

# NORTH WEST NORFOLK CATCHMENT MANAGEMENT PLAN



## SUMMARY REPORT - MARCH 1995



**NRA**

*National Rivers Authority  
Anglian Region*

## INTRODUCTION

Catchment management planning aims to create a consistent framework within which all the NRA's functions and responsibilities can be applied in a co-ordinated manner within a particular catchment area.

The current state of the water environment and associated land is systematically analysed and compared with appropriate standards. Where these standards are not being met or are likely to be affected in the future, the shortfalls, together with options for action to resolve them, are presented as issues in a table at the end of this brochure.

## YOUR VIEWS

Formulation of this plan involves consulting and working with many public bodies and individuals. Your views on the issues identified are welcomed. You may also wish to comment on other matters affecting the water environment in the catchment area which you think should be examined by the NRA.

Please write with your comments to the following address, from which a full copy of the consultation report may also be obtained:

North West  
Norfolk  
Catchment  
Management  
Plan,  
Planning  
Manager,  
National Rivers  
Authority,  
Central Area,  
Bromholme  
Lane,  
Brampton,  
Huntingdon,  
Cams.  
PE18 8NE

Comments in  
writing, must be  
received by 24  
June 1995.



*Aerial View - Kings Lynn*

## WHAT IS CATCHMENT PLANNING

River catchments are subject to increasing use by a wide variety of activities, many of which interact giving rise to some conflicts. The many competing demands on the water environment and the interests of users and beneficiaries must be balanced.

Catchment management involves the NRA working with many people and organisations and using its authority to ensure rivers, lakes, coastal and underground waters are protected, and where possible improved, for the benefit of present and future users.

The NRA uses its resources to:

- Respond promptly to all reported pollution incidents and to emergencies due to flooding.
- Control pollution by working with dischargers to achieve improvements and monitor effluent compliance against standards.
- Maintain existing assets and invest in new ones to provide flood protection, manage and develop water resources and provide other NRA services.
- Monitor, survey and investigate the existing quality of controlled waters to determine short and long term changes.
- Determine, police, enforce and review conditions of water abstraction licences,



*Fisher Fleet - Kings Lynn*

discharge consents and flood defence consents in order to achieve operational objectives.

- Develop fisheries; promote recreation, navigation and conservation.
- Influence planning authorities to control development through Town and County Planning legislation.

## THE CATCHMENT

The catchment of the North West Norfolk rivers contains the River Great Ouse north of the Denver Sluice, the rivers Heacham, Ingol, Babingley and Nar which flow into the estuary, and the lowlands to the west of the Ouse. The catchment area also includes those parts of the estuary of the River Great Ouse known as the Wash which are the responsibility of the NRA. This represents an NRA





administrative area as the various legislation under which the NRA operates has a variety of off-shore limits.

The geology of the catchment comprises Chalk to the east, Lower Greensand in the centre and Clays and Alluvium to the west.

In the CMP area the River Great Ouse is tidal, and is often known as the Tidal River, and is contained within embankments which provide flood protection to the adjacent low lying land.

The Rivers Nar, Babingley, Ingol and Heacham originate as springs from the Chalk uplands in the east of the area and flow across low-lying land in embanked channels to discharge into the Tidal River or directly into the Wash.

Land Heights range from 93 metres above to 2 metres below sea level.



The area to the west of the Tidal River/Great Ouse is close to sea level and drains to the Wash by a combination of gravity outfalls and pumped discharges.

Most of the coastline in the CMP area is low lying, except at Hunstanton where there are cliffs, and is protected from inundation by the sea by a series of defences.

## CATCHMENT FACTS

Area 1007 km<sup>2</sup>

Population 1993 108,970 Predicted 2006 126,860

### FLOOD DEFENCE

Length of statutory main river 138.45 km  
(maintained by NRA)

Embanked main river 56.65 km

Length of sea defences 87.3 km

Length of navigable river 25.79 km

### WATER QUALITY

		km
Chemical	A (Excellent)	0
	B (Good)	18.5
	C (Fair)	67
	D (Fair)	31
	E (Poor)	17
	F (Bad)	16.5

Biological	A (Excellent)	63
	B (Good)	30
	C (Moderate)	58
	D (Poor)	4.5

Quality of Estuary Class B

Designated Bathing Hunstanton, Heacham  
Beaches

### FISHERIES

F1 Salmonid (Game) fishery 29 km F2 Cyprinid (Coarse) fishery 74 km

### CONSERVATION

Sites of Special Scientific Interest (SSSIs) 17

Water dependent SSSIs 8

County Wildlife Sites 256

Scheduled Ancient Monuments 71

## WATER QUANTITY

Availability for resource development:

Surface rivers	Summer	- none in area east of the Ouse - some availability in west of the Ouse
	Winter	- available in all catchments
Groundwater	Chalk	- none available except in NE part
	Greensand	- some availability

## LAND USE

The catchment is predominantly rural and is almost entirely within the county of Norfolk with forty percent of the population situated in the three main towns of King's Lynn, Downham Market and part of Hunstanton. During the summer season the population numbers in the principal seaside resorts can increase considerably. An operational military air base is located at Marham. The area is served by the A10(T) north-south and A47(T), A17(T) east-west roads and a main railway line to King's Lynn from London.

