



NRA

NOVEMBER 1995

## CATCHMENT FACTS

Area	1007km <sup>2</sup>
Population 1993	108,970
Predicted 2006	126,860

### FLOOD DEFENCE

Length of statutory main river	138.45km
Embanked main river	56.65km
Length of sea/tidal defences	87.30km
Length of navigable river (under NRA control)	25.79km

### WATER QUALITY 1994

General Quality Assessment (GQA) length (km)

Chemical	A (excellent)	0
	B (good)	42.6
	C (Fair)	42.4
	D (Fair)	54.4
	E (Poor)	28.7
	F (Bad)	0

Biological	A (Excellent)	63
	B (good)	30
	C (Moderate)	58
	D (poor)	4.5

Estuary	Class A	26.4 km
Quality	Class B	10.7 km

Designated Bathing Beaches: Hunstanton, Heacham

### WATER RESOURCES

Additional availability:

Surface rivers Summer: none in area East of the Ouse some available in area West of the Ouse

Winter: available in all catchments

Groundwater Chalk: only available in North East of the catchment

Greensand: some available

### FISHERIES

Salmonid (Game) fishery 29km

Cyprinid (Coarse) fishery 74km

### WILDLIFE AND ARCHAEOLOGY

Sites of Special Scientific Interest (SSSIs) 17

Water dependent SSSIs 8

County Wildlife Sites 256

Scheduled Ancient Monuments 71

### INTERNAL DRAINAGE BOARDS

Nordelph, Upwell, Hilgay Great West Fen, Northwold, West of Ouse, Southery and District, Stoke Ferry, Stringsides, Gaywood, Marshland Smeeth & Fen, Magdalen, Downham & Stoke Bardolph, Churchfield & Plawfield. Middle Level Commissioners, East of Ouse Polver and Nar.

# OVERVIEW





## THE VISION FOR THE NORTH WEST NORFOLK CATCHMENT

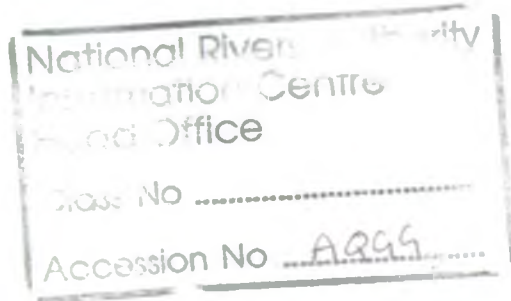
Most societies want to achieve economic development to secure a better quality of life, now and in the future. They also seek to protect their environment now and for their children. Sustainable development tries to reconcile these two objectives - meeting the needs of the present without compromising the ability of future generations to meet their own needs. To achieve this, judgements have to be made about the weight to be put on different factors in particular cases. Sometimes environmental costs have to be accepted as the price of economic development but on other occasions a site, or an ecosystem, or some other aspect of the environment has to be regarded as so valuable that it should be protected from exploitation.

The North West Norfolk catchment has been altered by many generations to control river and sea floods and to make use of the clean and plentiful supply of water in the aquifer. These changes have improved our standard of living and assisted the economic development of the area. However, many environmental features have been lost, groundwater and surface water polluted and a legacy of expensive and ever more vulnerable flood defence works remains for future generations to maintain. Today, the NRA's role is to recognise what environmental features are important in the catchment and ensure that flood protection works or other developments do not cause unacceptable damage to them. The NRA have a responsibility to ensure that the standard of flood protection to land is appropriate for its use and that development does not increase the risk of flooding. The NRA does not regard new developments in the flood plain as sustainable and is opposed to such developments. In the long term, due regard must be made to the possibility of sea level rise. The NRA rely on the support of Planning Authorities to achieve their aims of environmental protection and wishes to encourage more widely the partnership approach to environmental improvement and management.

In practice, environmental sustainability is achieved by setting limits of acceptable environmental change. Some of the activities which are described in the tables in this Action Plan outline the NRA role in setting these limits - particularly in the field of water quality and quantity management.

The NRA's vision for the North West Norfolk catchment is towards a future where:

- the abundance and diversity of water-related life in the catchment is maintained and increased;
- improvements continue to be made to existing discharges, meeting the most stringent appropriate standards;
- our groundwater supplies remain clean and our abstraction of water does not damage rivers and wetlands;
- agricultural land is used in such a way which reduces the risk of diffuse pollution and allows the habitat of rivers and wetlands to support appropriate species and quantities of wildlife;
- peoples' enjoyment and appreciation of the river system and catchment continues to grow;
- commercial and pleasure navigation develops at an environmentally acceptable way; and,
- there is minimal risk to people and property from flooding.



## FOREWORD

The National Rivers Authority (NRA) is committed to protecting and improving the water environment in its broadest sense. Establishing a sound base for the integrated management for river catchments is fundamental to our operations and therefore the Authority has devised Catchment Management Plans (CMP) as the vehicle to ultimately achieve environmental improvements.

CMPs demonstrate our public accountability to the customer and to the communities in which we are working.

This action plan, its vision and the activities it contains can only be achieved if the participants work with and influence others who also have an interest in the future well being of the North West Norfolk catchment - an integral feature of the Nation's Heritage. While the vision is, by its very nature, not constrained by the practicalities of budgets or resources, the activity plans, however, set out our

firm proposals for the delivery of real, sustainable improvements to the local water environment as first steps towards that vision. Consequently, CMPs are becoming one of the cornerstones to the NRA corporate business planning process.

May I express my gratitude to all those who were involved in the consultation process conducted earlier this year. I hope that many will in partnership with the NRA continue to refine, develop and implement the Action Plan over the next five years and beyond, as the responsibility for the plans moves to the forthcoming Environmental Agency.



Geoff Beel  
Area Manager (Central Area)

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## INTRODUCTION

### THE CONCEPT OF CATCHMENT MANAGEMENT PLANNING

Rivers, lakes, estuaries and coastal waters are subject to large and rapidly increasing demands from the users of the water environment. Many different uses interact or compete for water and will inevitably come into conflict with one another. The NRA is the major manager of the water environment in England and Wales and has the responsibility to reconcile conflicts between water users. The NRA Mission Statement expresses the following principles:

*"We will protect and improve the water environment by the effective management of water resources and by substantial reductions in pollution. We will aim to provide effective defence for people and property against flooding from rivers and the sea. In discharging our duties we will operate openly and balance the interests of all who benefit from and use rivers, groundwaters, estuaries and coastal water. We will be businesslike, efficient and caring towards our employees."*

The NRA has chosen to use Catchment Management Plans (CMP) to translate those principles into action. The plans describe our vision for each catchment, identify problems and issues and propose actions that may be taken to resolve them. The plans also provide the means of promoting two aspects of environmental management:

- Land Use Planning
- Water Quality Objectives

This Action Plan outlines how the NRA and other organisations plan to tackle issues which affect the water environment in this catchment. There are 23 issues which are grouped and summarised in the following Activity Plans.

It is hoped that CMPs will interface with and influence the plans of other organisations such as water company asset management plans, local and county statutory plans, etc.

### THE RELATIONSHIP BETWEEN LAND USE AND THE WATER ENVIRONMENT

The catchment is situated within the administrative boundaries of mainly Norfolk County Council (with a small area of Cambridgeshire) and the District/Borough Councils of Fenland, Breckland and King's Lynn & West Norfolk.

Change in land use will have a significant impact on the water environment. Although the NRA can control some of the things which influence the quality of the water environment (particularly the river corridor or concerning flood risk), the NRA has very little direct control over where and how land is developed. This is the responsibility of Local Planning Authorities through the implementation of the Town & Country Planning Acts.

The latest status of their statutory plans is as follows:

LOCAL PLANNING AUTHORITY	PROGRESS OF PLAN
Norfolk County Council	Structure Plan Approved 1993
Cambridgeshire County Council	Structure Plan Approved 1989
	New Plan under preparation; Adoption expected January 1996
Borough of King's Lynn & West Norfolk	Deposit draft at Public Inquiry (November 1995)
Breckland District Council	Consultation Draft (June 1994)
Fenland District Council	Adopted (August 1993)
Norfolk Minerals Local Plan	Draft - awaiting Inspector's report (November 1995)
Norfolk Waste Local Plan	Under preparation
Cambridgeshire Minerals Local Plan	Adopted (April 1991)
Cambridgeshire Waste Local Plan	Under preparation

The policies in statutory development plans are important as they set out the framework for land use change, and provide the key reference in determining development applications. The NRA is a statutory consultee on development plans and some planning applications and, therefore, works closely with the Planning Authorities and encourages the inclusion of policies which reflect its concerns and responsibilities.



## INTRODUCTION

### THE RELATIONSHIP BETWEEN LAND USE AND THE WATER ENVIRONMENT *continued*

As guidance for local authorities, the NRA has prepared a set of statements relating to the broad headings of water quality and water resources, flood defence, fisheries, conservation, recreation and navigation in the river corridor, and mineral workings and waste disposal. These statements are summarised in the NRA's "Guidance Notes for Local Planning Authorities on the Methods of Protecting the Water Environment through Development Plans" and aim to protect the water environment from harmful development. Where possible, the NRA will reinforce these policies when commenting on planning matters or will give due regard to them when making decisions within the catchment.

Further detailed guidance on areas of concern to the NRA are provided in, for example, DoE circular

30/92 "Development and Flood Risk"; where a Memorandum of Understanding has been signed by the local authorities' representative bodies and the NRA with regard to the scope and timing of providing floodplain maps (see issue 20f). Without adequate consultation, there is an increased risk of inappropriate developments in the floodplain and similar areas of constraint. This circular and other Government policy guidance stresses the importance that Local Planning Authorities should attach to the NRA's advice.

This Action Plan highlights our concerns about development. It is hoped that the Local Planning Authorities will make due regard to the statements made in this CMP and play their necessary role in implementing the actions and tackling issues.

