

UPPER OUSE CATCHMENT MANAGEMENT PLAN- CONSULTATION REPORT



NRA
*National Rivers Authority
Anglian Region*

MARCH 1996

KEY DETAILS

Area	1487 km ²	Major Sewage Treatment Works	Brackley, Cotton Valley (Milton Keynes), Dunstable, Leighton Linslade, Towcester
Population 1996	381,900	Internal Drainage Boards	Buckingham, River Ouzel
Predicted 2006	444,600	Main Towns (Populations for 1996)	Milton Keynes 173,200 Leighton Buzzard 33,600 Newport Pagnell 15,700 Buckingham 9,800 Brackley 9,360 Towcester 6,800
Ground Levels	Min Level 24 m AOD Max Level 243 m AOD	Length of statutory main river (maintained by NRA)	225.5 km
Geology	South East Lower Greensand, Gault Clay and Chalk. Central Jurassic clays - Kimmeridge, Amphill and Oxford Clay. North West Lias; Cornbrash and Oolite.	Embanked main river	0 km
County Councils	(% of catchment area) Northamptonshire 22% Buckinghamshire 53% Bedfordshire 21% Oxfordshire 4%	Length of navigable river (Grand Union Canal)	53 km (approximately)
District & Borough Councils	(% of catchment area) Daventry 0.4% Milton Keynes 22% Aylesbury Vale 31% Bedford 10% South Beds. 6% Mid Beds. 5% Cherwell 4%	Water Quality GQA grades	Length of river in km A (excellent) 0 B (good) 143 C (fair) 139 D (fair) 60 E (poor) 0 F (bad) 0
NRA Organisation	Anglian Region Central Area Administrators The catchment of the River Great Ouse from Brackley to the Sea. Catchment South Office Administrators The River Great Ouse upstream of Hermitage Lock, Earith.	Water Quality Biological Survey 1994	A (excellent) 257 B (good) 86 C (fair) 8 D (poor) 0
Water Companies	Anglian Water Services Limited Thames Water Utilities Three Valleys Water Company	Salmonid (Game) fishery	4 km
		Cyprinid (Coarse) fishery	114 km
		Sites of Special Scientific Interest (SSSIs)	33
		Water dependent SSSIs	15
		Water Related Scheduled Ancient Monuments	48

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 Environment Agency starts its work of managing the environment in England and Wales on 1 April 1996.



NRA EMERGENCY HOTLINE
0800 80 70 60
24 hour emergency telephone line

Help the
NATIONAL RIVERS AUTHORITY
to protect the
water environment



NRA



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UPPER OUSE CATCHMENT MANAGEMENT PLAN

CONSULTATION REPORT

MARCH 1996

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YOUR VIEWS

This Consultation Report is the first stage of the Catchment Management Planning Process for the Upper Ouse Catchment.

We want to hear your views:

- Have we identified the realistic objectives?
- Have we identified all the major issues?
- Have we identified all the potential options for action to resolve these?
- Have you any comments on the appearance and contents of the report?

Please comment in writing to:

The Planning Manager
Upper Ouse Catchment Management Plan
National Rivers Authority - Anglian Region
Central Area
Brampton
HUNTINGDON
Cambs PE18 8NE

Telephone enquiries: (01480) 414581

(After 1 April 1996, please address to Environment Agency)

ALL COMMENTS SHOULD REACH US BY 13 JUNE 1996

Further Copies are available from the above address.

FOREWORD

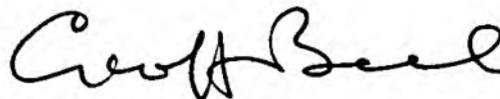
The National Rivers Authority (NRA) is committed to protecting and improving the water environment in its broadest sense. Establishing a sound base for the integrated management for river catchments is fundamental to our operations and therefore, the Authority has devised Catchment Management Plans (CMP). This vehicle will ultimately achieve environmental improvements which will continue as responsibility after 1st April 1996 moves to the Environment Agency Local Management Plans (EALMPs)

Public consultation secures input and helps provide commitment from all interested parties towards achieving action on important issues.

The issues to be considered in this plan, include:

- Securing the protection against river flooding (through surface water management and development control in), for example, Newport Pagnell, Leighton Buzzard which impact on the flood plain;
- The need for balance between river maintenance standards in the catchment and nature conservation priorities;
- Reviewing the water resource balance for the catchment, restating the quantities allocated to the environment and the proportion available for abstraction;
- Water quality issues (concerning nutrients) on the River Great Ouse (at Clapham), River Ouzel and Foxcote Reservoir;
- Navigation and Recreation issues upstream of Bedford (for example at Felmersham) and the implications of the proposed new canal link to the Grand Union Canal.

I look forward to receiving your comments to assist in the production of an action plan which balances the conflicting demands placed upon the Upper Ouse Catchment.



GEOFF BEEL
Area Manager

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ACKNOWLEDGEMENTS

- (i) All those organisations, groups and individuals who are involved in the informal liaison period.
- (ii) Great Ouse Catchment Panel especially the sub-panel group members, R Bennett, P Wix, D Payne, K Ball.
- (iii) NRA area project Team; B Elsdon, M Doyle, M Duplock, K Rutterford, D Jones, M Whiteman, M Sargeant, I Finnigan, T Ross, J Kent, R Pickering and H Rimmer.

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SECTION 1
INTRODUCTION

THE NATIONAL RIVERS AUTHORITY AND THE ENVIRONMENT AGENCY

1.1 The National Rivers Authority (NRA) was established in 1989 as an independent public body with statutory responsibilities for:

- Flood Defence of people and property
- Flood Warning
- Effective management of Water Resources.
- Control of pollution and improving the quality of river and groundwaters.
- Maintenance of improvement of fisheries
- Promotion of water based recreation including navigation
- Conservation of the natural water environment.

1.2 Since the passing of the Environment Act by Parliament during the summer of 1995, preparations have been made towards the formulation of the Environment 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 -leading to the plan's enhancement by addressing the integrated management of Land, Air and Water Environments. All mentions of HMIP, WRA and NRA in this document should be assumed to be the Environment Agency.

1.3 The NRA is funded through a variety of charges, for example, water abstraction charges, effluent discharges, rod licence fees, navigation licence fees, etc, as well as through government grants from the Department of the Environment (DoE) and the Ministry of Agriculture, Fisheries and Food (MAFF).

1.4 As "Guardians of the Water Environment", the NRA has defined its role in the following mission statement:

"The National Rivers Authority will protect and improve the water environment. This will be achieved through effective management of water resources and by substantial reductions in pollution. The Authority aims to provide effective defence for people and property against flooding from rivers and the sea. In discharging its duties it will operate openly and balance the interests of all who benefit from and use rivers, groundwaters, estuaries and costal waters. The Authority will be business-like, efficient and caring towards its employees".

1.5 The NRA is committed to preparing a sound and thorough plan for the future management of the region's river catchments. A Catchment Management Plan (CMP) identifies the existing values of the catchment and the key issues and problems. Action plans are then outlined in order to preserve these values and to address any issues and problems. This Consultation Report phase of the CMP is a step towards achieving the goal for the Upper Ouse Catchment, which lies within the Central Area of the NRA's Anglian Region.

1.6 CATCHMENT MANAGEMENT PLANNING

The water environment, eg, rivers, streams, lakes, ponds, aquifers, springs, etc, is subject to a wide variety of uses which invariably interact and sometimes conflict with each other. The catchment management planning process has been developed to help manage all water-based interests within individual catchment areas and any interactions or conflicts between them for the overall benefit of the water environment and its users. The process has various stages, as follows:

		Timescale
•	Step 1: Consultation Report Launch	13 March 1996
•	Step 2: Consultation Period	until 13 June 1996
•	Step 3: Action Plan	November 1996
•	Step 4: Implementation of the plan which is monitored and reported in a Annual Review Report	December 1997 (first report)
•	Step 5: Full repeat of process	March 2001.

1.7 THE CONSULTATION REPORT

Although the NRA has a pivotal role to play in the management of the water environment, the catchment management planning process recognises that a partnership approach between the NRA and others is essential. Consequently, this report has been produced as a means of progressing detailed consultation with all interested parties.

Consultees may wish to:

- raise additional issues not identified in the plan
- comment on the issues and options identified in the plan
- suggest alternative options for resolving identified issues

The NRA recognises that many of the options for action identified by the Consultation Report will involve organisations or individuals other than the NRA and their views

will be crucial to the preparation of the Action Plan.

1.8 CMPs are intended to produce a framework for advising on development plan policies including issues such as water and sewerage infrastructure, floodplain protection, waste disposal etc. It is hoped, therefore, that Planning Authorities will give due regard to CMPs when formulating development plan policy.

1.9 This plan is organised on the following basis:

Section 2 Catchment Overview

A description of the natural features of the catchment.

Section 3 Uses, Resources and Activities

The "uses" of the catchment are the principal demands upon the water resources and the environment. These fall into a series of categories relating to the basic role of the river as a conveyance of water received as rainfall and passed out to sea, for example, effluent disposal, navigation, and so on. The uses made of this resource by the environment and by human activity are managed by a set of "activities" which are the responsibility of the National Rivers Authority.

Section 4 Objectives and State of the Catchment

Section 4 identifies the primary responsibilities and objectives of the NRA in relation to its activities and the management of the various uses within the catchment. Such objectives may be derived from legislative duties and responsibilities, National and Regional policy, and specific local circumstances. For each catchment use, at any location, it is the most stringent objective which must be achieved.

The current state of the water environment in the catchment resulting from the use made of it and the NRA's activities within it are also described. The current state of the catchment is assessed against the NRA's objectives in managing the water environment. The shortfalls between the current state and the objectives are identified as issues which may need to be addressed in the future management of the catchment.

Section 5 Issues and Options

Section 5 discusses the identified issues and, where possible, some options for their resolution are proposed. The options which are presented represent a range of alternative courses of action and are not generally mutually exclusive. Some options will only be implemented following a full project appraisal. The section includes with a tabulated summary of issues and options which identifies the organisation responsible and also some benefits and constraints of the suggested options. To aid the understanding of how these are arrived at, the issues are also referred to throughout Sections 3 & 5.