Arable farming is the predominant land use, principally of Grade 3. The whole of the area to the west of the Ouse is Grades 1 and 2. Some Grade 4 exists in the central part.



*Sea Front - Heacham*

## WATER QUALITY

Fluvial surface waters are generally good to fair, with some short lengths of poor quality, which is an overall improvement from the previous state in 1990.

The Tidal River Ouse is classed as good to fair quality.

The Wash itself supports a diverse fauna indicating generally good quality. Bacterial numbers are high, the major source being the King's Lynn STW discharge.

The bathing beaches designated under the EC Bathing Waters Directive at Hunstanton and Heacham both comply with the Directive.

Most rivers and tributaries have sewage treatment works discharges, and the Nar





and the Ouse have a number of major trade discharges.

The Chalk groundwater is generally of high quality, but is susceptible to pollution. High nitrate problem areas exist, and groundwater protection zones have been defined. Nitrate Vulnerable Zones have been designated, which, with compliance with the Code of Good Agricultural Practice and more stringent controls on nitrate application, will enable these Chalk groundwater sources to meet the requirements of the EC Nitrate Directive.

## WATER QUANTITY

The river flow in the catchment reflects rainfall, topography and surface geology.

The Tidal River/Great Ouse, will, in times of flood, discharge substantial quantities of water. During drought periods it is possible for flows in the Tidal River to fall substantially which can cause siltation problems and poor water quality.

Flows in the eastern rivers are generally low and exhibit little seasonal variation. This pattern of flows in these rivers reflects the importance of the continual spring flow to the river.

The Fenland region to the west of the Great Ouse is crossed by numerous man-made drainage channels most of which drain into the Tidal River and estuary.

There are no Minimum Acceptable Flows (MAF) defined for the rivers in the area. A Minimum Residual Flow (MRF) has been set for the abstraction by Anglian Water Services from the River Nar at Marham.

There is also an MRF in force for the transfer of water from Denver to the Ely

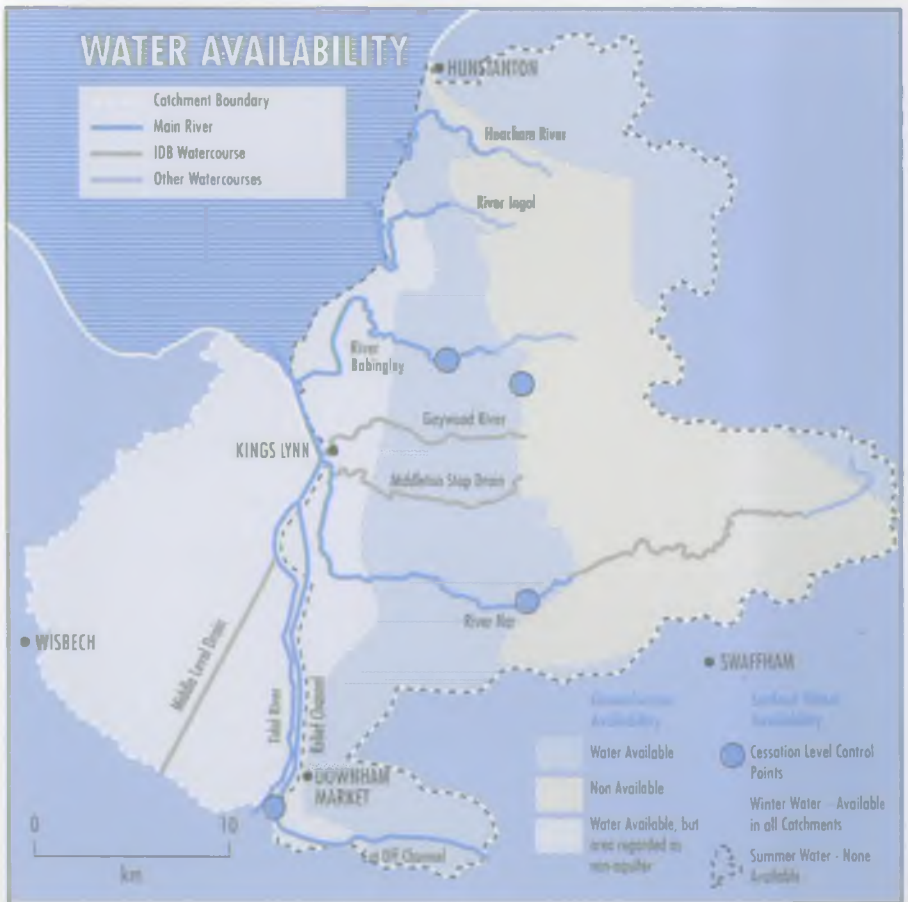


Ouse Essex scheme. This requires a flow through the Denver sluices, when the transfer is taking place.

All new licences and existing licences due for renewal in the catchments of the Babingley and Nar will be subject to cessation conditions based on historic flow regimes rather than target future flows.

The principal stores of groundwater reserves are the Chalk and Lower Greensand aquifers. There are several areas of Sands and Gravels which are also important locally.

An assessment has been made of the average yearly volume of water which contributes to the groundwater stores. The reliable groundwater resources are divided between the environmental need for water, i.e. the rivers and wetlands, and the water which may be allowed for abstraction.



There is currently water available in the Lower Greensand aquifer and in the north eastern part of the Chalk. None is available in all other parts of the Chalk aquifer.