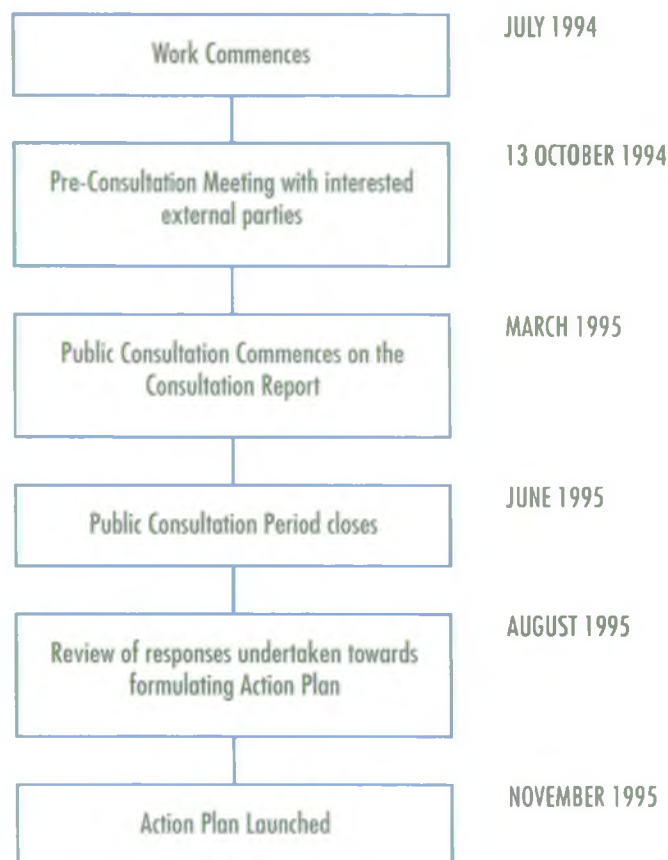


*Aerial view - King's Lynn*

## REVIEW OF CONSULTATION PROCESS

### DEVELOPING THE PLAN

The production of this plan for the North West Norfolk catchment has involved a number of stages over the last 18 months:



### SUMMARY OF CONSULTATION EXERCISES

The pre-consultation meeting and the involvement of the Great Ouse Catchment Panel enabled the NRA to identify with some certainty, the key issues for the local water environment. The issues listed in this Action Plan were first identified in the North West Norfolk Catchment Management Plan - Consultation Report (March 1995). The Catchment Panel represents a wide range of commercial and environmental interests in the catchment.

To encourage formal responses to the Consultation Report, the following were undertaken:

- a formal launch of the plan at Knights Hill Hotel, King's Lynn on 24 March 1995;
- the distribution of the document to over 100 organisations and individuals. Information was, also, placed in local libraries, local authority offices and museums;
- advertisement of the plan in the local media. Interest was significant from newspapers and the plan was further promoted through radio and press interviews.

20 written responses were received and these are detailed in the Report on Public Consultation which is available on request. Verbal feedback given at the meetings was also noted. The NRA values and appreciates the efforts made to contribute to the success of this process.

The following points were raised:

- great support for the integrated catchment management planning process;
- a small number of factual errors were identified, none of which materially affected the plan's findings;
- there were very few new issues raised, consultees were mainly asking for clarification, especially concerning River Quality Objectives. Many would have preferred to see a stronger emphasis for their particular area of interest, especially from conservationists.

The detailed responses made have been considered when developing the Vision and activity plans - in a way which is believed to reflect a reasonable balance between the opinions expressed and the desire to ensure the plan is feasible and robust.



## CATCHMENT OVERVIEW

The North West Norfolk catchment (see Overview Map) consists of two distinctly different areas; the eastern, highland area of chalk outcrop and the western low lying area dominated by the tidal influences of the Wash and the Great Ouse Estuary. The catchment includes the River Great Ouse, north of Denver sluice and the rivers Heacham, Ingol, Babingley and Nar. The catchment also includes those parts of the Wash which are the responsibility of the NRA (see below). The River Great Ouse is tidal throughout the catchment and flows between embankments which help to prevent flooding of adjacent low lying land. The rivers Nar, Babingley, Ingol and Heacham originate as springs from the chalk uplands but are embanked in their lower reaches. The River Nar is a site of special scientific interest (SSSI); an outstanding river of its type, combining the characteristics of a southern chalk stream with that of an East Anglian fen river.

There are three documents which complement this CMP:

- The Wash Estuary Management Plan will be published by English Nature in December 1995, following consultation of the draft report last spring;
- A Wash Shoreline Management Plan (SMP) is being prepared by the NRA in collaboration with MAFF as a major contribution to the Estuary Management Plan. The purpose of the SMP is to set out a strategy for coastal defence (as part of a national initiative). Stage 1 of this process which deals with the collection and presentation of data was completed in June 1995. The second stage is to integrate all views and information, leading to the production of coastal defence strategies;
- The Wash Catchment Management Plan will be produced during 1996/7 by the NRA/Environmental Agency (Anglian Region). Some of the issues highlighted in the North West Norfolk CMP Consultation Report will be addressed in this plan, eg, shellfishing.



*Fisher fleet - King's Lynn*

## SUMMARY OF CATCHMENT USES

Given below is a summary of how the water environment is used within this catchment and relates to the basic role of the river as a conveyance of rainfall falling onto the catchment to the sea. This has been covered in greater detail in the Consultation Report.

### FLOOD DEFENCES

There is a clear requirement for 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.

The majority of the catchment's rivers discharge into the tidal water through flapped outfall structures and the Heacham River pumping station.

All rivers are embanked to protect adjacent low lying land (eg, Heacham, Babingley, Nar and Wissey).

The Relief Channel is required to convey water from the Ely-Ouse system via the Tail Sluice.

Sea and tidal defences are vital to the safety and economy of the area. Coastal defences include:

- concrete stepped and piled sea wall between Hunstanton and Heacham;
- flexible concrete structure at Heacham North Beach;
- shingle ridge between Heacham North and Snettisham;
- 54 flood gates between Fisherfleet and Millfleet to protect King's Lynn from tidal surges;
- Earth embankments between Snettisham and King's Lynn;
- Earth embankments to the Tidal River;
- Earth bank between Hunstanton South and Wolferton Creek;
- Re-profiled Beach between Hunstanton and Snettisham provides a more effective, natural sea defence; and,
- The Marsh Cut from King's Lynn has stone training walls originally constructed to control siltation in the navigable channel.



*Sea front - Heacham*



## SUMMARY OF CATCHMENT USES

### WATER ABSTRACTION

This use relates to the abstraction of water from rivers, springs and groundwater for domestic or commercial use. Abstraction licences are issued by the NRA to control this use and are granted only when there is sufficient water, when the need for it is justified, when existing abstractors are protected and that the water environment is not unacceptably affected.

Anglian Water Services (AWS) is licensed to abstract from the Rivers Gaywood (827 000 m<sup>3</sup>/yr) and Nar (4 977 700 m<sup>3</sup>/yr) to supply demand from King's Lynn and the south west area of the catchment.

The major sources of groundwater in this catchment are the Chalk and Lower Greensand aquifers. Abstractions are made by AWS to supply the local population, seasonal holiday population and industry in King's Lynn, Hunstanton and Downham Market. Public water supply equates to 79% of the total licensed quantity in the catchment.

There are also a small number of spring and groundwater sources in the catchment used for private, mainly domestic, supply.

Agricultural use (eg, livestock watering, spray irrigation) represents 22% of the total quantity of water licensed in this catchment. This catchment supports a mixed agricultural economy, where sugar beet, cereals, potatoes, other vegetable and salad crops are grown.

Industrial use equates to 13% of the total licensed quantity in the catchment although a significant proportion returns to the river or groundwater close to the point of abstraction. There are two abstraction licences issued for sugar refining (site closed) at King's Lynn and cooling purposes, as well as a number for mineral washing. However, most of the water supplied by AWS to industry is via the mains.

### EFFLUENT DISPOSAL

This is the use of the water environment, in particular surface water, for the disposal, dispersal and dilution of a wide variety of effluents. The quality of any effluent discharged to controlled waters must comply with the details of the consent issued by the NRA and for certain processes by Her Majesty's Inspectorate of Pollution (HMIP) as part of the Government's policy on Integrated Pollution Control.

In addition to consented discharges, a significant amount of pollution in watercourses can be caused by surface water drainage from urban areas and also from spillages from a range of domestic, commercial, agricultural and industrial activities. Many of these incidents could have been prevented. Therefore, the NRA is proactive in conducting pollution prevention site visits and providing advice.

There are 12 major Sewage Treatment Works (STW) operated by AWS within the catchment. Effluents are of mainly domestic origin. King's Lynn is the largest



*Flooding of the River Nar near West Winch*



## SUMMARY OF CATCHMENT USES

in the catchment and discharges in to the tidal River Great Ouse. Ingoldisthorpe STW which discharges into the headwaters of the River Ingol is the second largest.

Many rural areas are served by small private STW and septic tanks.

King's Lynn's estuarine location has attracted a wide variety of industry, most notably food processing and chemicals. Discharges from these works are now connected to the public foul sewer and treated at King's Lynn STW with the exception of discharges from British Sugar, Dow Chemicals and Porvair (Plastics).

### WASTE DISPOSAL

Land within the catchment may be used for waste disposal by either land fills or by spreading wastes directly onto the ground. Waste management licences and Waste Disposal Plans are issued by the County Council Waste Regulation Authority. The NRA is a statutory consultee on these licences.

The spreading of sludge on land for agricultural (as fertiliser) or other benefits, is exempt from Waste Management Regulations. This activity has potential for pollution if poorly managed.

There are relatively few major sites for waste disposal in the area, reflecting the catchment's predominately rural nature. The main land fill sites for domestic waste are at Docking and Blackborough End. Existing and closed sites may pose a threat to groundwater resources, eg, at Wereham.

### MINERAL ABSTRACTION

This use relates to the extraction of sand, gravels, Chalk and special clays and the necessity to pump water out of the workings - which is exempt from abstraction licensing. Mineral extraction can, therefore, affect the quantity, quality and nature of ground waters, thus affecting other uses including the water environment.

Minerals Local Plans have been produced by the County Councils. The NRA is a statutory consultee. This use obviously relates very closely to waste disposal, where restoration of the mineral extraction sites by landfilling can pose additional environmental threats.

Some minerals workings also include plant for processing the mineral, eg, washing and this is

licensed by the NRA.

There are 10 active mineral extraction sites. Sand and Gravel is concentrated along five sites in the River Nar valley, one of which also extracts clay. Carrstone is produced at a site north of the Nar valley and a site near Snettisham. Chalk is quarried at Hillington and Newton.

### ANGLING

This use relates to the recreational use of the coarse and salmonid fisheries.

Coarse fishing on the Relief Channel and some of the Middle Level Main Drain is controlled by the King's Lynn Angling Association, the other part being controlled by Wisbech and District Angling Association. Popular species include roach, bream, pike and zander. The King's Lynn Angling Association, also, control coarse fishing interests on the lower reaches of the Rivers Babingley and Nar.

Brown trout on the rivers Nar and Babingley are mostly controlled by fishing syndicates. None of the other Norfolk rivers in this catchment have any organised angling taking place on them, although they may support a small local fishery.

Former gravel extraction sites, particularly along the River Nar, provide stillwater angling opportunities, eg, Middleton, Pentney Pits, Watlington Hall lakes. The most popular site for stillwater game angling is at the Narborough Trout lakes.

### COMMERCIAL FISHING & FARMING

This relates to the commercial exploitation of fish and shellfish stocks within the catchment.

Under the Salmon & Freshwater Fisheries Act 1975, the NRA has a responsibility to regulate freshwater fish to a six mile limit from the coast. The NRA only licences drift fishery with most activity taking place on the Norfolk and Suffolk coast between Wells and Aldeburgh.

Some commercial eel fishing takes place on rivers in the catchment by traditional dutch fyke netting.