1.10 THE ACTION PLAN

This will be produced following consultation (November 1996) and will have regard to the comments received. The Action Plan (to be monitored annually) will form a basis for the NRA's action within the catchment and will also provide a public document which will form a framework for the NRA's interaction with other organisations. The NRA will be seeking commitment to planned actions by others wherever possible.

1.11 LIMITATIONS OF CATCHMENT MANAGEMENT PLANS

The CMP will inevitably be subject to some limitations, the major examples of which are as follows:

- Where improvement works are required to overcome catchment problems, these works will in many cases be the responsibility of other organisations or individuals. This may be a Company who may see little or no financial benefit in carrying out the actions, or a Local Authority with restricted capital budgets. In such cases the NRA has no powers to control the necessary actions directly.
- Inevitably, the achievement of some objectives will depend upon the Town and Country Planning Policy of the County or District Council concerned. The NRA is a consultee to such policy, but it is recognised that the Councils are subject to many other constraints in meeting their obligations to the Planning process and will not always be able to put the need of the river catchment first.
- The land-use within a catchment is a major contributor to the state of that catchment and, in area terms, the largest land use is agriculture. In cases where farming practice will need to change to permit the catchment improvements to proceed, it will be necessary to obtain the support of the landowners concerned and for them to make such changes voluntarily where existing legislation provision does not exist.
- The proposed options have to undergo NRA project justification procedures and the availability of funds. Staff and monetary resources may not be available due to budget shortcomings or more urgent priorities.

1.12 Whilst these limitations will inevitably hamper the achievement of some of the plan objectives, it is essential that these objectives should still be set and striven after. Alternative means of achieving them might be identified, or the very fact of their identification and publication might bring about the necessary pressure to encourage those involved to work towards their achievement.

SECTION 2
CATCHMENT BACKGROUND



National Rivers Authority
Anglian Region -
Central Area
Map 1

NRA

-  Regional Boundary
-  Catchment Boundary
-  Operational Boundary
-  Main River
-  Main Towns
-  NRA Offices



2.1 CATCHMENT OVERVIEW

The Upper Ouse catchment (see Map 2) consists of the surface water catchment of the River Great Ouse to the west of Bedford (between Brackley and Kempston Mill), including the tributaries of the Padbury and Claydon Brook (known locally as "The Twins"), Tove and Ouzel. The catchment covers part of Bedfordshire, Buckinghamshire, Northamptonshire and Oxfordshire.

This "upland" catchment is predominately rural with development confined to established towns, ie, Towcester, Brackley, Leighton Buzzard, Buckingham, Newport Pagnell and the new city of Milton Keynes - a comparatively recent settlement encompassing Bletchley, Wolverton and Stony Stratford.

The major roads crossing the catchment are the M1 and M40 motorways and the A5, A6 and A43 trunk roads. Three major north-south railway lines cross the catchment. Milton Keynes is well served by road and rail, a major factor in the siting of the city, with easy access to the West Coast Main Line, the M1 motorway and the A5 trunk road. As a major employer, Milton Keynes generates large volumes of commuter traffic from all parts of the catchment and beyond. The catchment is also within reasonable commuting distance to London and a significant number of commuters utilise the M1 motorway and the rail links from Milton Keynes and Leighton Buzzard.

Other notable features of the catchment are the Grand Union Canal, passing through Leighton Buzzard and Milton Keynes, and the Silverstone Motor Circuit attracting large volumes of road traffic to weekend race meetings.

It is important to protect the water environment in these upper reaches since this is key to maintaining the quality of the remainders of the river downstream, as the Great Ouse flows to the Wash (see Map 1).

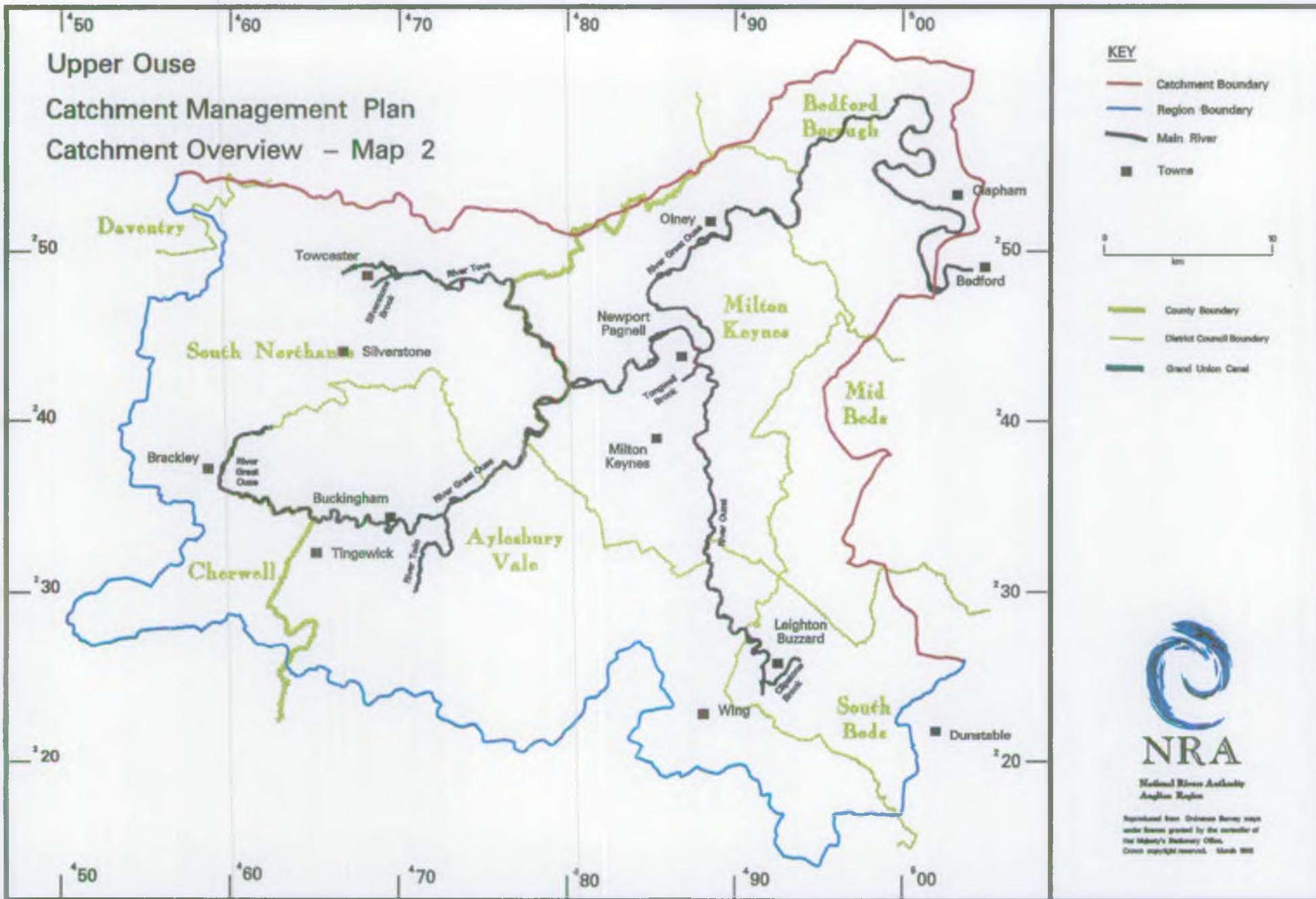
2.2 GEOLOGY AND LANDSCAPE

Map 3 depicts the geology of the catchment. The surface geology of much of the catchment area is comprised of (impermeable) clays. This widespread clay coverage means that surface water runoff after rainfall is an important contributor to river flows, especially in the winter months when the ground is wet.

The source of the Great Ouse is located along the 150 m AOD (above Ordnance Datum) contour north of Brackley, where a number of springs emerge from the permeable Oolite Limestone (Blisworth Limestone Formation). Flowing in an easterly direction downstream of Brackley, the river passes over the permeable Cornbrash and Oolite limestones of the Great Oolite Limestone series. Joined by the Padbury Brook (known locally as the River Twin or "the Twins") at Thornborough, the Ouse then flows broadly north-eastwards to be joined by the River Tove (west of Milton Keynes) and the River Ouzel (from the south) in Newport Pagnell, until it reaches Bedford 94 km further on.

The geology of the catchment consists of a series of Jurassic and Cretaceous limestones,

Upper Ouse
 Catchment Management Plan
 Catchment Overview – Map 2



KEY

- Catchment Boundary
- Region Boundary
- Main River
- Towns
- County Boundary
- District Council Boundary
- Grand Union Canal

0 10
km



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 National Rivers Authority
 Anglian Region

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sandstones and clays, dipping gently to the south east (Map 3). These rocks are overlain by more recent glacial deposits at the surface, including Boulder Clay, gravels and silts, and in the river valleys by river gravels and silts (alluvium). To the west, the rivers Ouse and Tove lie on Jurassic Oolite limestones (Blisworth Limestone Formation). The River Ouzel rises on Chalk and Lower Greensand (also known as the Woburn Sands Formation) to the south of the catchment.

The main aquifers in the Upper Ouse are the Lower Greensand and the Bedford Oolite.

Landscapes in the Upper Ouse are gently rolling with small, enclosed fields. Traditional agricultural practices predominate, with a large proportion of livestock units. The land use has generally not been subject to the rapid changes seen elsewhere in the Anglian Region, except locally in the Milton Keynes area.

2.3 SURFACE WATER HYDROLOGY

River flows in the Upper Ouse comprise two principal natural components. These are surface runoff resulting from rainfall, surface or near-surface drainage, and secondly baseflow, derived from springflows from groundwater. Springs are found to the south-east of the catchment on the Lower Greensand (Woburn Sands Formation) and Chalk, and to the north of Bedford and in the west of the catchment from the Oolite (Blisworth Limestone Formation).

In addition to natural flows, the rivers in the catchment contain flow derived from discharges from sewage treatment works (STW), which can provide a particularly significant proportion of summer flows. Runoff from rainfall is also derived from paved surfaces and roads in the urban areas, including Milton Keynes, Bletchley, Newport Pagnell, Leighton Buzzard and Buckingham.

Natural flows tend to be at their highest during the winter as a result of rapid surface runoff when the land is saturated, and decline steadily during the summer months when evaporation exceeds rainfall and river flow is sustained only by springflows and by effluent discharges.