Water level changes at Dersingham Bog, Leziate, Sugar & Derby Fens and Royden Common SSSI wetland sites are due to be studied under the "Hydrological Monitoring of Wetlands" project in conjunction with English Nature. This project aims to establish and develop the understanding of the hydrology of wetland sites enabling the causes and effects of water level change at these sites to be identified.

## ENVIRONMENTAL FEATURES

Fish biomass classifies most of the rivers within the higher categories of A to B.

The principal coarse fisheries within this catchment are the Relief Channel and the Middle Level Main Drain. Since its creation in the 1960's the Relief Channel has supported a coarse fishery which at times has been of national renown particularly during the early to mid 1970's. Currently it is a biomass category "B" fishery. The Middle Level Drain from Mullicourt Aqueduct downstream supports a moderate biomass category "B" fishery.

In their upper reaches the Rivers Nar and Babingley are typified by riffle pool sequences and support a fish population of breeding native brown trout.

Evidence exists also of a sea trout run in both the River Nar and the River Babingley.

A small breeding brown trout population has also been recorded upstream of Heacham village on the Heacham River where habitat is suitable.

Currently five of the six shellfish beds are adversely affected by sewage discharges to the Wash, shellfish caught from the affected beds require additional cleansing before sale for human consumption.

Where the environmental value of certain channels has been adversely affected by past land drainage activities, fisheries and general conservation value would be improved by appropriate habitat enhancement or restoration.

Of the 138km of statutory Main river in the catchment 7% requires conservation measures, 81% requires enhancement, and 12% requires restoration.

The Chalk streams are generally unpolluted and rich in aquatic macrophytes. They support a diverse and abundant invertebrate fauna.

The River Nar is a Site of Special Scientific Interest, designated as an outstanding river system of its type, combining the characteristics of a southern chalk stream and an East Anglian fen river.

The Wash estuary is an internationally important site for wildfowl and waders, as well as providing a valuable habitat for marine species.

The estuary itself supports a healthy and diverse fauna. The brown shrimp often predominates, whilst the presence of the Smelt is encouraging as this fish is regarded as being intolerant of pollution.

There is limited use in this catchment for inland navigation, that which does take place is centred on the Denver - Salters Lode crossing of the Tidal River. This can be a difficult crossing and is only possible at certain stages of the tide. Other navigations in the catchment are controlled by the King's Lynn





Conservancy Board and the Middle Level Commissioners.

There is an increasing demand for public access to the countryside and waterways for a variety of recreational needs. These include footpaths, bridle paths and cycleways and the NRA seeks collaboration with other bodies to enhance such access along river corridors in a sensitive manner.

More formal freshwater based recreations are centred primarily on former mineral workings and the Relief Channel, and comprise sailing, windsurfing and waterskiing.

Two bathing beaches are designated under, and comply with, the EC Directive. These are at Hunstanton and Heacham.

## FLOOD DEFENCE

An area of some 300km<sup>2</sup> of the catchment is below highest known tide level and therefore flood defence in the catchment is dominated by tidal influences, where failure of the defences could result in extreme danger and hazard to life. For centuries King's Lynn and the marshland/fenland areas have been subjected to tidal flooding when wind and sea conditions combine to produce surge tides. In recent times two major events dominate the record, those of 1953 and 1978.

Since 1978 there has been massive investment to overhaul the Catchment's sea and tidal defences, and substantially all now satisfy the National Guidelines Standard of Protection of 1:100 years (i.e. a 1% chance of exceedance in any given year).

Between Hunstanton and Snettisham the combination of "hard" and "soft" defences provides the required standard of protection to the area, however, monitoring must continue to establish the nett loss of beach material over the years so that need for a further beach recharge can be established. In the meantime an annual recycling exercise is carried out to re-distribute approximately 50,000 cubic metres of beach material along the frontage.

One of the most significant problems to be tackled is that of Tidal River siltation which not only affects the ability of the river to discharge flood water but also both commercial and pleasure navigation interests.

The defences throughout King's Lynn rely on manual closure of flood gates and cooperation between the NRA and Associated British Ports for the closure of the Alexandra Dock Gates upon receipt of Tidal Surge Warnings.

The position of fluvial defences is less clearly defined and less satisfactory.



However, a region-wide Standards of Service exercise is underway to establish a clear picture of the situation. A critical area is the River Nar where, during the November 1993 floods, a section of the river embankment failed flooding 132 hectares of agricultural land. Studies have been commissioned to identify a strategy for the long term solution to the problem.

## DEVELOPMENT CONTROL

The population is expected to grow at a rate in excess of 1% p.a. with both residential and commercial development occurring mainly at the existing centres of population.

With some 30% of the catchment below highest tide level, comments on the development of low-lying land have always been made with reference to the standard of flood defences. With the completion of the major upgrading works

on the tidal river defences following the 1978 tidal surge event, a satisfactory standard of flood defence will have been established.

The coastal zone static caravan and chalet sites are still a concern with regard to flood risk and the integrity of the flood defences; where appropriate the NRA will still support restrictions on seasonal occupation.

At present, the majority of the River Nar embankments give protection to agricultural standards only. This matter will need addressing with regard to the proposed White House Farm development to the south-east of King's Lynn in particular.

A large proportion of the villages in the catchment are unsewered and the discharge from septic tanks can cause problems. Further development of these settlements requires careful consideration.