All other commercial fishing, in the Wash, is overseen by the Eastern Sea Fisheries Joint Committee who are responsible for stock management, regulation and policy. There is also a private fishery off the eastern coast of the Wash, known as Le Strange fishery.

## SUMMARY OF CATCHMENT USES

The Wash area is used as a nursery ground by the juvenile fish of many species such as plaice, sole and cod. Offshore fishing for fin-fish has rarely reached a viable level although small fisheries do occasionally exist for sprat, mullet, sole and skate.

The waters of the Wash form one of the most important shellfish areas in England and Wales and there are six commercial shellfish beds for mussels and cockles. Commercially significant fisheries of brown and pink shrimp also exist.

Fish farming activities are concentrated on the River Nar and are influenced by the high water quality.

### WATER RELATED HABITAT

This use relates to the use of the water environment as habitat for flora and fauna both within the river corridor and in sites of conservation value which are water dependent.

Wetland sites exist where the geomorphology, geology and land use allow a concentration of surface and groundwater flows and levels. The NRA is seeking to protect wetland sites of conservation interest by controlling future abstraction within these areas. The NRA is specifically required to consult organisations where NRA work or consent is likely to impact on sites of high conservation value such as National Nature Reserves (one), County Wildlife sites (256) and SSSIs (8 water-dependent sites). Some of the areas of interest are described below.

Roydon Common near King's Lynn is the most important freshwater wetland site in the catchment, in addition to its SSSI status, it is also designated as a RAMSAR site and SPA.

The River Nar is the most notable river in the catchment in terms of conservation. The river combines the characteristics of a typical southern Chalk stream and an East Anglian fen river. Together with the adjacent terrestrial habitats, the Nar is an outstanding river system and is designated as a SSSI. The upper reaches of the Nar have a wide range of natural physical features including riffles and pools and a diversity of habitats. The Nar supports a rich and diverse flora, wetland and washland habitats. Where land adjacent to the river is seasonally flooded and has not been reclaimed as pasture, areas of rough fen and "unmanaged" scrub remain. Further downstream the scrub has developed into mature wet woodland.

Areas of ecological interest on the Babingley river

include stands of common reed and extensive emergent fringes along the river with adjacent ponds and rich flora. The Heacham river flows through woodland with riffle-pool sequences. Ecological interest includes fringes of common reed, woodland and wet grassland. The lower river flows parallel to the coastline and provides shelter for waterfowl.

The Tidal River has different plant communities to the other rivers in the catchment due to the saline intrusion, eg, freshwater to maritime plants. The extensive embankments are of value to waterfowl.

The Wash has been notified as a RAMSAR site, SPA and SSSI with part of it declared as a National Nature Reserve. Wading waterfowl are of international importance. Grey and common seals are also present.

As stated earlier, there are a number of initiatives currently in progress which relate to the management of the Wash including the Wash Shoreline Management Plan which seeks to develop a strategy for flood defence works in the Wash.

### LANDSCAPE AND ARCHAEOLOGY

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

Within the catchment there are 71 sites designated as Scheduled Ancient Monuments and various other sites of county value. Part of the catchment is recognised as the Norfolk Coast Area of Outstanding Natural Beauty renowned for its marsh coastlands, sandflats, tidal creeks, saltmarsh and lagoon. This fragile, shifting shoreline is managed as a Heritage Coast.

King's Lynn is the major town within the catchment and the old historical docks area are of archaeological interest.

### NAVIGATION

The Tidal River from Denver to Stowbridge is the only part of this catchment for which the NRA is the navigation authority. Two other bodies also exercise this power, the Middle Level Commissioners (for the Middle Level system) and the King's Lynn Conservancy board (for the lower tidal Great Ouse and into the Wash).

Today, commercial traffic inland from the Wash has all but ceased, although the river still provides an important link for recreational access between the

## SUMMARY OF CATCHMENT USES

Bedford Ouse, Ely Ouse and the open sea. The strong tidal currents between Denver and King's Lynn mean that the use of the Tidal River is only suited to larger boats. The port of King's Lynn is still used today with a busy fishing fleet and other ships exporting general cargo, sugar beet and grain. It is estimated that the port handles over 2000 boat movements a year including 50 fishing boats a day.

The Tidal River provides an important link between the Ely Ouse at Denver and the west of Ouse navigations in the Well Creek and the Old Bedford River. This short section is the busiest section of the tidal Great Ouse and is used by boat traffic on the Nene-Ouse navigation link.

Facilities for use by recreational craft are limited to lock passage at Denver and Well Creek, mooring in King's Lynn is very difficult due to the large tidal range. Commercial fishing boats normally moor in an off-river inlet in King's Lynn, known as Fisher Fleet.

### BOATING AND IMMERSION SPORTS

This use deals with water-based recreational activities such as sailing, canoeing, rowing and water skiing. The NRA discourages swimming in all rivers, primarily due to the risk of drowning, but also because of the possibility of contracting water-borne diseases.

Water based recreation within the freshwater parts of the catchment are centred primarily on former mineral workings, with the addition of some activities on the Great Ouse Relief Channel.

The Leziate/Bawsey complex of lakes near King's Lynn caters for sailing and windsurfing, similar facilities are also available at Wood Lakes, north of Downham Market. Water Skiing is carried out at Abbey Road Pits near Pentney. Sailing and water skiing also takes place on the Great Ouse Relief Channel.

Informal activities such as canoeing take place in the navigable channels. Sailing (Dinghy) also takes place on the Wash (near Heacham).

A study commissioned by the Eastern Council for Sport and Recreation (1993) showed that the participation in water-based recreation in East Anglia was above the national average.

### RECREATION AND AMENITY

This use includes walking, horseriding, caravanning and camping, tourism and sites of interest within the water environment. Navigation, boating and freshwater angling are all major recreational activities and are covered elsewhere in this plan.

The local authorities promote tourism which is often linked to the river or coastline.

Footpaths exist along the banks of the Tidal River Great Ouse, the River Nar and the Middle Level Main Drain and the catchment is traversed by part of the historic Peddars Way.

There are a variety of sites for Caravanning and Camping around the popular holiday resort of Hunstanton and Heacham and Snettisham. A notable inland camping and recreational centre comprising sailing, windsurfing, boating and angling has been developed at Wood Lakes near Stowbridge.



## ACTIVITY PLANS

### INTRODUCTION

The Action Plan provides a planning framework to define both a strategy for future management of the catchment and a series of activity plans for the NRA, working with others to achieve the Vision for the North West Norfolk catchment.

The activity plans will cover 23 issues (see Summary Map overleaf) and will address:

- what will be done?
- who will be involved in doing it?
- when it will be done?
- how much it will cost?

The Plans are dynamic and will evolve on a regular basis. It is hoped that partnerships will develop between larger organisations such as the NRA and local authorities as well as involving other public, private and voluntary groups to work together to deliver this Vision.

In addition to the activities highlighted in the plans, the NRA will continue to undertake (often statutory) work to protect and improve the water environment. A number of the concerns raised during consultation will be covered by this work. These activities include:

### OPERATIONS TO [MAINTAIN RESOURCES];

- maintain flood defences and watercourse structures and manage NRA owned sites
- provide an effective emergency response to flooding incidents, pollution incidents and fish kills

### MONITORING TO; [DESCRIBE/QUANTIFY RESOURCES],

- evaluate the quality and quantity of surface and groundwaters and their associated flora and fauna

### REGULATION, AUTHORIZATION AND ENFORCEMENT TO; [SAFEGUARD RESOURCES],

- control physical works on rivers and their floodplains and, where possible, to enhance the environment
- control fisheries activities
- control discharges of effluent and abstractions of water
- ensure compliance with authorizations and legislation

### IMPROVEMENT TO; [ENHANCE RESOURCES],

- promote and implement (habitat) enhancement schemes
- create a new use of the water environment

### LIAISON TO:

- ensure planning decisions do not lead to damage but improve and enhance the water environment.

It should be noted that the actions stated are aspirations that the NRA and others are working towards. All the participating organisations have limited resources and powers. If resources are not available due to budget shortcomings or more urgent priorities (including from other catchments) then the actions indicated cannot be executed within the allotted timescale. Through the business planning process, the NRA aims to prioritise all the activities to be carried out in all the catchments. Please refer to the Glossary for abbreviations and explanation.

The NRA staff responsible for implementing these actions are given in the activity plans as follows:

Area Water Quality Manager	WQM
Area Water Resources Manager	WRM
Area Flood Defence Manager	FDM
Area Planning Manager	PM
Area Fisheries, Recreation, Conservation and Navigation Manager	FRCNM

## ACTIVITY PLANS: SURFACE WATER QUALITY

Most rivers and streams in this catchment are generally of good to fair chemical quality with some short lengths of poor or bad quality.

The NRA has proposed river quality objectives (known as River Ecosystem (RE) targets) for many of the rivers in this catchment (see map below which shows both short and long term objectives). It is felt the targets can be achieved within the short to

medium term (up to ten years). The targets have been chosen to allow for differences in the natural characteristics of rivers and also to allow for planned investment in water treatment. Most of the issues listed in the following tables are concerned with where quality is falling short of these targets. A number of activities are listed which maintain existing water quality but do not, in the short term improve conditions.



## ACTIVITY PLANS: SURFACE WATER QUALITY

### ISSUE 1 River Nar Water Quality Problems

Many of the water quality problems on the River Nar are linked to low summer flows. The initiatives listed under "Issue 10b - Balancing abstraction against in-river needs", are also linked to water quality problems on the River Nar. Concern about eutrophication on the river Nar reflects its special status as a SSSI.

ISSUE	ACTIVITY	RESPONSIBILITY	Cost £	TIMESCALE					NOTES
				95/96	96/97	97/98	98/99	99/00	
<b>Issue 1a</b> River Nar Mileham to Litcham. Failure to meet Proposed RE3 Target	Examine relationship between Low DO and River Flow - review data	NRA WQM	R	■	■	■	■	■	Low oxygen levels appear to be linked to periods of low river flows - a "natural" phenomenon
	Maintain RE5 in short/medium term	NRA WQM	R	■	■	■	■	■	Long term RE3 target will be used for water quality planning.
<b>Issue 1b</b> River Nar Litcham to Lexham Hall. Failure to meet Proposed RE3 Target	Maintain RE4 in short/medium term	NRA WQM	R	■	■	■	■	■	Prevents deterioration in water quality.
	Review flow data for the river	NRA WQM	R		■				Capital investment may be needed if tighter limits are to be imposed. This should be addressed in future Asset Management Plans.
	Review consent limits if required	NRA WQM	R			■			
<b>Issue 1c</b> River Nar, Lexham Hall to Castle Acre Failure to Meet RE2 Target	Examine relationship between Low DO and River Flow - review data	NRA WQM	R	■	■	■	■	■	Low oxygen levels appear to be linked to periods of low river flows - a "natural" phenomenon
	Maintain RE4 in short/medium term	NRA WQM	R	■	■	■	■	■	Prevents deterioration in water quality. Allows objective to be set on a statutory basis
<b>Issue 1d</b> Eutrophication in the River Nar	Review and update phosphorous data	NRA WQM	R	■	■	■	■	■	Will enable patterns and trends to be identified
	Review water quality monitoring	NRA WRM	R	■					May be able to improve understanding of this issue by changing monitoring undertaken
	Improve flow monitoring upstream of Marham	NRA WQM			■				Will increase understanding of phosphate loads
	Investigate benefits of further controls to limit phosphorous discharges	NRA WQM	R			■	■		Sources of phosphorous in addition to sewage effluent may be significant



## ACTIVITY PLANS: SURFACE WATER QUALITY

### ISSUE 2 Gaywood River Catchment Water Quality Problems

See Introduction above. There is, also, a need to investigate the perception that Slurry disposal could be adversely affecting the conservation value of Roydon Common SSSI.

