planning process using existing legislation and adoption of NRA Anglian Region model policies. (See Appendix 3).	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: 23		Six rivers identified for instream and bankside increased habitat diversity.	
Increase diversity without loss of channel capacity in consultation with Local Trusts, EN, etc.	NRA +	Improve conservation and amenity value of the streams.	Increased cost of routine. Maintenance programme.
ISSUE NO: 24		Maintaining adequate outfall at river havens.	
Dredging to facilitate gravity discharge.	NRA	Maintains outflow velocity to reduce siltation.	Effects on SSSI and NNR – Ongoing conflict with conservation.
Pumped freshwater outfall to tide. (Assuming it is available to pump).	NRA	Maintains adequate outflow.	Costs. Interference with SSSI's and NNR's during construction. Long term effects on haven morphology.
Sacrifice area of land to act as tidal storage to facilitate flushing of the channel.	NRA +	Maintains adequate outflow velocity. Benefits to nature conservation. Stewardship Schemes.	Land take. Cost of construction and maintenance.

ISSUE NO: 25		To restore the Louth Canal as a fully operational navigation.	
OPTIONS	Responsibility	Advantages	Disadvantages
Full programme of works to re – establish the navigation.	NRA/BWB/ navigation interests/ conservation societies.	Provides increased facilities for recreational use.	Huge cost of construction/ maintenance. Potential environmental damage. Conflict with other users. Significant effects on flood defence.
Partial works to re – open some sections.	As above.	As above.	As above.
Commission study into both above options.	As above.	Could promote advantages above.	Cost.

7.0 CONFLICTS

7.1 General

In considering the many demands placed upon the water environment conflicts are bound to arise, e.g. availability of water/fisheries/quality. In drawing up this plan many areas of conflict have arisen and been discussed whilst drawing up the options in relation to the issues identified. Many conflicts still remain and the public consultation will no doubt identify others. It is this process of consultation that will, ultimately attempt to address these issues and provide a consensus for action.

When considering the functions that the NRA performs internal conflicts can, and do, arise. The table below shows the interactions between these functions. It shows which of the functions listed along the top of the matrix from left to right are significant (s), very significant (vs) or insignificant (-) functions to be taken into account when performing any of the functions listed in the left hand column.

	Fisheries	Conser - vation	Rec - reation	Flood Defence	Navig - ation	Water Res - ources	Water Quality
Fisheries		--	VS	S	VS	S	VS
Conservation	--		S	VS	S	VS	VS
Recreation	--	--		S	S	S	S
Flood Defence	S	VS	--		S	--	--
Navigation	--	--	--	S		--	--
Water Resources	S	S	--	--	-		VS
Water Quality	S	--	--	--	-	S	

7.2 Summary of general conflicts

In considering the issues and options it is generally felt that three main areas of conflict re-occur and warrant further comment. As previously stated the consultation process will address these, and other conflicts further before any final plan is produced.

- 1) Priorities of water uses – there is no priority ranking of users of the water environment. This is of particular concern to the resource aspect where potentially demand exceeds supply. In essence all users must consider each other and an element of compromise may have to arise.
- 2) Cost – in many of the options identified cost is highlighted as a disadvantage. Whilst not a constraint in the development of options it is a factor that will have to be considered in drawing up any final scheme of work.
- 3) Environmental impact – again in considering any options to resolve issues environmental impacts occur. In any discussion regarding future works the overall effect on the environment must be considered along with all other factors. This aspect, as with the previous two, is the responsibility of all users of the water environment who must work together to seek the improvements we all want to see.

APPENDIX 1 – DEVELOPMENT

1.	Catchment Area	1,040 km ²	
2.	Total Population	88,000	
3.	<u>Towns and Main Villages</u>	<u>Present Population</u>	<u>Predicted 2001</u>
	Alford	3,067	3,800
	Binbrook/Brookenby	1,085	
	Burgh le Marsh	2,174	
	Chapel St. Leonards	2,875 + Hol. pop.	3,485 + Hol. pop.
	Holton le Clay	3,813	
	Legbourne	546	
	Louth	14,444	16,884
	Mablethorpe/Sutton	9,526 + Hol. pop.	11,966 + Hol. pop.
	Manby/Grimoldby	1,716	
	North Somercotes	1,496	1,985
	North Thoresby	1,254	
	Skegness	16,809 + Hol. pop.	21,689 + Hol. pop.
	Spilsby (50%)	1,933	2,543
	Tetford	380	
	Tetney	1,703	
	Wainfleet	2,158	2,890
4.	<u>Local Authorities/Utilities Companies</u>		
	Humberside County Council		
	Lincolnshire County Council		
	Cleethorpes Borough Council		
	East Lindsey District Council		
	West Lindsey District Council		
	Anglian Water Services Plc		
	East Midlands Electricity		
	Yorkshire Electricity		
	British Gas (E.M.)		
	British Telecom		

APPENDIX 1 - DEVELOPMENT (Continued)

<p>5. <u>Structure/Local Plan Proposals</u></p> <p> Humberside County Structure Plan</p> <p> Lincolnshire County Structure Plan</p> <p> Cleethorpes Borough Local Plan</p> <p> East Lindsey Local Plan</p> <p> West Lindsey Eastern Area Local Plan</p>	<ul style="list-style-type: none">- under review.- currently in draft. - under review.- Housing - Amendment No. 1 adopted 1991.- Employment - Amendment No. 2 on deposit (1992).- Leisure - Amendment No. 3 to be reviewed 1992. - under review. - under review.- Draft 1992. - under review.- Draft 1992.	
--	--	--

APPENDIX 2

LEVELS OF SERVICE: MINIMUM TARGET STANDARDS OF FLOOD PROTECTION

The following minimum target standards of flood protection have been adopted by the Anglian Region of the National Rivers Authority as an interim measure.

Land Classification Band	Minimum target standard of flood protection expressed as flood return period (years)	
	Fluvial	Tidal & 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.

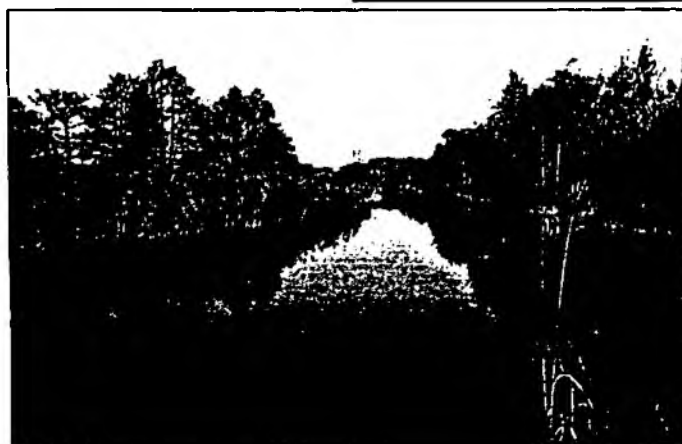
Band E

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.

APPENDIX 3

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;
- 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.