The concentrated run-off of surface water from development into non-maintained watercourses, often with inadequate culverts, causes many local problems. Much of the proposed major development will drain to Internal Drainage Board watercourses and they will need to decide whether they can accept this increased surface water run-off into their drainage systems and if not what upgrading works are necessary.

The upgrading of sewage disposal facilities to accommodate future development will also be a consideration.

## ISSUES AND OPTIONS

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

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

## ISSUES AND OPTIONS

ISSUE	OPTIONS
<p><b>ISSUE 1:</b> Review the Available Water Resources for the Catchment</p>	<p>Collect more information about aquifers and rivers</p> <p>Improve Conceptual Model of Water Balance System</p> <p>Determine interaction between the Chalk and Lower Greensand aquifers</p> <p>Determine interaction between groundwater and surface water</p>
<p><b>ISSUE 2 :</b> Review the Quantity Allocated to the Environment</p> <div data-bbox="212 807 629 1481" style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p><b>ABBREVIATIONS USED</b></p> <p><b>AWS</b> Anglian Water Services</p> <p><b>DO</b> Dissolved Oxygen</p> <p><b>DoE</b> Department of the Environment</p> <p><b>IDB</b> Internal Drainage Board</p> <p><b>MAF</b> Minimum Acceptable Flow</p> <p><b>MAFF</b> Ministry of Agriculture, Fisheries and Food</p> <p><b>NFU</b> National Farmers Union</p> <p><b>RCS</b> River Corridor Survey</p> <p><b>REC</b> River Ecosystem Class</p> <p><b>REDS</b> Rivers Environmental Database</p> <p><b>RNC</b> River Needs Consent</p> <p><b>STW</b> Sewage Treatment Works</p> <p><b>WRA</b> Waste Regulation Authority</p> </div>	<p>Identify Methodology</p> <p>Carry out Methodology for each river</p> <p>Identify protection zones for individual wetlands</p> <p>Identify River Flow Objectives and/or MAFs</p> <p>Identify Operational Management of the Denver Complex during periods of low flows</p>



RESPONSIBILITY	ADVANTAGES	DISADVANTAGES
NRA	Obtain more knowledge about the aquifers and rivers etc.	Cost of Data Collection, Construction of Gauging Stations etc.
NRA	Improved Knowledge	Cost of constructing and calibrating computer models
NRA	Better Management/Licensing Policies	Cost of investigations
NRA	Better Management/Licensing Policies	Cost of investigations
NRA	Better approach to problem	Cost of Investigations
NRA	Better Protection of the River Ecology	Costs of applying methodology (Field Work etc.) Cost to abstractor who may be restricted
NRA	Better Protection of the Wetland Ecology	Costs of investigation Cost to abstractor who may be restricted
NRA	Better Management of the River System	Costs of Works needed Operational Costs to the NRA Cost to abstractor who may be restricted
NRA	Better Protection against saline intrusion into fresh water rivers Better Management Practices	Cost of investigation Operational Costs to the NRA

## ISSUES AND OPTIONS

ISSUE	OPTIONS
<p><b>ISSUE 3 :</b> Restate the Allocation of Water Resources and the Licensing Policy</p>	<p>Identify Management Strategy for water resources</p> <p>Actively Manage system to meet River Flow Objectives</p> <p>Investigate needs for works in catchment</p> <p>Examine possibility of revoking/ reducing licences</p>
<p><b>ISSUE 4:</b> Development in Unsewered Areas</p>	<p>Seek to restrict development through the planning process</p> <p>Installation of first time sewerage schemes following prioritisation</p> <p>Installation of private sewage treatment plants</p>
<p><b>ISSUE 5:</b> Redevelopment of Contaminated Land</p>	<p>Identify degree and nature of contamination</p> <p>Agree measures to prevent pollution</p>

RESPONSIBILITY	ADVANTAGES	DISADVANTAGES
NRA	Better management of water resources	Cost of producing report
NRA	Better Management Practices Protection/Enhancement of River Ecology	Operational Costs to NRA
NRA	Necessary Works are identified	Cost of investigation Future Costs of Capital Works
NRA	Necessary revocations/reductions identified •	Cost of investigation Future Costs of Compensation to Licence Holders
NRA/Planning Authority	Prevents problem increasing	Does not solve existing problem
NRA/Councils/Householders	Improved water quality and reduction in nuisance	Cost to householder and council
Householder	Pollution prevention	Cost Limited Applicability Increase in NRA monitoring required
NRA/Planning Authority Developer	Increase knowledge will enable prioritisation of affected sites	May not be possible to identify contaminant. May not be able to identify all possible sites
NRA Planning Authority Developer	Protection of the water environment	Cost

## ISSUES AND OPTIONS

ISSUE	OPTIONS
<p><b>ISSUE 6:</b> Potential Pollution of Groundwater Supply</p>	<p>Define groundwater protection zones (GPZ) for remaining sources</p> <p>Prioritise inspection regime</p> <p>Offer advice and enforce pollution prevention measures</p>
<p><b>ISSUE 7:</b> Nitrate Levels in Groundwater</p>	<p>Installation of Nitrate removal plants</p> <p>Define Nitrate Sensitive Areas and Nitrate Vulnerable Zones</p> <p>General Reduction in fertilizer application rates</p>
<p><b>ISSUE 8:</b> Contamination of Groundwater from Dilute and Disperse Waste Sites</p>	<p>Monitoring of plume of contamination</p> <p>Undertake remedial measures as required</p>