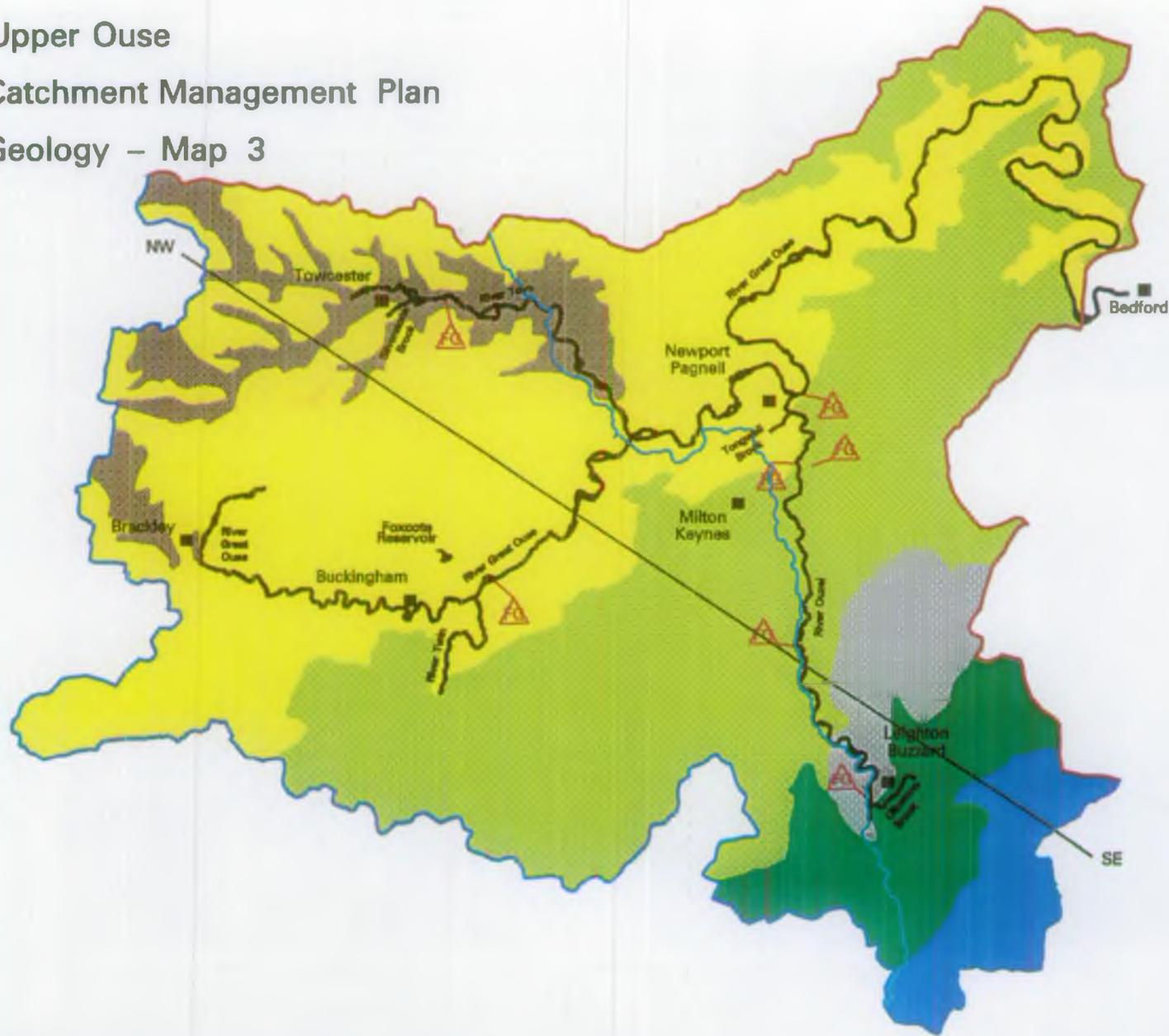
There are seven permanent flow gauging stations in the catchment (Map 3).

Rainfall is highest to the west of the catchment where there are upland areas. The long term average rainfall varies from 670mm in the west to 570mm in the east of the catchment (Map 4). Figure 1. shows how the annual rainfall patterns have varied from the long-term average at Foxcote raingauge.

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

The flows in the Great Ouse and the Tove receive contributions from groundwater in the outcrop area of the Bedford Oolite (Blisworth Limestone Series) in the west and north of the catchment. The River Ouzel is fed by groundwater from the Chalk and Lower Greensand (Woburn Sands Formation) aquifers to the south of the catchment. Further important contributions to river flows are made by surface runoff in areas where clays are present at the surface (see Map 3). The contribution to river flows from urban runoff is particularly important in the Milton Keynes area. Another major contributor to surface flow is the

Upper Ouse
 Catchment Management Plan
 Geology – Map 3



KEY

- Catchment Boundary
- Region Boundary
- Main River
- Towns
- Grand Union Canal

0 10
km

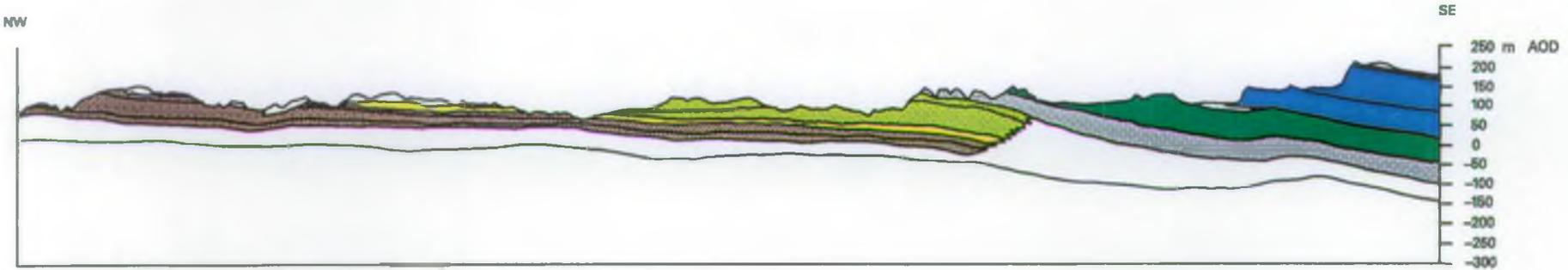
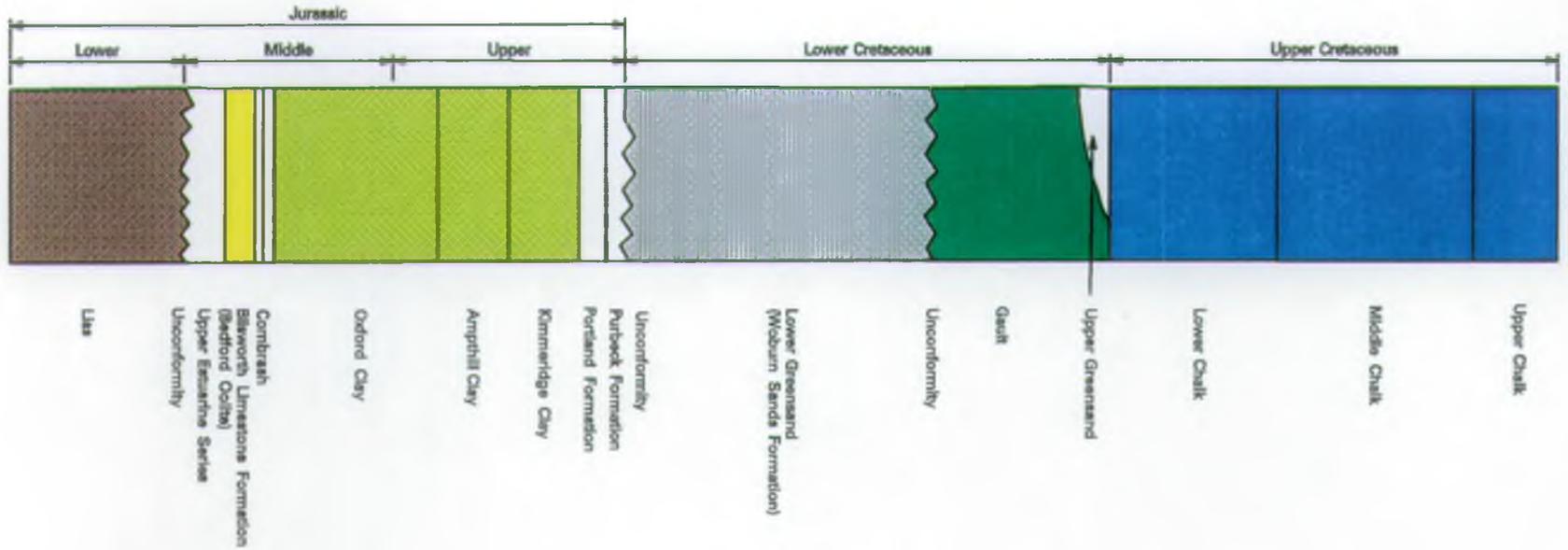
- Chalk
- Gault Clay
- Lower Greensand (Riburn Sand Formation)
- Jurassic Clays
- Oolite (Ellsworth Limestone Formation)
- Lias
- Fluvial Gauging Station