ISSUE	ACTIVITY	RESPONSIBILITY	Cost £	TIMESCALE					NOTES
				95/96	96/97	97/98	98/99	99/00	
<b>Issue 2a</b> Gaywood River Failure to meet proposed RE3 Target	Review cause of elevated ammonia and depressed oxygen levels	NRA WQM	R	■	■	■	■	■	Cause may be diffuse or discrete discharges
	Maintain RE4 in short/medium term	NRA WQM	R	■	■	■	■	■	Prevents deterioration in water quality
<b>Issue 2b</b> Gaywood River Catchment. Roydon Common & Slurry disposal to land	Investigate sludge disposal practices and potential impact	NRA, AWS, WRA WQM	N/K	■	■	■			There is concern that this wetland SSSI may be at risk from this activity

### ISSUE 3 River Babingley Water Quality Problems

See Introduction above.

ISSUE	ACTIVITY	RESPONSIBILITY	Cost £	TIMESCALE					NOTES
				95/96	96/97	97/98	98/99	99/00	
<b>Issue 3a</b> River Babingley Failure to meet proposed RE2 Target in the embanked lower reaches	Investigate cause of low DO - review water quality data	NRA WQM	R	■	■	■	■	■	Prevents deterioration in water quality
	Maintain RE3 in short/medium term	NRA WQM	R	■	■	■	■	■	

### ISSUE 4 Heacham River Water Quality Problems

See Introduction above.

ISSUE	ACTIVITY	RESPONSIBILITY	Cost £	TIMESCALE					NOTES
				95/96	96/97	97/98	98/99	99/00	
<b>Issue 4a</b> Heacham River Failure to meet proposed RE3 Target	Investigate cause of low DO - review water quality data	NRA WQM	R	■	■	■	■	■	Prevents deterioration in water quality.
	Maintain RE4 in short/medium term	NRA WQM	R	■	■	■	■	■	

## ACTIVITY PLANS: SURFACE WATER QUALITY

### ISSUE 5 Middle Level Drain Water Quality Problems

Failure to meet river quality objective for DO exacerbated by the ponded nature of the watercourse and how this encourages plant growth.

ISSUE	ACTIVITY	RESPONSIBILITY	Cost £	TIMESCALE					NOTES
				95/96	96/97	97/98	98/99	99/00	
<b>Issue 5a</b> Middle Level Main Drain, Failure to meet proposed RE3 Target	Adopt RE4 in the short/medium term	NRA WQM	R	■	■	■	■	■	Prevents deterioration in water quality.

### ISSUE 6 Water Quality Problems King's Lynn Area

The water quality problems in the King's Lynn area are due to a variety of sources - some known and others to be found - within the town. The pollution prevention work listed here is an increasingly important aspect of NRA work.

ISSUE	ACTIVITY	RESPONSIBILITY	Cost £	TIMESCALE					NOTES
				95/96	96/97	97/98	98/99	99/00	
<b>Issue 6a</b> Oil Pollution Nuisance, Fisher Fleet King's Lynn	Promote better practices for storage and handling of oil by boat owners	NRA, Harbour Authority WQM	2k	■	■				Leaflet and poster campaign and advice. The NRA will provide information on pollution prevention measures
	Assist harbour authority to prosecute offenders	NRA WQM	R	■	■	■	■	■	The NRA can assist by sampling and tracing sources
<b>Issue 6b</b> Middleton Stop/ Pierre point Drain Failure to meet proposed RE3 Target	Investigate and confirm sources of pollution from industrial areas in King's Lynn	NRA WQM	R	■	■	■			Intermittent pollution can sometimes be traced back to source and eliminated
	Carry out pollution prevention inspections of industrial premises	NRA WQM	R	■	■	■	■	■	Pollution prevention is an important aspect of our work
	Undertake remedial action	Polluter WQM	R	■	■	■	■	■	Costs could vary widely
	Maintain RE5 in short term but move towards RE4 in medium term	NRA WQM	R	■	■	■	■	■	Prevents deterioration in water quality.

## ACTIVITY PLANS: SURFACE WATER QUALITY

### ISSUE 7 Estuary Eutrophication

Levels of nitrate, algae and chlorophyll-a are of concern. However, a major adverse impact of this such as an algal bloom have so far been avoided.

ISSUE	ACTIVITY	RESPONSIBILITY	Cost £	TIMESCALE					NOTES
				95/96	96/97	97/98	98/99	99/00	
<b>Issue 7a</b> Estuary Eutrophication	Review current monitoring work	NRA WQM	R	■					To understand this problem better, the NRA may need to change monitoring procedures
	Review and submit data for potential eutrophic sensitive area status under the UWWTD and Polluted Waters (eutrophic) under the Nitrate Directive.	DOE, NRA WQM	R			■			A national review of eutrophication. Designation of Sensitive areas and polluted waters will be carried out by DoE
<b>Issue 7b</b> Impact of King's Lynn STW on the estuary	Construct new STW facilities.	AWS WQM	12 mil	■					Better treatment is necessary to comply with the UWWTD. This work will improve water quality; oxygen levels in the estuary and reduce bacterial concentrations
	Monitor effluent quality for toxicity	NRA, AWS WQM	R	■	■	■	■		The current effluent occasionally shows relatively high toxicity in tests on brown shrimps. It is hoped that improvements to levels of treatment will reduce this problem.
	Review consent limits for King's Lynn	NRA WQM	R				■		

### ISSUE 8 Bathing Water Quality

There are two EC designated bathing waters at Heacham North Beach and Old Hunstanton. Unfortunately, the former site has failed to comply with the directive's standards.

ISSUE	ACTIVITY	RESPONSIBILITY	Cost £	TIMESCALE					NOTES
				95/96	96/97	97/98	98/99	99/00	
<b>Issue 8a</b> Heacham North Beach failed to meet the EC Bathing Water Directive for the 1995 Bathing Season	Investigate the cause of microbiological failures through carrying out surveys of the Heacham River system and the coast around Heacham and Hunstanton	NRA WQM	R	■	■				New issue since the Consultation Report



## ACTIVITY PLANS: GROUNDWATER QUALITY

Groundwater in the catchment is generally of high quality but vulnerable to pollution. The threat to groundwater quality is a major issue in this catchment. There are increasing levels of nitrate in some areas and to tackle this problem Nitrate Vulnerable Zones are being established by MAFF. The NRA is mapping Groundwater Protection Zones around major supply boreholes to aid the implementation of the Authority's Groundwater Protection policy. Groundwater vulnerability maps for the area have now been published. The three major issues relating to groundwater quality in this catchment are described below.

### ISSUE 9 Pollution Risks to Groundwater Supplies

Risks include the methods of storage, use and disposal of industrial and agricultural chemicals and wastes. Also, nitrate levels exceed the EC drinking water directive.

ISSUE	ACTIVITY	RESPONSIBILITY	Cost £	TIMESCALE					NOTES
				95/96	96/97	97/98	98/99	99/00	
<b>Issue 9a</b> Groundwater Source Protection	Define groundwater protection zones for remaining sources	NRA WQM	R	■	■	■			This is a significant piece of work. Some zones have been mapped but more work is needed
	Prepare a prioritised site inspection programme	NRA WQM	R	■					Will help identify and prevent pollution
	Offer advice and enforce pollution prevention measures	NRA WQM	R	■	■	■	■	■	Pollution of groundwater supplies prevented
<b>Issue 9b</b> Groundwater contamination from "Dilute and Disperse" waste sites	Monitor plume of contamination	WRA WQM	R	■	■	■	■	■	To establish risks to ground and surface water
	Carry out remedial work as required	Developer Site operator NRA, WRA WQM	N/K	■	■	■	■	■	Prevent further pollution of ground and surface water
<b>Issue 9c</b> Rising Nitrate Levels in Groundwater	Establish and monitor Nitrate Sensitive Areas and Nitrate Vulnerable zones	MAFF, NRA WQM	R		■	■	■	■	General and long term reduction in pollution risk to aquifer
	Reduce fertilizer application rates throughout the area	MAFF, NFU Landowners Fertilizer Industry WQM	N/K	■	■	■	■	■	

## ACTIVITY PLANS: WATER RESOURCES

The current use of water resources is discussed in Water Abstraction on page 7. The future use of groundwater for irrigation and water supply is an important issue affecting the catchment. In safeguarding water supplies for the future, the NRA will continue to balance the needs of abstractors with the needs of the environment.

### ISSUE 10 Managing Water Resources in the Catchment

See Introduction above.

ISSUE	ACTIVITY	RESPONSIBILITY	Cost £	TIMESCALE					NOTES
				95/96	96/97	97/98	98/99	99/00	
<b>Issue 10a</b> The availability of water resources in the catchment	Review the allocation of resources linked with the Chalk and Greensand aquifers	NRA WRM	R			■			Improve understanding of water resources and allows impact of abstraction to be estimated and better management of water resources
	Use computer model from groundwater protection zone work to improve water balance calculations in the catchment	NRA WRM	R			■			Modelling allows the impact of abstraction to be estimated and give better management
<b>Issue 10b</b> Balancing abstraction against in river needs	Undertake in-river needs study for the River Nar	NRA WRM	15k R		■	■			Allows NRA to set future limits on abstraction
	Undertake in-river needs study for the Gaywood River	NRA WRM	10k R		■	■			Allows NRA to set future limits on abstraction
	Undertake in-river needs study for the Heacham and Ingol Rivers	NRA WRM	N/K				■	■	Allows NRA to set future limits on abstraction
	Set up the hydrological monitoring of four wetland SSSIs	NRA WRM	32k C	■	■	■			To be used in future identification of protection zones for individual wetlands
<b>Issue 10c</b> Hydrometric Monitoring	Review of hydrometric monitoring installations needed	NRA WRM	R	■	■	■	■	■	Ensure hydrometric data collection serves all functional requirements
	Carry out monitoring of the four wetland SSSIs	NRA WRM	20k			■	■	■	

## ACTIVITY PLANS: FLOOD DEFENCE

300km<sup>2</sup> of land area in the catchment is below the highest known tide level. Since 1978, there has been substantial investment made to overhaul the Catchment's sea and tidal defences and most structures now provide a Standard of Protection of 1 in 100 years. One of the most significant problems to be tackled is siltation in the Tidal River. Siltation may increase flood risk and affect commercial and pleasure navigation interests. When complete, the NRA standards of service review will help target resources more effectively and ensure that NRA river maintenance is appropriate to established land uses. Balancing the impact of flood defence activities with the needs of wetland flora and fauna will remain a challenge throughout the life of this Plan. Over the coming years, the NRA and other operating Authorities will develop a series of Water Level Management Plans to help safeguard recognised conservation sites, eg, SSSIs, through consultation with interested parties. Flood defence works are now subject to NRA Environmental Assessment Procedures.