RESPONSIBILITY	ADVANTAGES	DISADVANTAGES
<p>NRA</p> <p>NRA</p> <p>NRA</p>	<p>Establish movement of contaminant</p> <p>Cost effectiveness and value for money from inspection targeting</p> <p>Reduction in risk to supply</p>	<p>Theoretical model based on available data Planning blight</p> <p>Time delay at some sites</p> <p>Cost to site operator Much of pollution advice not enforceable but only voluntary</p>
<p>AWS Ltd</p> <p>MAFF/NRA</p> <p>MAFF/NFU/NRA/Manufacturers</p>	<p>Allows AWS to comply with legal obligations Removes nitrates from potable supply</p> <p>Protection of potable supplies</p> <p>Reduction in nitrates in groundwater</p>	<p>Cost</p> <p>Planning blight and cost to farmers Reduces farming options Theoretical model based on best available data May "shift" problem to non-NSA/NSZ areas.</p> <p>Voluntary Agricultural productivity and profitability may be reduced.</p>
<p>NRA/WRA</p> <p>Developer/Site operator/NRA</p>	<p>Assessment of risk</p> <p>Reduces pollution in aquifer</p>	<p>Theoretical model Cost</p> <p>Cost</p>

## ISSUES AND OPTIONS

ISSUE	OPTIONS
<p><b>ISSUE 9:</b> Restoration of Degraded Rivers and Habitats</p>	<p>Identify sites most in need of restoration</p> <p>Develop restoration plans and implement them</p>
<p><b>ISSUE 10:</b> Water Level Management Plans</p>	<p>Assist in production of Water Level Management Plans</p> <p>Apply WLMP in operations.</p>
<p><b>ISSUE 11:</b> The Identification of Special Ecosystems</p>	<p>Identify the Sites which form part of the Special Ecosystem Class of the Water Quality Objectives (SWQO)</p>
<p><b>ISSUE 12:</b> River Corridor Buffer Zones</p>	<p>Complete R &amp; D Project</p> <p>Develop Buffer Zones</p>
<p><b>ISSUE 13:</b> River Maintenance Standards</p>	<p>Complete Standards of Service Review</p> <p>Apply criteria to flood defence maintenance</p>
<p><b>ISSUE 14:</b> Non Main River Flooding</p>	<p>Clarify the roles and responsibilities of the various drainage authorities.</p>

RESPONSIBILITY	ADVANTAGES	DISADVANTAGES
NRA	Allows assessment of risk and prioritises urgent action	
NRA/Landowners/Conservation bodies/English Nature	Improve species and habitat diversity within the river environment	Requires co-operation of landowners Cost
NRA/IDBs/MAFF  NRA/IDB	Improvement in water level management leading to improved species and habitat diversity  As above	Increased control of structures required Cost  As above
NRA/MAFF/English Nature/ County Wildlife Trusts	Allows SEC objectives to be implemented. Highlight areas requiring River Flow Objectives	Timescale Cost
NRA (National)  NRA/MAFF/English Nature/ Countryside Commission	Establish methodology and needs  Improve species and habitat diversity within the river environment	Voluntary Requires funding external to NRA
NRA  NRA	Better able to identify criteria and targets for expenditure  Value for money can be identified leading to effective targeting of resources	Difficulty of translating standard of service to actual maintenance activities  May reduce level of service where this exceeds target level
Local authority/NRA/IDB's	Reduction in flooding risk Improved level of service	Availability of resources for undertaking remedial works.

<b>ISSUES AND OPTIONS</b>	
<b>ISSUE</b>	<b>OPTIONS</b>
<b>Issue 15:</b> Section 105 (2) Survey	Carry out survey of flood risk areas
<b>ISSUE 16:</b> Sea Level Rise and Climate Change	To maintain a Watching Brief
<b>ISSUE 17:</b> Structure and Local Plans	Adoption of NRA Guidance Notes in Structure and Local Plans
<b>ISSUE 18:</b> Planning Application Forms	Amend planning application forms to include water supply source (ie mains/borehole)
<b>ISSUE 19:</b> New Roads and Bypasses	<p>Incorporate flood prevention measures into all road proposals</p> <p>Incorporate pollution prevention measures into all road proposals</p> <p>Ensure nature conservation interests are protected &amp; enhanced with all road proposals</p>
<b>ISSUE 20:</b> Impact of King's Lynn STW on the Estuary	<p>Installation of secondary treatment at King's Lynn STW</p> <p>Ultra Violet disinfection of the effluent</p> <p>Carry out trade effluent investigation</p>



RESPONSIBILITY	ADVANTAGES	DISADVANTAGES
NRA	Definitive information on flood risk areas	Cost to NRA
NRA	Proactive works can proceed as data becomes available	No timescale
NRA/Planning Authorities	Protection & enhancement of Water Environment	
Local Authorities	Will enable NRA to better assess planning proposals in terms of water resource availability & advise accordingly	Initial Costs of changing the forms
NRA/Highway authority/IDB	Avoid increased flood risk	Cost
NRA/Highway authority	Avoid pollution	Cost
NRA/Highway authority	Protection and enhancement of water environment	Cost
AWS Ltd	Improvement in effluent quality Reduced impact on estuarine water quality	Cost
AWS Ltd	Reduces bacterial contamination of effluent	Cost
AWS Ltd	Enable source of pollution to be identified and remedial measures implemented	Uncertainty of a positive outcome for cost incurred  <i>Continued</i>