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 Angles Regis

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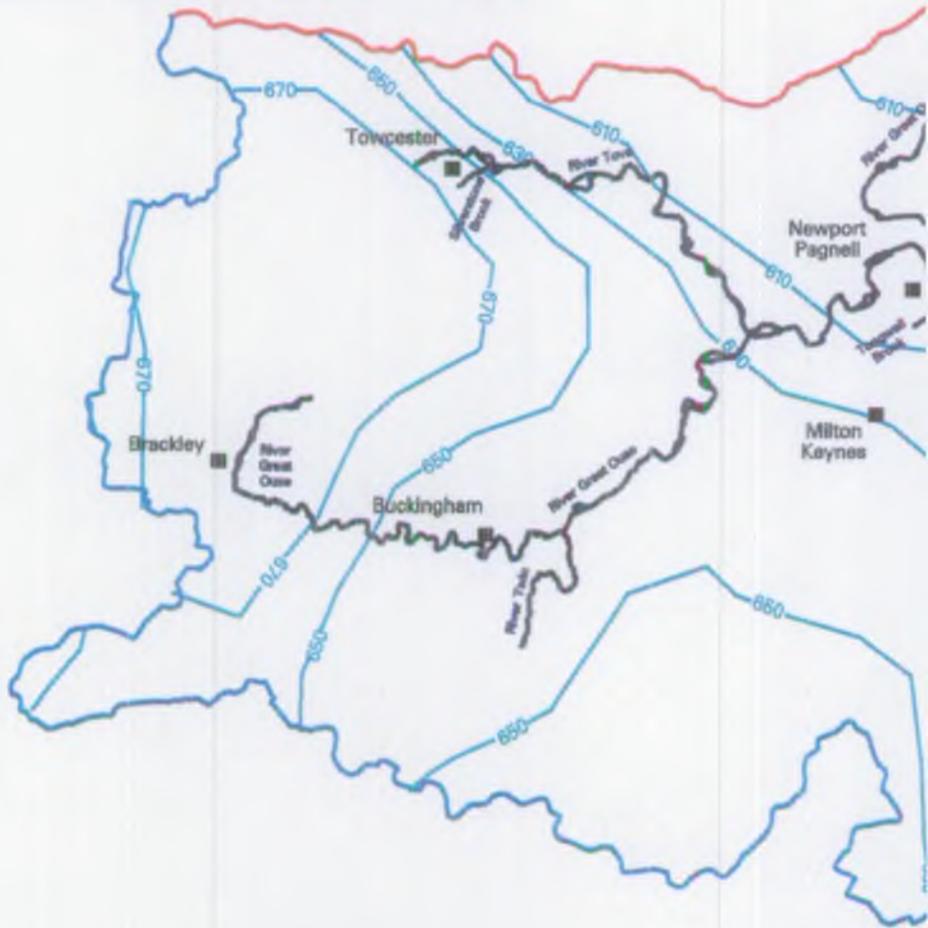
Generalised Vertical Section



Generalised Cross-section of the rocks in the Upper Ouse Catchment (Simplified after BGS, (1992) Sheet 220 (Leighton Buzzard) and BGS (1969) sheet 202 (Towcester)



Upper Ouse
Catchment Management Plan
Mean Annual Rainfall – Map 4





KEY

— Catchment Boundary

— Region Boundary

— Main River

■ Towns



—670— Mean Annual Rainfall in mm



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Deviation from Longterm Average Rainfall As Recorded at Foxcote

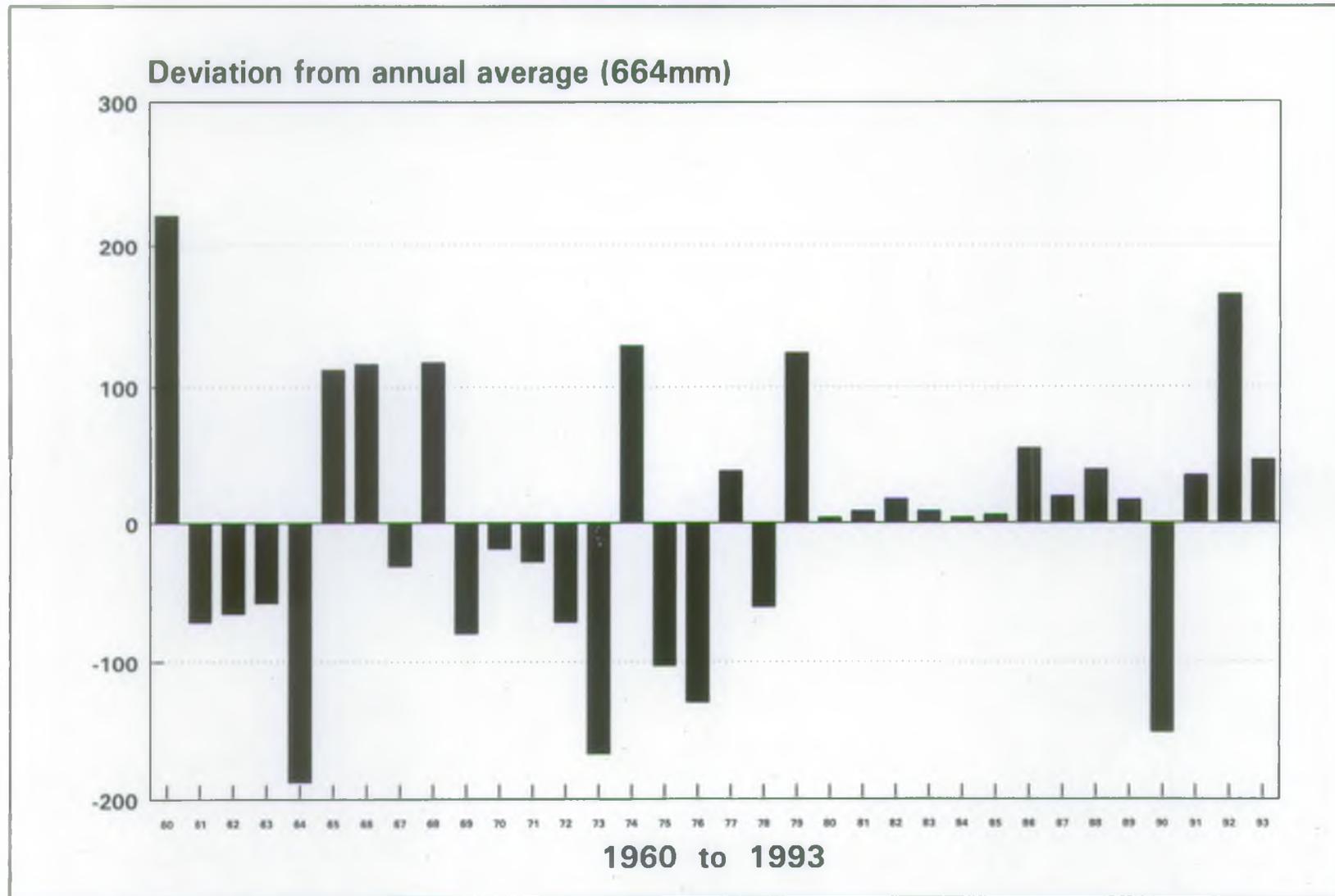


FIG 1

discharged effluent from sewage treatment works, such as Brackley, Towcester and Cotton Valley (Milton Keynes).

Of the flow arriving at the downstream end of the catchment in Bedford, the table below shows the contributions made by the various tributaries:

Source of river flows in the Great Ouse at Bedford

Description	River	Contribution to Bedford Flow (percent)
Area upstream of Cappenham gauging station	Tove	11
Area upstream of Thornborough gauging station	Great Ouse and Twin	25
Ungauged area upstream of Newport Pagnell gauging station	Great Ouse/Tove	20
Area upstream of Willen gauging station	Ouzel	20
Area upstream of Broughton Brook gauging station	Broughton Brook	3
Ungauged area between Newport Pagnell and Bedford gauging station	Great Ouse, Ouzel	21

2.4 WATER QUALITY

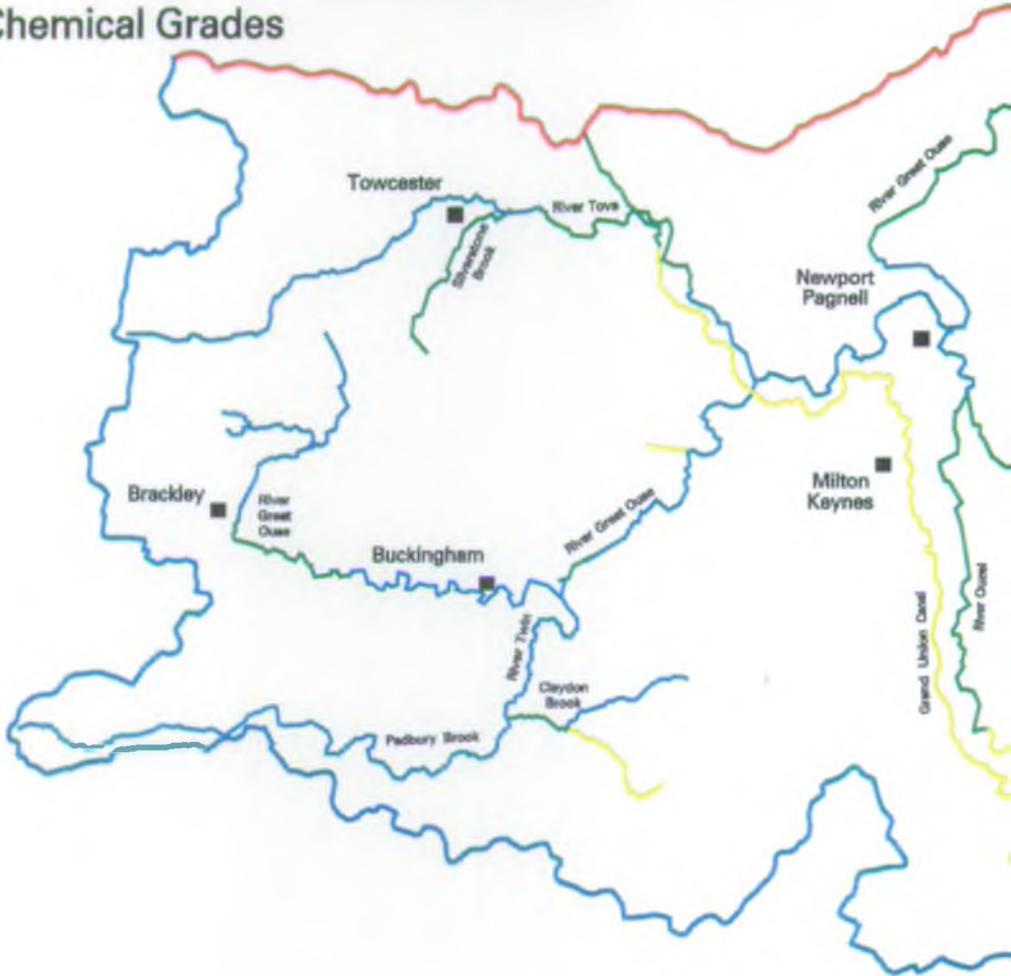
In 1993 the NRA introduced a General Quality Assessment (GQA) scheme for the periodic reporting of river quality. This scheme replaced the National Water Council scheme. The GQA scheme currently consists of only the general chemistry component but will eventually include nutrients, aesthetics, and biology providing four separate windows upon the quality of river stretches. The chemical grading under GQA for rivers and canals is shown in appendix B.