### ISSUE 11 Coastal Flood Defence Problems

There is a need to maintain the beach's effectiveness as a sea defence through understanding the system dynamics and recycling. Also, existing access ramps to the beach are becoming congested resulting in unlawful and sometimes damaging boat launches elsewhere.

ISSUE	ACTIVITY	RESPONSIBILITY	Cost £	TIMESCALE					NOTES
				95/96	96/97	97/98	98/99	99/00	
<b>Issue 11a</b> Hunstanton to Snettisham beach recharge	Continue monitoring of effectiveness	NRA FDM	180k C	■	■	■	■	■	Review 95/96 & routine monitoring thereafter
	Continue recycling beach material from Snettisham Beach to Hunstanton	NRA FDM		■	■	■	■	■	
	Review Beach/Flood Defence Strategy for Hunstanton - Snettisham and take appropriate action	NRA FDM		■	■	■	■	■	
<b>Issue 11b</b> Hunstanton - Snettisham Beach Access	Investigate siting of further access ramps	NRA/ Local Authority FDM	N/K			■			Have to be written into Local Authority Byelaws
<b>Issue 11c</b> Loss of beach material south of Hunstanton boat ramp	Agree suitable form of protection	NRA, Local Authority, Hunstanton Town Council FDM	100k C			■			Subject to outcome of Review (11a)
<b>Issue 11d</b> Sea Banks East, Wolferton - Snettisham	Investigate a source of material and re-profiling at specified locations	NRA FDM	400k R		■	■	■	■	Improved maintenance access
<b>Issue 11e</b> Coastal Zone Development - risks to human life	Restrict occupancy of holiday homes in high risk areas to the summer period	Planning Authority/ NRA FDM	R	■	■	■	■	■	There is a high risk to life during winter storm tidal surges. Planning control & public advance notification issues.
<b>Issue 11f</b> Storm Tide Warning Service	Rationalise service boundaries with existing police and other authority boundaries and review their role	Storm tide Warning Service, Police, NRA, MAFF, Local Authority FDM	R	■	■	■	■	■	This will improve and simplify the operation of the service. Problems experienced since police and local authority boundaries do not coincide with the physical boundary of the coast.



## ACTIVITY PLANS: FLOOD DEFENCE

### ISSUE 12 King's Lynn Tidal Defences

Despite the protection from flooding provided by existing tidal defences, Kings Lynn is still under real threat from flooding. This issue highlights the on-going effort necessary to manage this situation and also aims to raise awareness of the problem.

ISSUE	ACTIVITY	RESPONSIBILITY	Cost £	TIMESCALE					NOTES
				95/96	96/97	97/98	98/99	99/00	
<b>Issue 12a</b> King's Lynn tidal defences, Common Staithe Square to Purfleet Quays	Design and construct works to increase the level of protection to 1:100 year flood	NRA FDM	100k £	■					
<b>Issue 12b</b> King's Lynn tidal defences, South Quay	Development over the years has meant that the South Quay area has a maze of redundant services, making the results of water movement unpredictable. Therefore, there is a need to update records and procedures as the whereabouts of pipework etc becomes known.	Land owner, Utilities, Local Authority, NRA FDM	N/K	■	■	■	■	■	On going process. Many old services may never be traced. It is believed that there is potential for backflow via the old service pipework to breach flood defences.
	Continue to issue appropriate flood warnings	NRA, Police, Local Authority FDM	R	■	■	■	■	■	Ensures best possible preparation against flood risk
<b>Issue 12c</b> King's Lynn tidal defences King's Staithe Square and the Purfleet	Incorporate permanent defences into any future development of the site	NRA, Developer, Local Authority FDM	R	■	■	■	■	■	We rely on the cooperation of the planning authority to include flood defences as development proceeds

## ACTIVITY PLANS: FLOOD DEFENCE

### ISSUE 13 Tidal River and Relief Channel Flood Defence Problems

The Tidal River between Denver and King's Lynn has suffered increased siltation during the last 35 years, following the completion of the flood protection scheme, and is now affecting water movement and sluice operation and sluice operation. The training walls, which run on both sides of the Tidal River from King's Lynn to the Wash are meant to provide a "self-cleansing" channel in terms of sediment for Navigation and Flood Defence purposes. Salt Marsh has encroached on these walls reducing their effectiveness.

ISSUE	ACTIVITY	RESPONSIBILITY	Cost £	TIMESCALE					NOTES
				95/96	96/97	97/98	98/99	99/00	
<b>Issue 13a</b> Tidal River Bank Improvements and Erosion Control	Carry out annual inspections	NRA FDM	2k R	■	■	■	■	■	The bank improvements have increased the protection from erosion. Problems will be quickly and systematically identified
	Improve Tidal River Banks to 1 in 100 standard of protection	NRA FDM	2.3 Mil & 1.4 Mil C	■	■				Works to increase stability of banks and improve from current standard
	Inspect banks after major storm surges	NRA FDM	2k R	■	■	■	■	■	As required
<b>Issue 13b</b> Tidal River Siltation	Study and report on problem	NRA FDM	50k C	■					Siltation is a major influence on the effectiveness of Tidal River Flood Defences but definition of the problem requires a "state of the art" analysis of an extremely complex system. This study will give an initial indication of the problem.
	Further "training" works alongside the river channel	NRA FDM	8 Mil C			■	■	■	Reduces siltation long term
	Silt Removal and siltation control works	NRA FDM	N/K		■	■	■	■	May provide immediate solution in specific locations but only effective for short term. Timing is indicative only - will depend on the outcome of the study
<b>Issue 13c</b> Tidal River Training Walls	Increase height of training walls	NRA FDM	2 Mil C			■	■	■	Reduce volume of silt entering the Tidal River
	Complete Wash outfalls study	NRA FDM	20k C	■					Better understanding of sediment and saltmarsh dynamics
<b>Issue 13d</b> Tidal River Outfalls	Develop automated system	NRA FDM	10k C			■			Should stop saline intrusion and reduce flood risk
	Clarify responsibility and agree working procedures	NRA, IDB FDM	N/K	■	■				Responsibility will be more clearly defined

## ACTIVITY PLANS: FLOOD DEFENCE

### ISSUE 13 Tidal River and Relief Channel Flood Defence Problems *continued*

ISSUE	ACTIVITY	RESPONSIBILITY	Cost £	TIMESCALE					NOTES
				95/96	96/97	97/98	98/99	99/00	
<b>Issue 13e</b> Relief Channel Bank Erosion	Continue Monitoring	NRA FDM	2k	■	■	■	■	■	Will improve long term monitoring and reduce costs
<b>Issue 13f</b> Tail Sluice Automation	Complete Tail Sluice automation	NRA FDM	50k C	■					
	Monitor for performance and reliability in all conditions	NRA FDM	R	■	■	■			

### ISSUE 14 River Nar Flood Defence Problems

There is a need to assess the amount of protection from flooding provided by the River Nar embankments and increase that level of protection to an agreed standard.

ISSUE	ACTIVITY	RESPONSIBILITY	Cost £	TIMESCALE					NOTES
				95/96	96/97	97/98	98/99	99/00	
<b>Issue 14a</b> River Nar bank instability	Complete study outlining options and issues and undertake any necessary improvement works	NRA FDM	1.8 mil C	■	■				Embankments on the river Nar protect large areas of agricultural land from flooding
<b>Issue 14b</b> Non main river Flooding at West Winch	Re-excavate existing drains	Local Authority, Riparian Owner FDM	N/K		■				The NRA regulates but cannot instigate works on ordinary watercourses.  Timing relates to discussions with responsible parties.
	Promote alternative drainage scheme	Local Authority, Riparian Owner FDM	N/K		■				

### ISSUE 15 River Babingley Flood Defence Problems

The issue is as a result of the outfall's isolated location and the crude levels of control achieved manually.

ISSUE	ACTIVITY	RESPONSIBILITY	Cost £	TIMESCALE					NOTES
				95/96	96/97	97/98	98/99	99/00	
<b>Issue 15a</b> River Babingley outfall	Investigate feasibility of providing power to the site and automation of outfall to relieve effects of water level fluctuations on habitat and flow regimes	NRA FDM	2K C		■				Will improve control of water levels. Ingression of sea water also impacts on water quality. (See also issue 13d).
	Carry out works to relieve the effects of water level fluctuations on habitat	NRA FDM	40K C			■			



## ACTIVITY PLANS: FLOOD DEFENCE

### ISSUE 16 Heacham River Flood Defence problems

The Kalajuga Sluice, which discharges water through the sea bank at Heacham, lacks back-up defences in the event of a failure. Also, the fact that the Heacham Pumping Station directly affects the river means that it should be under the NRA's control.

ISSUE	ACTIVITY	RESPONSIBILITY	Cost £	TIMESCALE					NOTES
				95/96	96/97	97/98	98/99	99/00	
<b>Issue 16a</b> Heacham river, Kalajuga Sluice Lacks a Secondary Flood Defence	Install a suitable penstock on upstream face of sluice structure	NRA FDM	10k C		■				
<b>Issue 16b</b> Heacham river, Pumping Station	Hand over station from AWS to NRA	NRA, AWS FDM	N/K		■				Progress to be decided. Overall control will rest with the NRA
<b>Issue 16c</b> Heacham river Non Main river flooding at Fring	Prepare scheme to deal with uncontrolled spring water	Local authority, County Highways FDM	N/K		■				Will relieve flooding problems and reduce number of road closures. Timing relates to discussions with responsible parties

### ISSUE 17 River Ingol Flooding Problem

Outfall refurbishment is necessary since it is dilapidated and has no back-up defence capability. Also, the flooding at Dersingham is caused by unconsented ditch filling and inadequate piping.

ISSUE	ACTIVITY	RESPONSIBILITY	Cost £	TIMESCALE					NOTES
				95/96	96/97	97/98	98/99	99/00	
<b>Issue 17a</b> River Ingol Outfall	Refurbish outfall	NRA, IDB, Landowners FDM	70k C	■	■				Work in progress
<b>Issue 17b</b> River Ingol Non main river flooding at Dersingham	Re-excavate ditches and replace undersized culverts	Riparian Owner, Local Authority FDM	N/K		■				Timing relates to discussions with responsible parties.

## ACTIVITY PLANS: FLOOD DEFENCE

### ISSUE 18 General Flood Defence Problems and Initiatives

See Introduction to Flood Defence Issues above.