## ISSUES AND OPTIONS

ISSUE	OPTIONS
<b>ISSUE 20 continued:</b>	Impose toxicity based consent if source not positively identified by AWS
<b>ISSUE 21:</b> Eutrophication in the Estuary	Review current monitoring of eutrophic status  Collect data and undertake review of potential Sensitive Area status in 1997
<b>ISSUE 22:</b> Hunstanton - Snettisham Beach Access	Investigate siting of further access ramps
<b>ISSUE 23:</b> Hunstanton - Snettisham Beach Recharge	Continue monitoring of effectiveness
<b>ISSUE 24:</b> Loss of Beach Material South of Hunstanton Boat Ramp	Agreeable form of protection
<b>ISSUE 25:</b> Sea Banks East, Wolferton - Snettisham	Investigate Ingol outfall project proposals as a source of material for reprofiling
<b>ISSUE 26:</b> Coastal Zone Development	To restrict occupancy of holiday homes to the summer period
<b>ISSUE 27:</b> Storm Tide Warning Service Boundaries	Integrate with existing police and other authority boundaries
<b>ISSUE 28:</b> Tidal River bank Improvements and Erosion Control	Undertake Annual inspections  Inspections after major storm surge events

RESPONSIBILITY	ADVANTAGES	DISADVANTAGES
NRA	Places controls and monitoring on effluent toxicity.	Monitoring cost to NRA Cost to AWS Source not identified
NRA  NRA/DOE	Greater confidence in the data for decision making  Confidence in classification of eutrophic status	Cost of possible increased monitoring  Possible lack of positive outcome
NRA/Local Authority	Reduced pressure on existing ramps	Control of access Have to be written into Local Authority Byelaws
NRA	Better data for decision making	Long-term commitment to costs
NRA/Local Authority/ Hunstanton Town Council	Improve level of protection Safety improvements	Safety
NRA	Material available in close proximity to beach recharge sites	Insufficient or poor quality material may be available
Planning authority	Safeguard human life	Restricted use of holiday homes
Storm Tide Warning Service/Police/ NRA/MAFF/Local Authority	Clarification of responsibility	Problem not able to be resolved as a compromise
NRA  NRA	Able to take rapid appropriate action as above	Long-term cost  as above

## ISSUES AND OPTIONS

ISSUE	OPTIONS
<p><b>ISSUE 29:</b> Tidal River Siltation</p>	<p>Review efficiency of Tidal River</p> <p>Further training works</p> <p>Silt Removal</p>
<p><b>ISSUE 30:</b> Tidal River Training Walls</p>	<p>Increase height of training walls</p> <p>Complete Wash outfalls study</p>
<p><b>ISSUE 31:</b> Navigation of Salters Lode - Denver Crossing</p>	<p>Review level of navigation facilities</p> <p>Production of navigation guidance sheet and information board</p>
<p><b>ISSUE 32:</b> Tidal River Outfalls</p>	<p>Development of automated system</p> <p>Clarification of areas of responsibility followed by agreements/ working procedures</p>
<p><b>ISSUE 33:</b> Oil Pollution Nuisance, Fishers Fleet King's Lynn</p>	<p>Promote better practices for storage and handling of oil by boat owners</p> <p>Provide assistance to harbour authority in the pursuance of prosecutions</p>
<p><b>ISSUE 34:</b> King's Lynn Sea Defences, King's Staithe Square and the Purfleet</p>	<p>Incorporate permanent solution into any future development on the site</p>

	RESPONSIBILITY	ADVANTAGES	DISADVANTAGES
	NRA	Identify issues & options for future	Cost
	NRA	Possible long term increase in self cleansing of the channel	Cost
	NRA	Immediate solution to the problem	Short term only Cost
	NRA	Reduced volume of silt entering the Tidal River	Medium term solution only
	NRA	Better understanding of sediment and saltmarsh accretion	
	NRA	Possible improvements to existing facilities, improved safety	Increased cost of new works and time taken to solve problem
	NRA	Increased awareness of safety hazard	
	NRA	Stop saline intrusion Removed flood risk	No "off the shelf" method available
	NRA/IDB	More clearly defined responsibility	
	NRA/Harbour Authority	Aesthetic improvements Reduced risk of pollution	Cost to boat owners Voluntary
	NRA	Prevents pollution occurring.	Dependent on Harbour Authority
	NRA/Developer/Local Authority	Permanent Resolution of flood risk problem	



## ISSUES AND OPTIONS

ISSUE	OPTIONS
<p><b>ISSUE 35:</b> King's Lynn Sea Defences, Common Staithe Square to Purfleet Quays</p>	<p>Works to increase the level of protection to 1 in 100 year standard</p>
<p><b>ISSUE 36:</b> King's Lynn Sea Defences, South Quay</p>	<p>Update records and procedures as whereabouts of pipework becomes known</p> <p>Continue to issue "conservative" flood warnings</p>
<p><b>ISSUE 37:</b> Relief Channel Bank Erosion</p>	<p>Identify problem areas and the cause.</p> <p>Examine use of "soft" defences</p>
<p><b>ISSUE 38:</b> Conservation Enhancements to the Relief channel</p>	<p>Review bank mowing policy</p> <p>Target appropriate management using data from REDS and RCS</p> <p>Identify appropriate grazing management</p>
<p><b>ISSUE 39:</b> Fisheries Habitat Within the Relief channel</p>	<p>Increase fish refuges using willow crows</p> <p>Examine possible sites for artificial reefs.</p>