The GQA grades and Biological grades for 1994 are shown on Maps 5 and 6 respectively. The majority of river stretches are GQA grade B or C indicating good to fair water quality and Biological class A, indicating excellent biological quality. Most notable improvements have been recorded in the River Ouzel following recent improvements at Dunstable STW. In contrast to the rivers in the catchment, the Grand Union Canal is classified as grade D. However the biological grade is A.

The upper stretches of the River Great Ouse and River Ouzel support small populations of brown trout which require good water quality. These are artificially stocked, although recent surveys have found a breeding population of brown trout in the Water Stratford area. The Upper Ouse catchment, with the exception of the Grand Union Canal supports an excellent (Fisheries Class A), coarse fishery and stretches of the River Great Ouse, River Ouzel, River Tove, Claydon and Padbury Brooks are designated under the EC Fisheries Directive.

Groundwater quality is routinely monitored in Limestone, Lower Greensand and Chalk aquifers in the Upper Ouse catchment. At present, groundwater quality is classified on the basis of suitability for use as drinking water. However, a revised scheme for the classification

Upper Ouse
Catchment Management Plan
General Quality Assessment (1994) – Map 5
Chemical Grades





KEY

 Catchment Boundary

 Region Boundary

 Towns



 Grade B

 Grade C

 Grade D



NRA

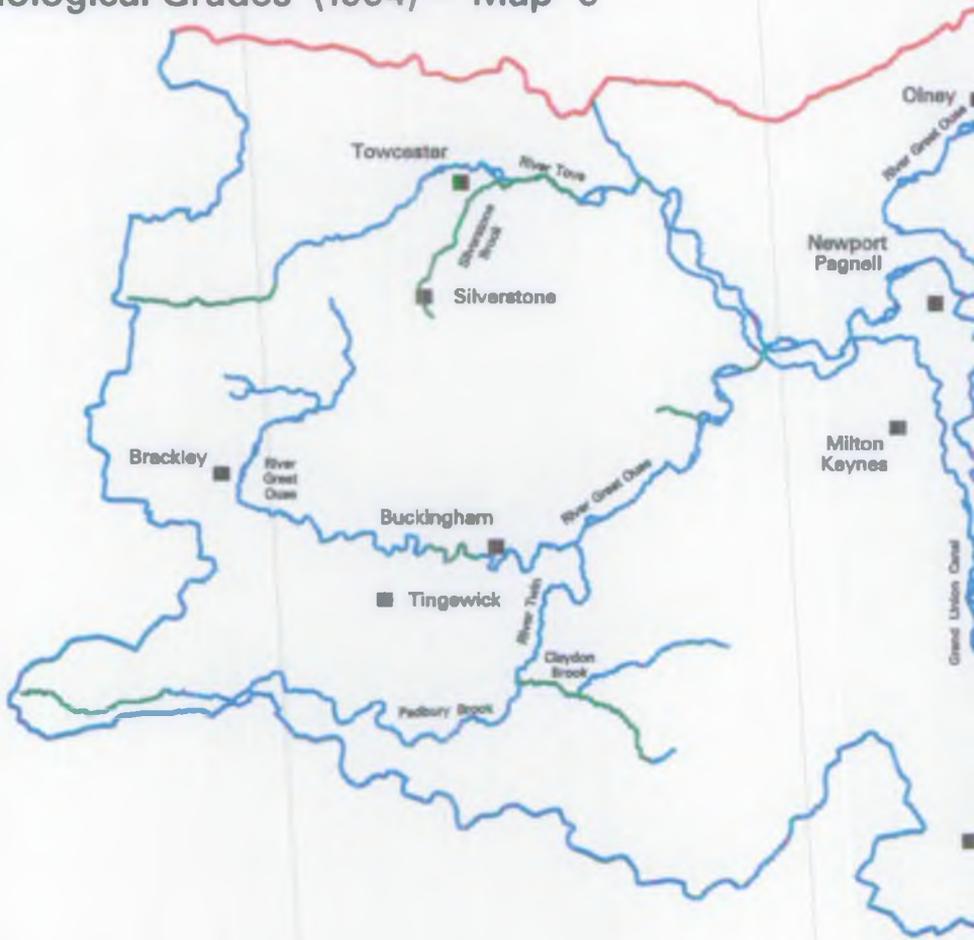
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Upper Ouse

Catchment Management Plan

Biological Grades (1994) – Map 6





KEY

— Catchment Boundary

— Region Boundary

■ Towns



— Class A

— Class B

— Class C

— Class D



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of groundwater is under development.

River water is abstracted for drinking water supplies at Clapham, just upstream of Bedford. There is also an abstraction point on the River Great Ouse near Foxcote Reservoir but this is not used at the current time. Foxcote Reservoir has been designated as a Sensitive Area (Eutrophic) under the Urban Wastewater Treatment Directive (UWWTD). Measures to reduce phosphate loading from large STW's (serving a population of greater than 10,000) may be required for compliance with the UWWTD.

A large proportion of the catchment upstream of Clapham abstraction is a proposed Nitrate Vulnerable Zone (NVZ). A full consultation on the proposed NVZ was carried out by MAFF and a decision is awaited from the government. Birchmoor has been designated a Nitrate Sensitive Area (NSA). Both NVZs and NSAs require farmers to restrict nitrogen application to land.

Figure 2 shows the number of pollution incidents in the Upper Ouse catchment in 1994. The pollutants are categorised into major pollutant types. Oil and related products are the main cause of pollutions - some 42% of the total. This correlates to the Anglian Region as a whole with 36% of the pollutions reported being caused by oil. There is a slightly higher percentage of organic waste pollutions in this catchment - 16% as compared to 11% for the Region as a whole. Most incidents of organic pollution have occurred in the upper catchment, around Padbury and Claydon Brooks, where there is a high density of dairy and beef farms.

See Section 5 Issue 20 : Oil Pollution incidents

NUMBER OF POLLUTION INCIDENTS IN 1994 BY TYPES OF POLLUTANT (% of total)

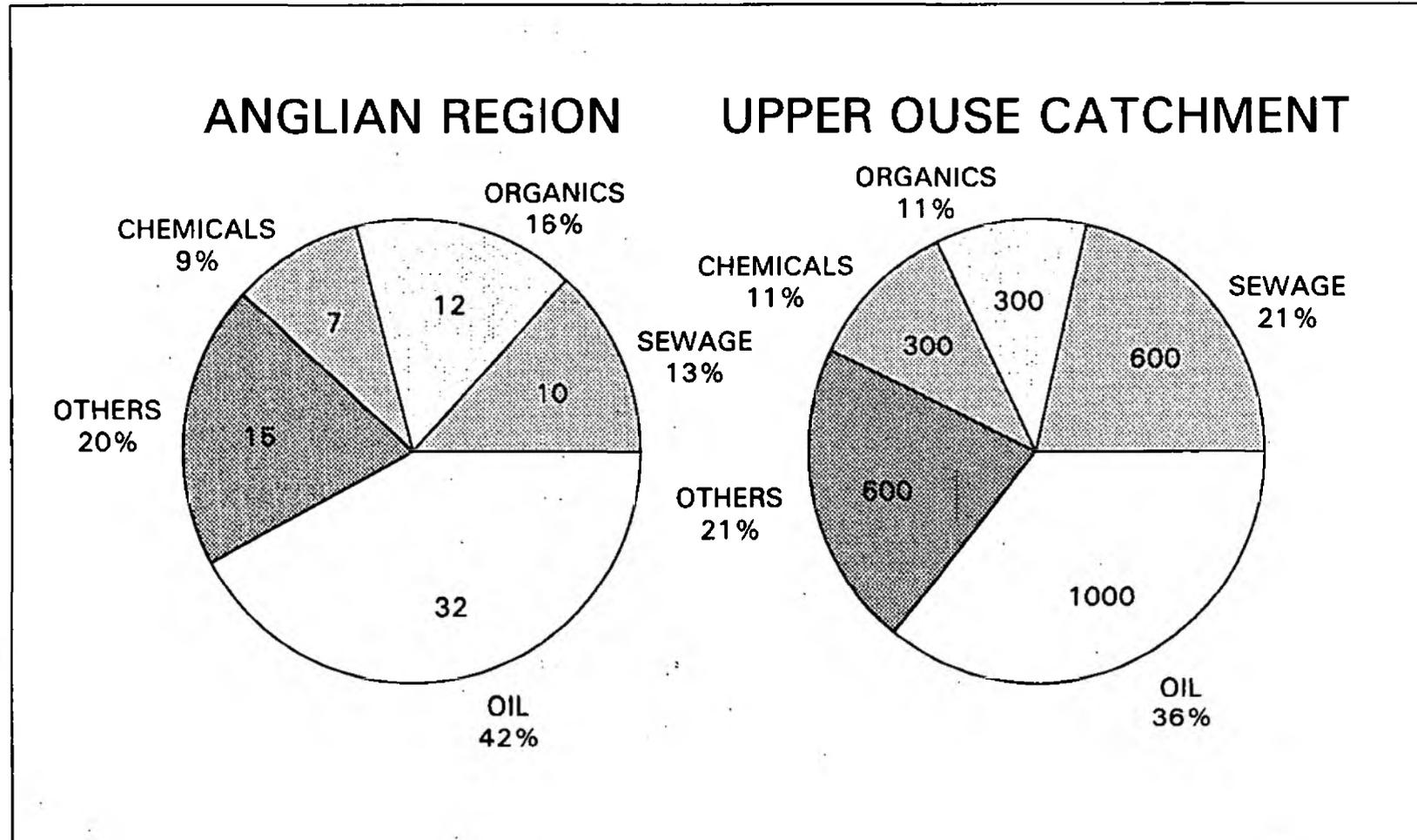


FIG 2

2.5 DATA COLLECTION

The NRA requires information and data about the water environment to carry out its regulatory functions. Rainfall, river levels and flows, groundwater levels, environmental water chemistry, biology and fish populations, river habitat and river corridor surveys are all measured within the catchment as part of the Authority's routine sampling programme.