ISSUE	ACTIVITY	RESPONSIBILITY	Cost £	TIMESCALE					NOTES
				95/96	96/97	97/98	98/99	99/00	
<b>Issue 18a</b> Water Level Management Plans	Complete plans or interim management statements for sites identified in the catchment. The NRA are charged with completing the River Nar SSSI (medium priority). Reviews of the plan will then follow.	NRA, IDBs, MAFF, EN PM	7k R	■	■	■			Will help to maintain and enhance wildlife value of recognised sites
	Apply plans to flood defence operations	NRA, IDB FDM	N/K		■	■	■	■	Will help to maintain and enhance wildlife value of recognised sites. Costs will depend on outcome of plans.
<b>Issue 18b</b> River maintenance standards	Complete standards of service review	NRA FDM	250k C	■	■	■	■	■	Will help us to provide more appropriate and cost effective river and structure maintenance
	Apply criteria to flood defence maintenance	NRA FDM	N/K		■	■	■	■	
<b>Issue 18c</b> Non main river flooding	Clarify the roles and responsibilities of the various drainage Authorities	Local authority, NRA, IDBs DM	R	■					A working protocol has been agreed with the local authorities in Norfolk. Result in reduced flood risk.
<b>Issue 18d</b> Sea Level Rise and Climate change	Monitor information and design schemes to best forecast	NRA FDM	R	■	■	■	■	■	On-going. Subsequent projects are likely to involve major capital expenditure.

## ACTIVITY PLANS: NAVIGATION

The Tidal river from Denver to Stowbridge provides an important link between the Ely Ouse at Denver and the West of Ouse navigation in the Well Creek and the Old Bedford River. This short section of river is probably the busiest section of the tidal Great Ouse and is used by boat traffic on the Nene/Ouse Navigation link. Strong tidal currents and a large tidal range make navigation difficult here and a significant safety hazard.

### ISSUE 19a Navigation of Salters Lode/Denver Tidal River Crossing

See Introduction above

ISSUE	ACTIVITY	RESPONSIBILITY	Cost £	TIMESCALE					NOTES
				95/96	96/97	97/98	98/99	99/00	
Issue 19a Navigation of Salters Lode/Denver Tidal River Crossing	Review level of Navigation facilities	NRA FRCNM	R	■	■				Improved service and safety. To be completed 95/96, with implementation 96/97
	Produce navigation guidance sheet and information board	NRA FRCNM	Sk R			■			Improve awareness of boat users



## ACTIVITY PLANS: DEVELOPMENT PRESSURES

Population Growth in this catchment is expected to be around 1% per annum. Most development will be centred around existing towns and limited village development.

There are two main ways that the NRA can influence development:

- Through the forward planning system, the NRA can assist local planning authorities to allocate land for development by commenting on structure plans and local plans, identifying constraints and highlighting where the river environment can be enhanced by sympathetic development. The NRA will continue to advise on water-related issues in comments on structure and district-wide local plans;
- The NRA can advise on the control of development by offering formal and informal comments to planning authorities on planning applications and development guides. The NRA can also control some developments using its own powers, for example, through issuing Land Drainage Consents.

The main objectives are to protect the water environment from the harmful effects of development and to minimize flood risk. With 30% of the catchment below the highest known tide level, controlling development to limit the risk of flooding is a priority.

### ISSUE 20 Development Pressures

See Introduction above.

ISSUE	ACTIVITY	RESPONSIBILITY	Cost £	TIMESCALE					NOTES
				95/96	96/97	97/98	98/99	99/00	
<b>Issue 20a</b> Development pressures - pollution risk from development in unsewered areas	Restrict development through the planning process	NRA, Planning Authority PM	R	■	■	■	■	■	Controls problem
	Install "first-time" sewerage schemes	AWS, Councils, Householders, NRA PM	N/K	■	■	■	■	■	Reduce pollution
	Install private sewage treatment plants	Householder PM	N/K	■	■	■	■	■	Reduce pollution
<b>Issue 20b</b> Development pressures - pollution risk from the redevelopment of Contaminated land	Identify type and scale of contamination	NRA, Planning Authority, Developer PM	R	■	■	■	■	■	Allows better design and control of redevelopment proposals
	Agree measures to prevent pollution	NRA, Planning Authority, Developer PM	N/K	■	■	■	■	■	Protect rivers and groundwaters and eliminate some sources of pollution
<b>Issue 20c</b> Development Pressures - Structure and Local Plans	Promote NRA Guidance notes in Structure and Local Plans	NRA, Planning Authorities PM	R	■	■	■	■	■	Illustrates model policies to protect the water environment

## ACTIVITY PLANS: DEVELOPMENT PRESSURES

### ISSUE 20 Development Pressures *continued*

ISSUE	ACTIVITY	RESPONSIBILITY	Cost £	TIMESCALE					NOTES
				95/96	96/97	97/98	98/99	99/00	
<b>Issue 20d</b> Development pressures - New Roads and Bypasses	Incorporate Flood protection measures into all proposals	NRA, Highway Authorities, IDBs PM	R	■	■	■	■	■	Avoids increased flood risk
	Incorporate pollution prevention measures into all road proposals	NRA, Highway Authorities, IDBs PM	R	■	■	■	■	■	Reduces pollution risks
	Ensure wildlife is protected and enhanced with all road proposals	NRA, Highway Authorities PM	R	■	■	■	■	■	Occasionally the water environment is enhanced with road developments. Most often the aim is to limit the damage they cause.
<b>Issue 20e</b> Proposed development behind River Nar Flood Defences	Improve flood defences to the required standard to accommodate development allocated in the Local Plan, south east of King's Lynn	Developer FDM	N/K		■	■	■	■	Developer needs to provide additional flood defence protection to allow development to take place. Beyond the protection provided by activities discussed in issue 14a, above.
<b>Issue 20f</b> Section 105 surveys	Improve our knowledge of flood risk areas through survey work and computer modelling	NRA FDM	N/K	■	■	■	■	■	Able to fulfil the remit of controlling development in the flood plain - subject of a memorandum of understanding between the local authorities and NRA.

## ACTIVITY PLANS: WILDLIFE AND LANDSCAPE CONSERVATION

Many of the rivers in this catchment have been engineered to improve land drainage capability and control flooding. This work has restricted the wildlife value of these rivers. The NRA have assessed 138km of Statutory Main River to enable us to prepare plans to restore their wildlife value. Issue 18a, Water Level Management Plans, describes an important country-wide initiative which will aid the protection and future management of rivers and wetlands in this catchment. The "buffer zones" Research and Development project (21b) is an example of another national initiative. With appropriate financial backing, buffer zones could yield water quality and wildlife benefits throughout intensively farmed land in lowland Britain.

### ISSUE 21 Degraded Rivers

See Introduction above.

ISSUE	ACTIVITY	RESPONSIBILITY	Cost £	TIMESCALE					NOTES
				95/96	96/97	97/98	98/99	99/00	
<b>Issue 21a</b> Degraded Rivers	Identify sites most needing restoration	NRA, Land owners, angling clubs, conservation groups <i>FRCNM</i>	4k R	■	■				Draw up criteria for prioritization. All can share the responsibility to identify sites which most need restoring.
	Develop and implement restoration plans	NRA, Landowners, Conservation bodies, English Nature <i>FRCNM</i>	20k		■			■	Concentrate on priority areas only and incorporate additional enhancements into routine flood defence works
<b>Issue 21b</b> River Corridor Buffer Zones	Complete R&D Project	NRA <i>FRCNM</i>	12k R	■					NRA National Project
	Develop buffer zones	NRA, MAFF, English Nature, Countryside Commission <i>FRCNM</i>	R	■	■	■	■	■	Implement recommendations of R&D. MAFF initiative. Land owners and tenants also have a role in developing buffer strips.
<b>Issue 21c</b> Habitat improvements to the Relief Channel	Review bank mowing policy	NRA <i>FRCNM</i>	1k R	■					Banks are maintained to prevent scrub encroachment and reduce vermin damage. Grazing is encouraged wherever practicable.
	Target new management techniques using REDS and RCS	NRA <i>FRCNM</i>	R		■				Cost incurred by bank mowing programme
	Identify appropriate grazing management	NRA <i>FRCNM</i>	R		■				Can only control grazing on NRA owned -banks



## ACTIVITY PLANS: WILDLIFE AND LANDSCAPE CONSERVATION

### ISSUE 22 Special Ecosystems

A category of the river quality objectives initiative had been proposed to protect ecosystems sensitive to potentially damaging changes in water quality.

ISSUE	ACTIVITY	RESPONSIBILITY	Cost £	TIMESCALE					NOTES
				95/96	96/97	97/98	98/99	99/00	
<b>Issue 22a</b> Special Ecosystems	Identify sites which will be included within the special ecosystem class of Water Quality Objectives	NRA, MAFF, English Nature, County Wildlife Trusts <i>FRCNM/WQM</i>	R	■	■				Enable implementation of new objectives when chemical criteria are finalised

## ACTIVITY PLANS: FISHERIES AND RECREATION

Many of the rivers in this catchment are good coarse fisheries. In the 1970s, the Relief Channel was regarded as one of the top coarse fisheries in the UK. The enhancements outlined here will help to improve the habitat for fish. The upper reaches of the Rivers Nar and Babingley support breeding brown trout. The scale of the sea trout run in these rivers does not justify major works to improve access through river structures although we will always consider fish access when river structures are being repaired or maintained. River and navigation works often affect the fishery. Targeting our river maintenance works more effectively - see Issue 18b - may also have beneficial effects on the fishery.

### ISSUE 23 Fisheries and Recreation Problems and Opportunities

See Introduction above.