RESPONSIBILITY	ADVANTAGES	DISADVANTAGES
NRA	Reduced risk of flooding	Requires consent of owners Listed Buildings constraints
Land Owner/Utilities/Local Authority/ NRA  NRA/Police/Local Authority	Better data for decision making  Ensure best possible preparation against flood risk	Unknown size of problem  Not a total solution to the problem
NRA  NRA	Better data for decisions  Improvements to increase species and habitat diversity	Cost  May increase costs
NRA  NRA  NRA	Increase species and habitat diversity  Identify areas to be enhanced/ conserved Drives subsequent actions  Increase species and habitat diversity	Possible risk to flood defence efficiency    Voluntary Cost to farmers
NRA  NRA	Increase fish biomass and improve population structure  as above	Impact upon flood defence  as above

## ISSUES AND OPTIONS

ISSUE	OPTIONS
<p><b>ISSUE 40:</b> Recreational Access to the Relief channel</p>	<p>Establish the potential demand</p> <p>Increase public information and safety provision</p> <p>Provision of more angling sites, available to anglers with disabilities.</p>
<p><b>ISSUE 41:</b> Tail Sluice Automation</p>	<p>Complete tail sluice automation</p> <p>Monitor for performance and reliability in all conditions</p>
<p><b>ISSUE 42:</b> Middle Level Main Drain, Failure to Meet Proposed REC 3 WQO</p>	<p>Adopt REC 4 in the long term</p>
<p><b>ISSUE 43:</b> Eutrophication of the River Nar</p>	<p>Improve water quality monitoring program</p> <p>Improve flow monitoring upstream of Marham</p> <p>Review and update phosphorous data.</p> <p>Investigate benefits of further controls to limit phosphorous discharges</p>
<p><b>ISSUE 44:</b> Access of Sea Trout into River Nar</p>	<p>Examine inclusion of fish pass in any renewal of gates</p>

RESPONSIBILITY	ADVANTAGES	DISADVANTAGES
NRA	Target resources to achieve best value for money	May be skewed in favour of a single interest group
NRA	Increased awareness of NRA role Increased public safety	Cost Impact on conservation value
NRA/Angling Clubs	Increased availability of affordable fisheries	Impact on conservation value of site
NRA	Improved long term monitoring Cost savings	Initial high cost
NRA	Better understanding.	
NRA	Protects water quality from deterioration. Permits objective to be set on a statutory basis	Perceived relaxation of target
NRA	Allow better estimates of phosphorous loads	Cost
NRA	Allow better estimates of phosphorous loads	Cost
NRA	Potential to limit discharge	Uncertainty of effect
NRA	Potential to limit discharge	Uncertainty of effect
NRA	Improve fishery	Cost Gates may not be replaced in the short term

## ISSUES AND OPTIONS

ISSUE	OPTIONS
<p><b>ISSUE 45:</b> River Nar, Mileham to Litcham. Failure to Meet Proposed REC 3 WQO</p>	<p>Investigate relationship between Low DO and River Flow</p> <p>Maintain REC 5 in short/medium term</p>
<p><b>ISSUE 46:</b> River Nar, Litcham to Lexham Hall. Failure to Meet Proposed REC 3 WQO</p>	<p>Review flow data for the river at this point to enable limits to be confirmed.</p> <p>Recalculate consent limits if required</p> <p>Maintain REC 4 in short/medium term</p> <p>Examine methods of increasing the flow available for effluent dilution during summer low flow periods</p>
<p><b>ISSUE 47:</b> River Nar, Lexham Hall to Castle Acre. Failure to Meet Proposed REC 2 WQO</p>	<p>Investigate relationship between Low DO and River Flow</p> <p>Maintain REC 4 in short/medium term</p>
<p><b>ISSUE 48:</b> River Nar Bank Instability</p>	<p>Completion of study outlining options and issues</p>



RESPONSIBILITY	ADVANTAGES	DISADVANTAGES
NRA	Provide improved information for decision making	May not be possible to establish relationship
NRA	Protects water quality from deterioration. Permits objective to be set on a statutory basis	Perceived relaxation of the target
NRA	Give confidence in the current standard and provide basis for RNC determination	
NRA	Improve water quality	No obligation on AWS Ltd to improve effluent quality
NRA	Protects water quality from deterioration.	Perceived relaxation of the target
NRA	Permits objective to be set on a statutory basis  Improve water quality	Unlikely to be additional resources available Potential cost
NRA	Provide improved information for decision making	May not be possible to establish relationship
NRA	Protects water quality from deterioration. Permits objective to be set on a statutory basis	Perceived relaxation of the target
NRA	Obtain best value for money solution	