Surface water levels and flows are monitored via a network of seven purpose-built gauging stations across the catchment. Data is collected either during site visits or by telemetry. Rainfall across the catchment is measured at 20 sites by members of the public who act as voluntary rainfall "observers" for the NRA. Five further raingauges are linked to the NRA's Regional Telemetry system for flood warning purposes.

Groundwater levels are measured by the NRA using a relatively sparse network of 19 observation boreholes. These are monitored monthly by site visit.

Surface water quality is monitored by a network of strategically placed water quality monitors. Data is continuously collected by telemetry.

It is also a requirement that abstraction licence holders are required to submit data on the amount of water taken annually.

Hydrometric and other data from these sites in the Upper Ouse are used as the basis for many of the NRA's operational decisions, including flood warning, abstraction licensing, planning of new development and the setting of discharge consents.

SECTION 3
USES, RESOURCES & ACTIVITIES

3. USES, RESOURCES AND ACTIVITIES

The "use" of the catchment relates to the principal demands upon the water resources and the environment. These fall into a series of categories relating to the basic role of the river as a conveyance of rainfall falling onto the catchment to the sea. The use made of this resource by the environment and by human activity are managed by a set of "activities" some of which are the responsibility of the NRA. These uses and activities are identified and discussed in this section.

3.1 FLOOD DEFENCES

3.1.1 General

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 climatic conditions, principally heavy rainfall. Flood events are described in terms of frequency at which, on average, a certain severity of flood is exceeded (see Map 7). This frequency is usually expressed as a return period in years, eg, 1 in 50 years.

An important NRA activity within this catchment is the management, maintenance, and provision of Flood Defence. The NRA has been assigned various powers to control the activities of others. The responsibility for the maintenance of any watercourse normally rests with the riparian landowner, whose ownership as a general rule extends to the centre line of any such river. In the flood defence system, certain channels are designated as Main River. The NRA has control of the construction of any structure in or close to the statutory Main River and may take a greater responsibility for the maintenance and control of the channel or structure on Main River. This and other activities likely to affect the bed or bank of the river or stability of the defence or flow in the flood plain require the formal consent of the NRA prior to commencement of work.

The NRA has a flood defence operational maintenance team which deals with emergencies (flooding and some pollution control support) together with "permissive powers" to carry out river maintenance. This work is targeted at past flood defence and drainage schemes to ensure they function as required. In other areas maintenance work is undertaken to a standard consistent with existing land use.

The NRA also has powers in respect of consents for weirs, dams and culverts and similar obstructions on watercourses which are not designated statutory Main River. District and County Councils have powers to carry out schemes on such watercourses, but are under no legal obligation to do so. Such sites require the NRA's consent under its requirements for overall supervisory duty of drainage matters.

Surface water and non-Main River flooding is likely to be more frequent than that experienced from a Main River and solutions to these rest with the District and County Authorities. The Internal Drainage Boards (IDBs) are responsible for drainage within their administrative areas and also perform maintenance and flood protection duties.

3.1.2 River Control Structures and Statutory Main River

Map 8 shows that, within the catchment, significant lengths of river have been designated as Main River.

The catchment has a predominately clay structure producing rapid runoffs during periods of intense rainfall. This runoff finds its way into the Bedford Ouse along with additional waters from its tributaries, discharging by gravity into the lower reaches of the Ouse downstream of Bedford.

River levels in this section are controlled by a series of weir and sluice river control structures. These structures are necessary for various reasons such as maintaining water levels for recreational purposes, conservation interests, aiding abstraction for public water supplies in normal flows and reducing flood levels during high flow events.

During high flows weirs are designed to drown out and sluices operate automatically to maintain maximum discharge efficiency. With high flood discharges when the available channel capacity is exceeded, use is made of the natural flood plain by flood waters. This is an important characteristic of all channels within the catchment, causing the attenuation of flows before they reach constrictions imposed by urban development areas.

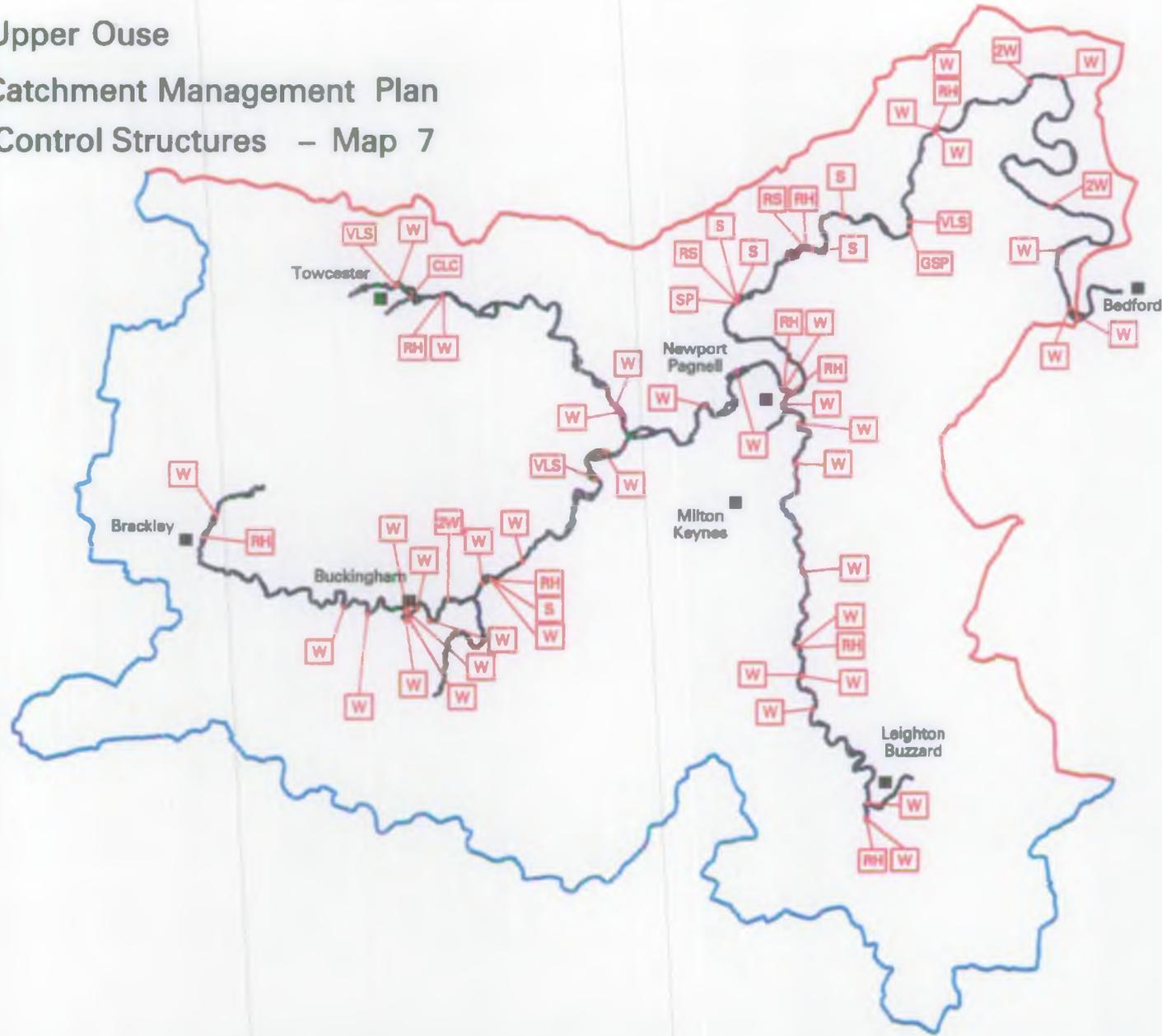
Since the floods of 1947, some structures have been enlarged or replaced with corresponding improvements to channel capacity in certain reaches. These improvements offer an enhanced level of flood defence up to certain return periods, but not major events towards 1947 levels. Therefore, the use of the existing flood plain, especially upstream of and within towns, is essential to prevent increased levels of property flooding.

3.1.3 Flood Warning

The NRA provides information and advice to the County Police Forces, giving them advanced warning of areas likely to be affected by fluvial or tidal flooding. Flood warnings are based on a three phase colour system: yellow for minor flooding with no public warning issued, amber for road flooding and flooding of isolated properties but no generalised public warning, and red for full flood situation, property flooding expected with a public warning issued.

The NRA is responsible for monitoring river flows and tidal conditions and predicting water levels. The responsibility for public warning currently rests with the Police. In the event of an emergency the local authorities provide a co-ordinating role, support in the form of rest centres for evacuated persons, and the maintenance of infrastructure and services.

Upper Ouse
 Catchment Management Plan
 Control Structures – Map 7



KEY

- Catchment Boundary
- Region Boundary
- Main River
- Towns



- W Weir
- ZW Two Weirs
- RH Recorder House
- VLS Vertical Lift Sluice
- RS Radial Sluice
- SP Spillway
- GSP Grass Spillway
- S Sluice
- CLC Concrete Lined Channel



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The NRA Emergency Planning Flood Warning manual outlines the catchment type and typical response to rainfall and tidal events, sites considered to be at special risk, data gathering points in the catchment and specific warning data. The latter item, based on calculated and observed river responses, consists of various threshold water levels and flows at upstream gauging stations which will be likely to result in downstream flooding. Periods of time before the flooding can be expected at each location at risk are included and this information forms the basis of any warning issued. Such procedures are re-assessed and modified as necessary in response to each flooding or near flooding event.

3.1.4 Control and Administration

MAFF have overall responsibility for Flood Defence in England. The aim of the government's Flood Defence policy is to:

"reduce risks to people and the developed and natural environment from flooding by encouraging the provision of technically, environmentally and economically sound and sustainable defence measures".

The Ministry does this by:

- a) establishing a policy framework for the responsible organisations such as the NRA to provide flood warnings and carry out defence, drainage and maintenance works;
- b) provision of Government grant for cost-effective flood defence works and flood warning systems.

The Upper Ouse Catchment contains the Ouzel and Buckingham Internal Drainage Districts, the boards of which are responsible for drainage within their administrative areas and perform both maintenance and flood protection duties.

Planning Authorities seek the NRA's advice and take this into account when deciding on planning consent proposals within the flood plain.