ISSUE	ACTIVITY	RESPONSIBILITY	Cost £	TIMESCALE					NOTES
				95/96	96/97	97/98	98/99	99/00	
<b>Issue 23a</b> Poor fisheries Habitat within the Relief Channel	Increase fish refuges using willow crows	NRA FRCNM	14k C	■	■		■		
	Examine and construct sites for artificial reefs	NRA FRCNM	56k C	■	■	■	■		
<b>Issue 23b</b> Recreational access to the Relief Channel	Establish the potential demand	NRA FRCNM	2k R			■			Survey of what NRA owns
	Increase public information and safety facilities	NRA FRCNM	8k C			■	■		
	Provide more angling sites - particularly accessible to the disabled	NRA Angling Clubs FRCNM	10k C			■	■		The steep, high banks do not lend themselves to a simple cost-effective solution of the problem of disabled angler access. The adjacent Cut-Off Channel may offer a more straightforward option.
<b>Issue 23c</b> Sea Trout access to the river Nar	Consider migrating fish access when sluice gates being renewed	NRA FRCNM	N/K						As and when possible
<b>Issue 23d</b> Coarse fishery on the lower reaches of the River Babingley	Operate sluice only when required	NRA FDM	R	■	■	■	■	■	Will help to stop loss of young fish
	Investigate use of habitat shelters	NRA FRCNM	3k C		■				Will help reduce fish loss when sluice is open
<b>Issue 23e</b> Sea trout access to River Babingley	Allow for fish movement when repairing or renewing river structures	NRA FRCNM	R	■	■	■	■	■	As and when possible
<b>Issue 23f</b> Smelt Population	Lack of knowledge of status of smelt population and factors determining population. A desk study will be completed in the first instance.	NRA FRCNM	5k R		■				Operational investigation bid. Considered a rare species

## SUMMARY OF ISSUES

The map below illustrates the location of the issues that exist in this catchment, which are also summarised below:

- |   |  |
|---|--|
| <b>ISSUE 1</b> River Nar Water Quality problems                   | <b>ISSUE 13</b> Tidal River and Relief Channel Flood Defence Problems    |
| <b>ISSUE 2</b> Gaywood River Catchment Water Quality Problems     | <b>ISSUE 14</b> River Nar Flood Defence Problems                         |
| <b>ISSUE 3</b> River Babingley Water Quality Problems             | <b>ISSUE 15</b> River Babingley Flood Defence Problems                   |
| <b>ISSUE 4</b> Heacham River Quality Problems                     | <b>ISSUE 16</b> Heacham River Flood Defence Problems                     |
| <b>ISSUE 5</b> Middle Level Drain Water Quality Problems          | <b>ISSUE 17</b> River Ingol Flooding Problems                            |
| <b>ISSUE 6</b> Water Quality Problems King's Lynn Area            | <b>ISSUE 18</b> General Flood Defence Problems and initiatives (unsited) |
| <b>ISSUE 7</b> Estuary Eutrophication                             | <b>ISSUE 19</b> Navigation of Salter Lode/Denver Tidal Crossing          |
| <b>ISSUE 8</b> Bathing Water Quality                              | <b>ISSUE 20</b> Development pressures                                    |
| <b>ISSUE 9</b> Pollution Risks to Ground Water Supplies (unsited) | <b>ISSUE 21</b> Degraded rivers (unsited)                                |
| <b>ISSUE 10</b> Managing Water Resources in the Catchment         | <b>ISSUE 22</b> Special Ecosystems (unsited)                             |
| <b>ISSUE 11</b> Coastal Flood Defence Problems                    | <b>ISSUE 23</b> Fisheries and Recreation                                 |
| <b>ISSUE 12</b> King's Lynn Tidal Defences                        |  |





## FUTURE REVIEW AND MONITORING

In collaboration with the jointly responsible organisations identified within this plan, the NRA will aim to pursue and implement the actions outlined in this Action Plan. An annual review will be undertaken to monitor progress. The results of this review will form a report produced by the NRA and distributed to interested parties. The first North West Norfolk annual review is expected in January 1997. However, regular monitoring of the implementation of the Activity Plans will be undertaken by Planning staff in close liaison with internal and external participants.

The review document will comprise the following information:

- a detailed comparison of actual progress against planned progress;
- identification of additional actions to maintain progress in the light of changes in the catchment;
- consideration of the need to update the CMP.

Update requirements will obviously depend upon the particular needs of the catchment. However, updates would normally be undertaken every 5 years.

## THE ENVIRONMENTAL AGENCY

Since the passing of the Environment Act by Parliament during the summer of 1995, preparations have been made towards the formulation of the Environmental Agency which will combine the NRA with Her Majesty's Inspectorate of Pollution (HMIP) and the Waste Regulation Authorities (WRA). Vesting day will be 1 April 1996. It is envisaged that the Agency will continue with the Catchment Management Planning Process initiated by the NRA - perhaps leading to the plan's enhancement by addressing the integrated management of Land, Air and Water Environments.

## FURTHER INFORMATION

If you require any further information and wish to make any comments, please contact:

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**THANK YOU FOR YOUR INTEREST IN THE  
NORTH WEST NORFOLK CATCHMENT.  
PLEASE CONTINUE TO LET US KNOW  
YOUR VIEWS, AND OF YOUR ACTIVITIES.**

## APPENDICES

### A: ISSUE CROSS REFERENCE FROM CONSULTATION REPORT

The table below shows how issues originally stated in the Consultation Report have been regrouped into the Action Plan. Through consultation, detailed changes have been made to the "options" text in the Consultation Report, to convert them into "Activities".

ACTION PLAN ISSUE		CONSULTATION REPORT ISSUE	
1 R Nar Water Quality Problems			
1a	Mileham to Litcham	45	Same title
1b	Litcham to Lexham Hall	46	Same title
1c	Lexham Hall to Castle Acre	47	Same title
1d	Eutrophication	43	Same title
2 Gaywood River Water Quality Problems			
2a	Failure to meet target	50	Same title
2b	Roydon Common SSSI	51	Same title
3 River Babingley Water Quality Problems			
3a	Failure to meet target	54	Same title
4 Heacham River Water Quality Problems			
4a	Failure to meet target	60	Same title
5 Middle Level Drain Water Quality Problems			
5a	Failure to meet target	42	Same title
6 Water Quality Problems in the King's Lynn Area			
6a	Oil pollution nuisance	33	Same title
6b	Middleton Stop/Pierrepoint Drain target failure	52	Same title
7 Estuary Eutrophication			
7a	Estuary Eutrophication	21	Similar title
7b	Impact of King's Lynn STW	20	Same title
8 Bathing Water Quality			
8a	Heacham North Beach failure	New Issue	
9 Pollution Risks to Groundwater supplies			
9a	Source Protection	6	Potential pollution of Groundwater Supply
9b	Dilute and Disperse waste sites	8	Same title
9c	Nitrate Levels in Groundwater	7	Same title
10 Managing Water Resources in the catchment			
10a	The availability of water resources	1	Review the available water resources in the catchment
10b	Balancing abstraction against in river needs	2	Review the quantity allocated to the environment
10c	Hydrometric Monitoring	1 & 2	As above

## APPENDICES

### ACTION PLAN ISSUE

### CONSULTATION REPORT ISSUE

#### 11 Coastal Flood Defence Problems

11a	Hunstanton to Snettisham beach recharge	23	Same title
11b	Hunstanton to Snettisham beach access	22	Same title
11c	Loss of beach material at Hunstanton Boat ramp	24	Same title
11d	Sea Banks East	25	Same title
11e	Coastal Zone Development - risks to human life	26	Coastal zone development
11f	Storm tide warning service boundaries	27	Same title

#### 12 King's Lynn Tidal Defences

12a	Common Staithe Square to Purfleet Quays	35	Same title
12b	South Quay	36	Same title
12c	King's Staithe Square and the Purfleet	34	Same title

#### 13 Tidal River and the Relief Channel Flood Defence Problems

13a	Tidal River Bank improvements and Erosion control	28	Same title
13b	Tidal River siltation	29	Same title
13c	Tidal River Training Walls	30	Same title
13d	Tidal River outfalls	32	Same title
13e	Relief Channel bank erosion	37	Same title
13f	Tail Sluice Automation	41	Same title

#### 14 River Nar Flood Defence Problems

14a	River Nar bank instability	48	Same title
14b	Non main river flooding at West Winch	53	Same title

#### 15 River Babingley Flood Defence Problems

15a	River Babingley outfall	55	Same title
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#### 16 Heacham River Flood Defence Problems

16a	Kalajuga sluice lacks a secondary defence	61	Same title
16b	Pumping station	62	Same title
16c	Non main river flooding at Fring	63	Same title

#### 17 River Ingol Flooding Problems

17a	River Ingol Outfall	58	Same title
17b	Non main river flooding at Dersingham	59	Same title

#### 18 General Flood Defence Problems and Initiatives

18a	Water Level Management Plans	10	Same title
18b	River Maintenance Standards	13	Same title
18c	Non main river flooding	14	Same title
18d	Sea level rise and climate change	16	Same title

#### 19 Navigation of Salters Lode/Denver Tidal River Crossing

19a	Navigation of Salters Lode, etc.	31	Same title
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## APPENDICES

### ACTION PLAN ISSUE

### CONSULTATION REPORT ISSUE

#### 20 Development Pressures

20a	Pollution Risk from development in unsewered areas	4	Development in unsewered areas
20b	Pollution risk from the redevelopment of contaminated land	5	The redevelopment of contaminated land
20c	Structure and local plans	17	Same title
20e	Proposed development behind River Nar Flood Defences	49	Proposed development dependent on flood defences
20f	Section 105 surveys	15	Similar title
20d	New Roads and By-passes	19	Same title

#### 21 Degraded Rivers

21a	Degraded rivers	9	Similar title
21b	River corridor buffer zones	12	Same title
21c	Habitat improvements to the Relief Channel	38	Conservation enhancements to the Relief Channel

#### 22 Special Ecosystems

22a	Special Ecosystems	11	The Identification of Special Ecosystems
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#### 23 Fisheries and Recreation Problems and Opportunities

23a	Poor fisheries habitat within the Relief Channel	39	Fisheries habitat within the Relief Channel
23b	Recreational access to the Relief Channel	40	Same title
23c	Sea Trout access to the River Nar	44	Same title
23d	Coarse Fishery on the River Babingley	56	Similar title
23e	Sea trout access to the River Babingley	57	Same Title
23f	Smelt Population		New Issue

## ABBREVIATIONS AND GLOSSARY

<b>Abstraction licence</b>	Document issued by the authority setting out the holders entitlement to take water. A licence is required to take water for most uses as defined in the Water Resources Act 1991.
<b>Ammonia</b>	Chemical used to characterise water quality as it is found in many effluent disposals.
<b>Aquifers</b>	Water bearing rock formations. Water occurs within the rock itself in the spaces between the rock granules as well as in cracks and fissures. Water contained within aquifers is known as groundwater and the level at which water occurs is the groundwater table.
<b>AWS</b>	Anglian Water Services Limited.
<b>Beach recharge</b>	Import of suitable beach material from elsewhere to raise the level and/or regrade a beach for sea defence or environmental purposes.
<b>Biochemical Oxygen Demand (BOD)</b>	Measure of the amount of oxygen in the water consumed by the breakdown of organic matter.
<b>C</b>	In the activity plans, refers to NRA capital budget expenditure.
<b>Carrstone</b>	A form of Lower Greensand which is often more like a sandstone than a sandy deposit.
<b>Chalk</b>	A calcium-rich rock formed from deposition of the shells of marine creatures. Groundwater is found within the fissures of the rock.
<b>Coastal cells</b>	The division of the coastline into discrete units for the purposes of flood defence planning and operations.
<b>Controlled Waters</b>	All surface water and groundwater bodies and channels to 3 nautical miles from the shore.
<b>Cut-Off Channel</b>	This water body is discussed in the Ely Ouse Catchment Management Plan. It links the Rivers Lark, Little Ouse and Wissey to Denver, taking storm water directly for discharge to tide and taking water from Denver for transfer to Essex for public water supply.
<b>Cyprinid</b>	Coarse freshwater fish such as roach, chub and bream, but not game fish such as Trout and Salmon.
<b>Designated Main River/sea defence</b>	Rivers and Sea defences agreed by MAFF and shown on a definitive plan.
<b>DO</b>	Dissolved Oxygen.
<b>DoE</b>	Department of the Environment.
<b>Dutch fyke netting</b>	Designed to catch eels consisting of a netting tube held up by hoops with funnels which trap the eel in the toe of the net.
<b>Eutrophic</b>	Nutrient rich usually resulting from high levels of organic matter but can be the result of nitrate pollution.
<b>Fauna</b>	Animal life forms.