## ISSUES AND OPTIONS

ISSUE	OPTIONS
<p><b>ISSUE 49:</b> Proposed Development of River Nar Flood defences</p>	<p>Improve flood defences to required standards</p>
<p><b>ISSUE 50:</b> Gaywood River. Failure to Meet Proposed REC 3 WQO</p>	<p>Investigate cause of elevated ammonia and depressed oxygen levels</p> <p>Maintain REC 4 in short/medium term</p>
<p><b>ISSUE 51:</b> Roydon Common &amp; Slurry Disposal to Land</p>	<p>Investigate perceived problem</p>
<p><b>ISSUE 52:</b> Middleton Stop/ Pierpoint Drain. Failure to Meet Proposed REC 3 WQO</p>	<p>Investigate sources of pollution from industrial areas in King's Lynn</p> <p>Implement program of pollution inspection and prevention visits</p> <p>Undertake remedial action</p> <p>Maintain REC 5 in short term but move towards REC 4 in medium term</p>
<p><b>ISSUE 53:</b> Non Main River Flooding at West Winch</p>	<p>Re-excavation of existing drains</p> <p>Promotion of alternative drainage scheme</p>

RESPONSIBILITY	ADVANTAGES	DISADVANTAGES
Developer	Allows unrestricted development	Cost
NRA  NRA	Better data for decision making  Protects water quality from deterioration. Permits objective to be set on a statutory basis	May not pin point the source  Perceived relaxation of target
NRA/Waste Regulation Authority	Protect internationally important wetland site from poor water quality	Cost of investigation
NRA  NRA  Polluter  NRA	Provide information for target  Eliminate illegal discharges  Reduces risks  Protects water quality from deterioration. Permits objective to be set on a statutory basis	May not be able to identify a specific cause  Cost  Cost  Perceived relaxation of target
Local Authority /Riparian Owner  Local authority/Riparian Owner	Resolution of flooding problem  Enhanced protection	Effect on Landowners property  May not be resolved in short term

## ISSUES AND OPTIONS

ISSUE	OPTIONS
<p><b>ISSUE 54:</b> River Babingley. Failure to Meet Proposed REC 2 WQO</p>	<p>Investigate cause of low DO</p> <p>Maintain REC 3 in short/medium term</p>
<p><b>ISSUE 55:</b> River Babingley Outfall</p>	<p>Investigate feasibility of providing power to the site and automation of outfall</p> <p>Installation of telemetry monitoring</p> <p>Carry out works to relieve the effects of water level fluctuations on habitat</p>
<p><b>ISSUE 56:</b> Improvement of Coarse Fishery of Lower Reaches of the River Babingley</p>	<p>Operation of sluice only when required</p> <p>Investigate use of habitat shelters</p>
<p><b>ISSUE 57:</b> Access of Sea Trout into the River Babingley</p>	<p>Consider installation of through passage when undertaking new works</p>
<p><b>ISSUE 58:</b> River Ingol Outfall Structure</p>	<p>Improve upstream storage and upgrade outfall</p> <p>Relocate the outfall upstream</p>
<p><b>ISSUE 59:</b> Non Main River Flooding at Dersingham</p>	<p>Re-excavate ditches and replace undersized culverts.</p>

RESPONSIBILITY	ADVANTAGES	DISADVANTAGES
NRA	Provide indication of solution to the problem	Uncertain outcome
NRA	Protects water quality from deterioration. Permits objective to be set on a statutory basis	Perceived relaxation of target
NRA	Improved control of water levels	Cost
NRA	Improved ability to manage water levels	Cost
NRA	Improved habitat and species diversity	Dependant on nature of water level management works
NRA	Stop flushing out of juvenile fish	Risk of flooding More site visits required
NRA	Prevent flushing fish when sluice is open	Risk of flooding
NRA	Increased population	Cost
NRA/IDB/Landowners	No need to replace the outfall Generates material for flood bank improvements	Loss of agricultural land
NRA	Improved discharge during flood	Effect on saltmarsh cost
Riparian owner/Local Authority	Reduce flood risk	Cost



## ISSUES AND OPTIONS

ISSUE	OPTIONS
<p><b>ISSUE 60:</b> Heachom River. Failure to Meet Proposed REC 3 WQO</p>	<p>Investigate cause of low DO</p> <p>Maintain REC 4 in short/medium term</p>
<p><b>ISSUE 61:</b> Heacham River. Kalajuga Sluice Lacks a Secondary Flood Defence</p>	<p>Installation of a suitable penstock on upstream face</p>
<p><b>ISSUE 62:</b> Heacham River Pumping Station</p>	<p>Reach agreement with AWS for hand over of station to NRA</p>
<p><b>ISSUE 63:</b> Non Main River Flooding at Fring</p>	<p>Preparation of Scheme to deal with uncontrolled spring water.</p>

RESPONSIBILITY	ADVANTAGES	DISADVANTAGES
NRA	Improve data for developing solution to the problem	Uncertainty of outcome
NRA	Protects water quality from deterioration. Permits objective to be set on a statutory basis	Perceived relaxation of target
NRA	Increased Flood Protection	
NRA/AWS	Overall control of water management will rest with a single authority	Future maintenance responsibility
Local Authority/County Highways	Relieve flooding problems Reduction in road closures	



## COMMENTS



# 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 and 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.



NRA

**NRA EMERGENCY HOTLINE**

**0800 80 70 60**

**24 hour emergency telephone line**

Accession No ... ANOB