Schemes for the protection of property can be devised, but there is always the possibility of an event more severe than the design standard. Thus planners of future development close to the river corridor should be mindful of potential risks.

The Grand Union Canal comes within the independent jurisdiction of British Waterways, who administer and control flood protection of the canal system within this catchment.

3.1.5 Maintenance Operations

These involve a variety of activities needed to ensure the efficient discharge capacity of the river. Regular maintenance activities include dredging, weed control, obstruction removal, structures operation, mechanical and electrical maintenance of

structures and river bank maintenance.

The annual maintenance programme takes full account of conservation recommendations identified by the Rivers Environmental Database (REDS). Identified special features are protected and the most appropriate working methods adopted to enhance river habitats, whilst maintaining flood defence objectives.

3.2 HOUSING, INDUSTRY AND COMMERCE

3.2.1 General

The control of development is the responsibility of local government under The Town and Country Planning process. It is the Government's intention that development will now be led by plans which set out policies against which the Planning Authorities consider development proposals. Guidance for future development is contained in Regional Planning Guidance, County Structure Plans, Minerals & Waste Local Plans and District Local Plans.

See Section 5 Issue 39: Structure and Local Plans

Regional Planning Guidance and Structure Plans set out the framework for development, Local Plans provide the details.

The Department of the Environment (DoE) issue Planning Policy Guidance notes (PPGs) to provide advice to Local Planning Authorities (LPAs) on key areas of interest. The advice contained in PPGs is an important material consideration for LPAs in the preparation of Development Plans and the determination of individual planning applications. The principal PPGs relevant to the interaction between land use planning and the water environment are:

PPG9	Nature Conservation
PPG12	Development plans and Regional Policy Guidance
PPG23	Planning and Pollution Control

The DoE also issue advice to LPAs in the form of Circulars. Circular 30/92 on Development in Flood Risk Areas sets out the type of information which the NRA should provide LPAs on flood plain areas and areas at risk from flooding and the weight which LPAs should give to the NRA's advice regarding proposed development in those areas.

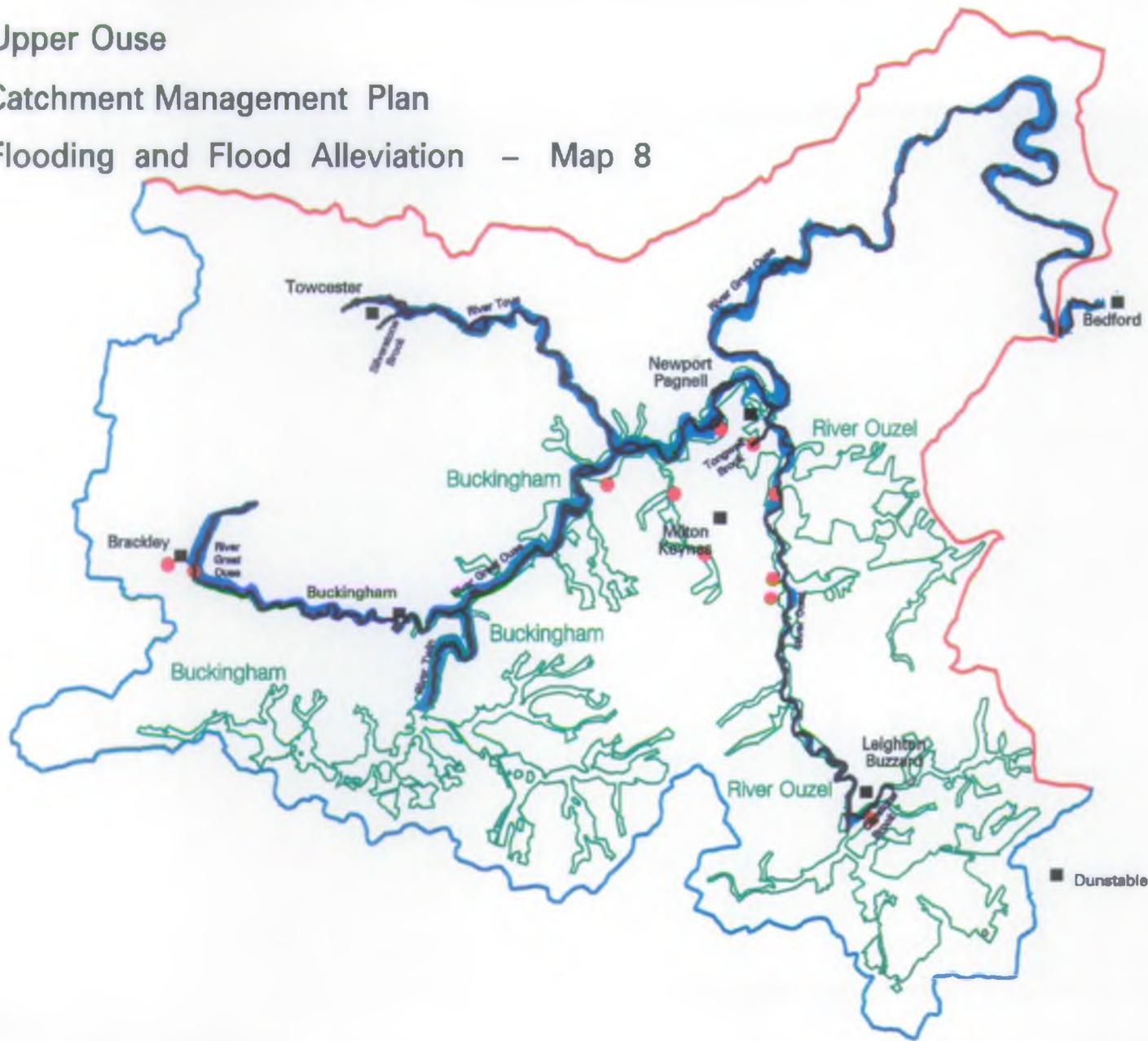
Flood plain development is resisted by the NRA not only because of the flood risk to development itself but also because of the increase in flood levels caused by the development and the increase in flood risk to others.

The NRA as a statutory consultee to LPAs advises on all proposals which may have an impact on the water environment.

Upper Ouse

Catchment Management Plan

Flooding and Flood Alleviation - Map 8



KEY

— Catchment Boundary

— Region Boundary

— Main River

■ Towns



Flood Area

Internal Drainage Board Area

Flood Storage Reservoir



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The NRA's purpose in this participation is the protection of the water environment and the prevention or mitigation of any adverse effects associated with development and land use change. It must be remembered however that the final decision on planning matters rests with the planning authorities.

Following the granting of a planning permission, the NRA may still influence the nature of a proposed development by the necessity of the developer obtaining appropriate licences or consents.

During the formulations of Structure and Local Plans, the NRA will continue to seek to persuade Local Authorities to adopt its policies. All Local Authorities have in their possession the NRA document "Guidance Notes for Local Planning Authorities on the Methods of Protecting the Water Environment through Development Plans" (currently under review). This provides the basis for discussion and agreement on policies to suit individual plans. In addition, the NRA intends that CMPs should positively influence the policies and actions of the Planning Authorities, developers and others.

Land use has the single most influence on the water environment. The NRA pays specific attention to proposals which may include:

- Development in flood risk areas (see Map 8)
- Development which concentrates surface water runoff and may lead to flooding;
- Development which may lead to direct pollution of surface or groundwater;
- Development which might impact on water resources;
- Development which would result in overload of the sewerage system and deterioration in the standard of discharge from sewage treatment works;
- Development which would result in the destruction of conservation interests particularly those regarded as non renewable.

3.2.2 Local Perspective

The catchment covers parts of Bedfordshire, Buckinghamshire, Northamptonshire and Oxfordshire and involves the following District/Borough Councils:

- Aylesbury Vale District Council
- Bedford Borough Council
- Cherwell District Council
- Mid Bedfordshire District Council
- Milton Keynes Borough Council
- South Bedfordshire District Council
- South Northamptonshire District Council

and a very small part of Daventry District Council.

The current status of the Structure Plans and Local Plans in the Upper Ouse Catchment is shown below:

STRUCTURE PLANS	CURRENT STATUS
Northamptonshire C.C.	Adopted (February 1989), alteration No 1 approved (January 1992)
Buckinghamshire C.C.	Proposed modifications, adoption expected (December 1995)
Bedfordshire C.C.	Draft Plan on deposit (February 1995), adoption expected 1996
Oxfordshire C.C.	Consultation Draft (August 1995)
LOCAL PLANS	CURRENT STATUS
South Northamptonshire D.C.	Deposit Draft on Report (August 1995)
Northamptonshire Minerals Local Plan	Proposed Modifications (August 1995)
Northamptonshire Waste Local Plan	Public Inquiry (September 1995), Adoption expected (December 1996)
Aylesbury Vale D.C.	Rural Areas Adopted (July 1995)
Milton Keynes Borough Council	Adopted (January 1995)
Buckinghamshire Minerals Local Plan	Adopted (January 1995)
Buckinghamshire Waste Local Plan	Public Consultation (February 1995)
Bedford Borough Council	Adopted (December 1993), Public Consultation of new plan (February 1995)
South Bedfordshire D.C.	Proposed Modifications (August 1995)
Mid Bedfordshire D.C.	Adopted (September 1993)
Bedfordshire Minerals and Waste Plan	Proposed Modifications (June 1995)
Cherwell D.C.	Proposed Modifications (August 1995)
Oxfordshire Minerals and Waste	Deposit Draft on Report (August 1995)

The most prominent feature of this rural upland catchment is the new City of Milton Keynes. This encompasses the old established towns of Bletchley, Wolverton and Stony Stratford, and is the fastest growing urban area in the United Kingdom, a major centre for business, high technology industries, shopping, leisure and recreation. With a population in 1991 of 143,100, 37,000 further dwellings are allocated for the city in the Buckinghamshire Structure Plan in the period 1991 to 2011. In line with the proposed population increase, Milton Keynes is the catchment's main employment growth centre. It will become a Unitary Authority in April 1997.

Other development in Buckinghamshire to the year 2001 is limited and allocated to Buckingham, Winslow, Newport Pagnell and Olney.

In Bedfordshire to the year 2001, 3130 housing units are allocated to Biddenham, Kempston and Wootton in the Bedford Borough area, and 437 units to Barton-le-Clay, 400 units to RAF Stanbridge and 50 units to Leighton Buzzard in South Bedfordshire.