## ABBREVIATIONS AND GLOSSARY

<b>Flora</b>	All plant life.
<b>Foreshore</b>	That part of the shoreline above the high water tidemark.
<b>Geomorphology</b>	The study of the physical landforms of an area.
<b>In river needs</b>	The totality of requirements for the water environment and effluent dilution before abstraction is taken into account.
<b>Integrated Pollution Control (IPC)</b>	Set out in the Environmental Protection Act 1990.
<b>Internal Drainage Boards (IDBs)</b>	Authorities responsible for dealing with land drainage within a district. They are primarily concerned with agricultural land drainage but also may be involved with water supply to their district for agricultural purposes.
<b>MAFF</b>	Ministry of Agriculture, Fisheries, and Food.
<b>m AODN</b>	see Sea Level.
<b>Middle Level</b>	Area which falls between the River Nene and Counter Drain/Old Bedford River. Much of it is below sea level and requires land drainage. It is an area of intensive farming activity. Water levels and navigation are the responsibility of the Middle Level Commissioners.
<b>Models</b>	Usually theoretical frameworks, often using computers, which use mathematical formulae to describe in a simplified way the complexity of the water environment.
<b>NFU</b>	National Farmers Union.
<b>N/K</b>	Refers to "Not known" in the activity plans.
<b>Permissive powers</b>	Powers which confer on the NRA the right to do things but not the duty to do them. See also Statutory Powers.
<b>Public water supply</b>	The supply of water by companies appointed as Water Undertakers by the Secretary of State for the Environment under the Water Industry Act 1991.
<b>R</b>	In the Activity Plans, indicates routine work from the NRA Revenue budget.
<b>Ramsar Sites</b>	Designated by the Convention on Wetlands of International Importance at Ramsar, Iran. Important particularly as wildfowl habitat.
<b>RE</b>	River Ecosystem Classes.
<b>Re-profiling</b>	Changing the shape, height or cross-section of a beach or river to prevent/correct erosion, to strengthen/enlarge or for conservation purposes.
<b>Riffle pool sequences</b>	Reoccurring shallows and depths which form naturally in rivers. They provide habitat by having shelter and wide range of river velocities and food supplies.
<b>Riparian</b>	Owners of the land immediately adjacent to a water course.
<b>River Corridor Survey (RCS)</b>	A standard map based habitat survey highlighting important plant species.



## ABBREVIATIONS AND GLOSSARY

<b>River Ecosystem Class (RE/REC)</b>	see Statutory Water Quality Objectives.
<b>Rivers Environmental Database (REDS)</b>	Comprehensive database based on 500m stretch surveys of Statutory Main River. It maps the physical and environmental information and provides a basic conservation resource.
<b>River Flow Objectives (RFO)</b>	A series of flows which aim to reflect the varying In River Needs and the seasonality of flow patterns.
<b>River Habitat Survey (RHS)</b>	An inventory survey of physical features of the river and adjacent habitat.
<b>Saline intrusion</b>	Salt water is heavier than freshwater and will therefore tend sink to the bottom of a water course. Once salt water has entered a water course it is difficult to remove other than by flushing with high flows during floods. It can have profound effects on the ecology of river.
<b>Salmonid</b>	Game fish such as Trout, Salmon and Sea Trout.
<b>Sea level</b>	As defined at Newlyn. Ground levels are measured as above Ordnance Datum Newlyn (AODN). In parts of the catchment ODN is reset at 100m, the South Level datum (SLD).
<b>SSSI</b>	Site of Special Scientific Interest.
<b>Siltation</b>	At low velocities water will deposit the material being carried with it. The slower the velocity the finer the material deposited. A deposit of clays and silt is very difficult to remove naturally as it requires turbulent and high velocities.
<b>South Level</b>	This area falls between the Ely Ouse and 100 Foot/New Bedford River. Much of it is below sea level and requires land drainage. It is an area of intensive farming activity.
<b>Statutory consultee</b>	In both the NRA's and other agencies' legislation there are requirements for consultation. Comments and objections which are received are noted but do not usually have the power to, in themselves, prevent the controlling authority from making a decision.
<b>Statutory Main River</b>	The "Main River" status of a watercourse must first be approved by MAFF. The NRA has the power to carry out works to improve drainage or protect land and property against flooding.
<b>Statutory powers</b>	Powers conferred on the NRA where it has a duty to do things.
<b>Statutory Water Quality Objective (SWQO)</b>	Use related standards necessary to set quality targets fulfilling local needs. They are divided into use classes. At present only the River Ecosystem Class (REC) is in use.
<b>Storm Tide Warning Service</b>	Funded by MAFF, a branch of the Meteorological Office with particular responsibility for predicting the size and warning of tidal surges.
<b>Surge level</b>	High tide level augmented by low atmospheric pressure and on-shore winds producing a higher than normal sea level.
<b>Sustainable</b>	The use of a resource not exceeding the ability of that resource to fully replenish itself over a set time period.

## ABBREVIATIONS AND GLOSSARY

<b>Telemetry</b>	The use of telephone or radio links to automatically communicate between measuring stations and a central location where the data is received.
<b>Temporary licences</b>	Abstraction Licences are now generally issued for a period of 10 years. This is to enable the NRA to continually review the allocation of resources. These licences can then be renewed but the renewal is treated as if it were a new licence application and subject to the same processes.
<b>Terrestrial habitats</b>	Land based habitats such as river banks which are affected or interact with the water environment.
<b>UWWTD</b>	Urban Waste Water Treatment Directive.
<b>Velocities</b>	The speed of movement of water past a point. Velocities relate to flows, but flow is the volume of water moving past a point and reflect the channel size. Velocities are measured in metres per second (m/sec).
<b>Wetland</b>	Habitats which are dependant on water. This may be either groundwater in contact with the vegetation or flow of surface water across or through the site. Washlands are often sites which are subject to periodic flooding and the habitat has developed a requirement for this.
<b>Willow croys</b>	Bundles of Willow stakes used to alter the velocity, halt bank erosion and increase upstream habitat diversity.

### UNITS USED IN THIS REPORT

<b>Cubic Metres</b>	m <sup>3</sup> = 220 gallons
<b>Litres</b>	l = 1.76 pints
<b>Kilometres</b>	km = 0.6214 miles
<b>Metres</b>	m = 3.281 feet

## SUPPORTING INFORMATION

### RIVER QUALITY OBJECTIVES

The NRA has strategic targets known as River Quality Objectives (RQOs) for all rivers. RQOs provide a planning framework commonly agreed between dischargers and the NRA, and therefore guide water quality management decision.

RQOs are based on a River Ecosystem classification scheme which comprises five quality classes. The standards defining River Ecosystem (RE) classes reflect the chemical quality requirements of different types of riverine ecosystems. In the future, RQOs may be transferred onto a legally binding basis known as the Statutory Water Quality Objectives (WQOs) scheme. The River Ecosystem scheme will form the basis of WQOs, and four other river uses are envisaged; Special Ecosystems; Abstraction for Potable Supply; Agricultural Abstraction; and Watersports.

#### River Ecosystem classes

Class	Quality
<b>RE1</b>	Water of very good quality suitable for all fish species.
<b>RE2</b>	Water of good quality suitable for all fish species.
<b>RE3</b>	Water of fair quality suitable for high class coarse fish populations.
<b>RE4</b>	Water of fair quality suitable for coarse fish populations.
<b>RE5</b>	Water of poor quality which is likely to limit coarse fish populations.

### FLOOD DEFENCE STANDARDS OF SERVICE

Flood Defence Standards of Service land use bands and targets are as shown below:

#### Standards of Service land use bands and targets

Land use band	Description of typical land use	Target standard of protection (return period)	
		Fluvial	Saline
<b>A</b>	Urban	1:50 - 1:100	1:100 - 1:200
<b>B</b>	Lower density urban	1:25 - 1:100	1:50 - 1:200
<b>C</b>	Isolated rural communities	1:5 - 1:50	1:10 - 1:100
<b>D</b>	Isolated properties/intensive farming	1:1.25 - 1:10	1:2.5 - 1:20
<b>E</b>	Low grade agricultural land	<1:2.5	<1:5

Whilst these are the ideal level of protection which would be provided, it may not be possible to justify works because of economic, environmental or technical problems.

The flood warning Level of Service is: "Where possible to issue a warning at least 2 hours in advance of flooding in accordance with a nationally agreed and consistent procedure, identifying the river reach or coastal zone at risk, together with an indication of public safety aspects, property and land at risk and an assessment of certainty".



## PROJECT TEAM MEMBERS

### NRA PROJECT TEAM

Brian Elsdon	Planning Manager
Michelle Doyle	Senior Planner
Malcolm Duplock	Senior Engineer
Michael Evans	Fisheries, Recreation, Conservation and Navigation Manager
Kevin Rutterford	Quality Planning Officer
Debbie Jones	Senior Engineer (Water Resources)
Chris Taylor	Senior Hydrogeologist
David Berridge	Catchment Quality Officer
Nigel Woonton	Catchment Engineer

### THE GREAT OUSE CATCHMENT PANEL

were represented by, on the following sub-panel, to guide the production of this plan:

Colin Clare (Chairman)

Capt David Garside

Simon Hooton

W Charlesworth

Cllr Richard Rockcliffe

David Jones

# The National Rivers Authority

## *Guardians of the Water Environment*

The National Rivers Authority is responsible for a wide range of regulatory and statutory duties connected with the water environment.

Created in 1989 under the Water Act it comprises a national policy body coordinating the activities of 8 regional groups.

The main functions of the NRA are:

- Water resources* — The planning of resources to meet the water needs of the country; licensing companies, organisations and individuals to abstract water; and monitoring the licences.
- Environmental quality and Pollution Control* — maintaining and improving water quality in rivers, estuaries and coastal seas; granting consents for discharges to the water environment; monitoring water quality; pollution control.
- Flood defence* — the general supervision of flood defences; the carrying out of works on main rivers; sea defences.
- Fisheries* — the maintenance, improvement and development of fisheries in inland waters including licensing, re-stocking and enforcement functions.
- Conservation* — furthering the conservation of the water environment and protecting its amenity.
- Navigation and Recreation* — navigation responsibilities in three regions — Anglian, Southern and Thames and the provision and maintenance of recreational facilities on rivers and waters under its control.

*The National Rivers Authority will form part of a new organisation which will have responsibilities for the environmental protection of water, land and air. The new Environmental Agency starts its work of managing the environment in England and Wales on 1 April 1996.*



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