Notable industrial allocation is to Leighton Buzzard.

In Northamptonshire to the year 2006, the housing allocation is Towcester, 625 units, and Brackley, 740 units. Both locations have allocated industrial development, this totalling 35 ha.

There are no significant urban areas in the catchment in Oxfordshire, village development as in all other areas being very limited. Part of the Upper Heyford air base is within the catchment, however, and its future redevelopment will have an impact.

Significant road schemes/improvements within the catchment notified to the NRA are as follows (see Cover Map):

- Bedford Western Relief Road
- M1 widening
- A6 Clapham Bypass
- Olney Bypass
- A4146 Stoke Hammond Bypass
- A421 Tingewick Bypass
- A421 Improvements
- A418 Wing Bypass
- A43 Silverstone Bypass
- A43 Brackley Hatch to Whitfield Turn Dualling.

The impact of many of the road schemes described above revolve around the effect of surface water runoff, crossing the flood plain and pollution risk. These are described in 5.6 along with some options for alleviation.

3.3 AGRICULTURE AND FORESTRY

3.3.1 General

Within the Upper Ouse catchment (see Map 9), there are 126 186 ha of agricultural land (based on MAFF 1994 census data). This shows a decline of 1,260 ha since 1984. The land use is summarised below:

Land Use	Area (ha)	%
Grassland	42 395	33.5
Rough Grazing	3 388	2.7
Crops & Fallow	55 183	43.7
Farm Woodland	10 668	8.5
Other Land	3 708	3.0
Set-aside	10 884	8.6
TOTAL	126 186	100

3.3.2 Cropping

Arable cropping predominates - 72% of the cropped land is covered by cereals with a further 20% taken up by oilseed rape, beans, dried peas and linseed. Over the last decade, the area of cropped land has declined by approximately 13% due to a fall in cereals and an increase in the set-aside land due to the introduction of the Arable Area Payment Scheme in 1992/93 under the introduction of Common Agricultural Policy Reform. These measures require that all but the smallest farms, set aside 10% of land growing cereals, oilseed and protein crops. Farmers are also not allowed to apply fertiliser or pesticide and are encouraged to manage the land in an environmentally beneficial manner. Land entered into the Habitat and NSA schemes can also count toward the set-aside obligation and that woodland will also be eligible as set-aside.

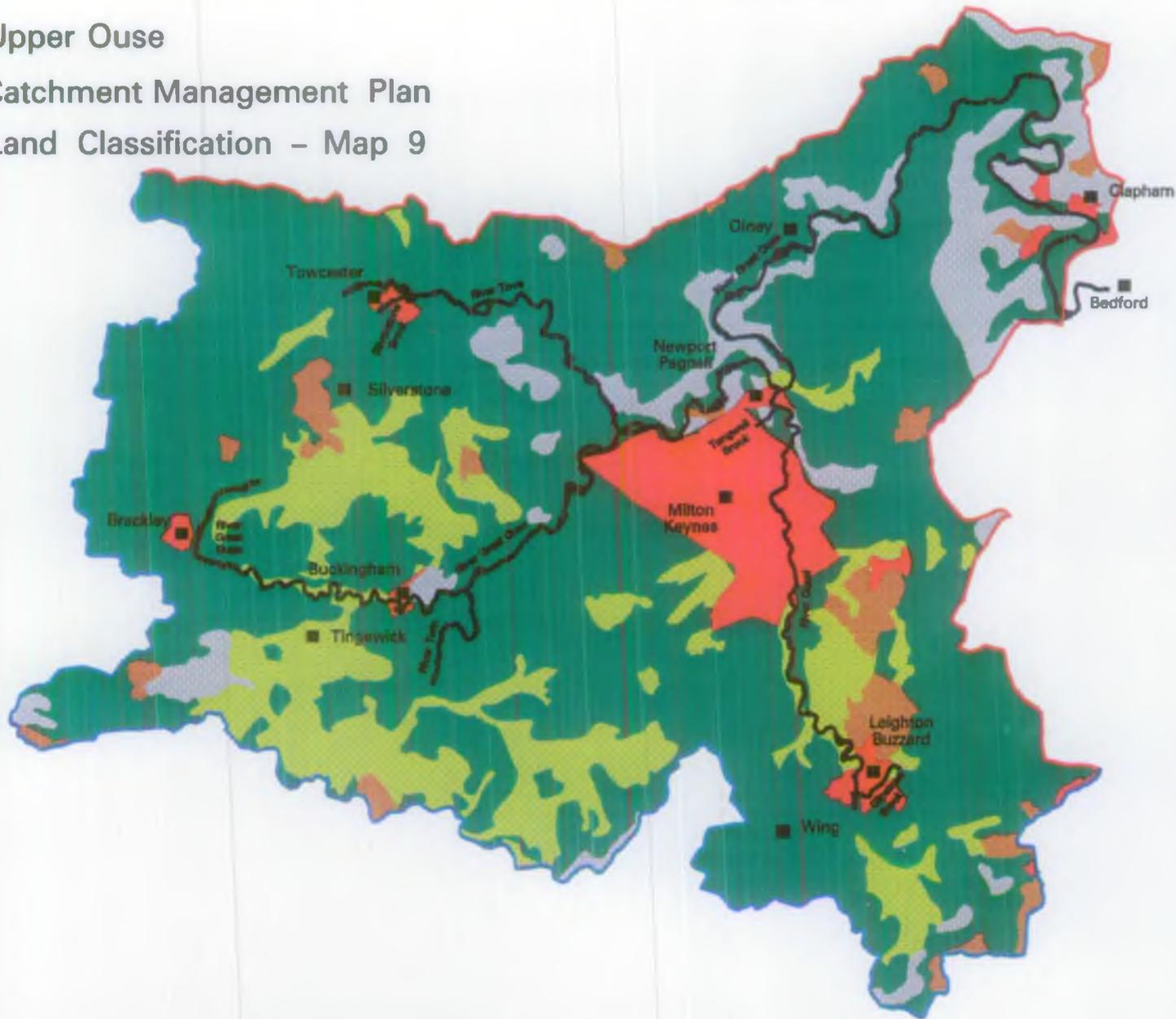
3.3.3 Livestock

The land used for grazing has also fallen over the last decade. Cattle numbers have fallen by 33% over this period as the farming has changed from dairy to beef herds. Similar to the trend throughout the UK, sheep numbers have increased. Intensive livestock farming such as pigs and poultry have fallen by 45%. It is thought that the decline in livestock has led to a decrease in the amount of organic waste being produced and applied onto the land.

3.3.4 Agricultural Land Quality

MAFF rate the quality of land, in this catchment, as follows:

Upper Ouse
 Catchment Management Plan
 Land Classification – Map 9



KEY

-  Catchment Boundary
-  Region Boundary
-  Main River
-  Towns

0 10
 km

-  Grade 1 Agricultural Land
-  Grade 2 Agricultural Land
-  Grade 3 Agricultural Land
-  Grade 4 Agricultural Land
-  Urban Use
-  Other Land in Non -
 - Agricultural Use



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Grade	%
1 & 2 (most productive)	3.1
3	55.1
4	6.9
5	0.6
Non-agricultural	25.2
Urban	9.0
TOTAL	100

Grades 1, 2 and 3 are normally protected from irreversible development. There are approximately 18 000 holdings in the catchment - cattle and sheep predominate. The majority of farms in this catchment are likely to be of good to moderate quality.

3.3.6 Environmental Schemes

Within the catchment plan area, some of the land is subject to voluntary designations which have an impact on the management of agricultural land. Details of Nitrate Sensitive Areas and Vulnerable Zones are given in sections 4.5 and 4.6 of this report. Some of the other schemes which focus more on nature conservation are listed below:

- *The Habitat Scheme* which was introduced last year to encourage farmers to create, protect or enhance a range of wildlife habitats by managing land in an environmentally beneficial way. Within the Upper Ouse the most relevant target areas is land formerly in 5 year set aside (agreed 1988 - 1991). Much of this land is still set-aside and has developed into valuable wildlife habitats. The requirement of the habitat scheme is that land is kept out of agricultural production for 5 years.
- *Countryside Access Scheme* is open to farmers who have non-rotational set aside land. It is designed to provide new opportunities for public access and recreation and could include access to watercourses.
- *Countryside Stewardship Scheme* is currently administered by the Countryside Commission, this scheme will transfer to MAFF in April 1996.

3.4 AGRICULTURAL ABSTRACTION

3.4.1 Regulation of Abstraction

All abstraction, except for general use less than 20 cubic metres per day taken from surface waters, requires a licence under the Water Resources Act 1991 (previously the Water Resources Act 1963).

An abstraction licence is only issued by the NRA if there is sufficient water available, the need for the water is justified, all rights of existing users are protected and the water environment (eg, rivers, springs and wetland sites) is not unacceptably affected. Abstraction from surface water sources is subject to low level or flow restrictions in order to protect the river and downstream users (Appendix B).

3.4.2 General

This use includes water abstracted for general agricultural use (eg, stock watering, mixing chemicals for weed control), fish farms and overhead spray irrigation.

3.4.3 Local Perspective

Water abstracted for agricultural use represents less than 4 % of the total volume abstracted in the catchment. This includes spray irrigation and livestock watering. However, the greatest number of licences issued are for agricultural uses (86%).

General Agriculture

There are 214 licences for general agricultural use of water in the catchment. Abstraction is mainly from shallow sand and gravel wells and catchpits with only limited surface water abstraction. The total licensed for this use is 574 thousand cubic metres per year which is less than 2 % of total water licensed for all uses in the catchment.

Spray Irrigation

Water abstracted for spray irrigation is considered as a total loss to water resources. Licences are issued on a time limited basis, normally 10 years, so that their impact may be reviewed.

A small amount of surface water is used for spray irrigation in the catchment. The abstraction of groundwater for spray irrigation is primarily sourced from the Lower Greensand. In areas of limited summer resource, farm reservoirs may be used to store winter water for subsequent summer use. The total of spray irrigation licences accounts for 603 thousand cubic metres. Spray irrigation represents a total of 2 % of total licensed abstraction in the catchment.

VOLUME OF WATER LICENSED IN THE UPPER OUSE CATCHMENT

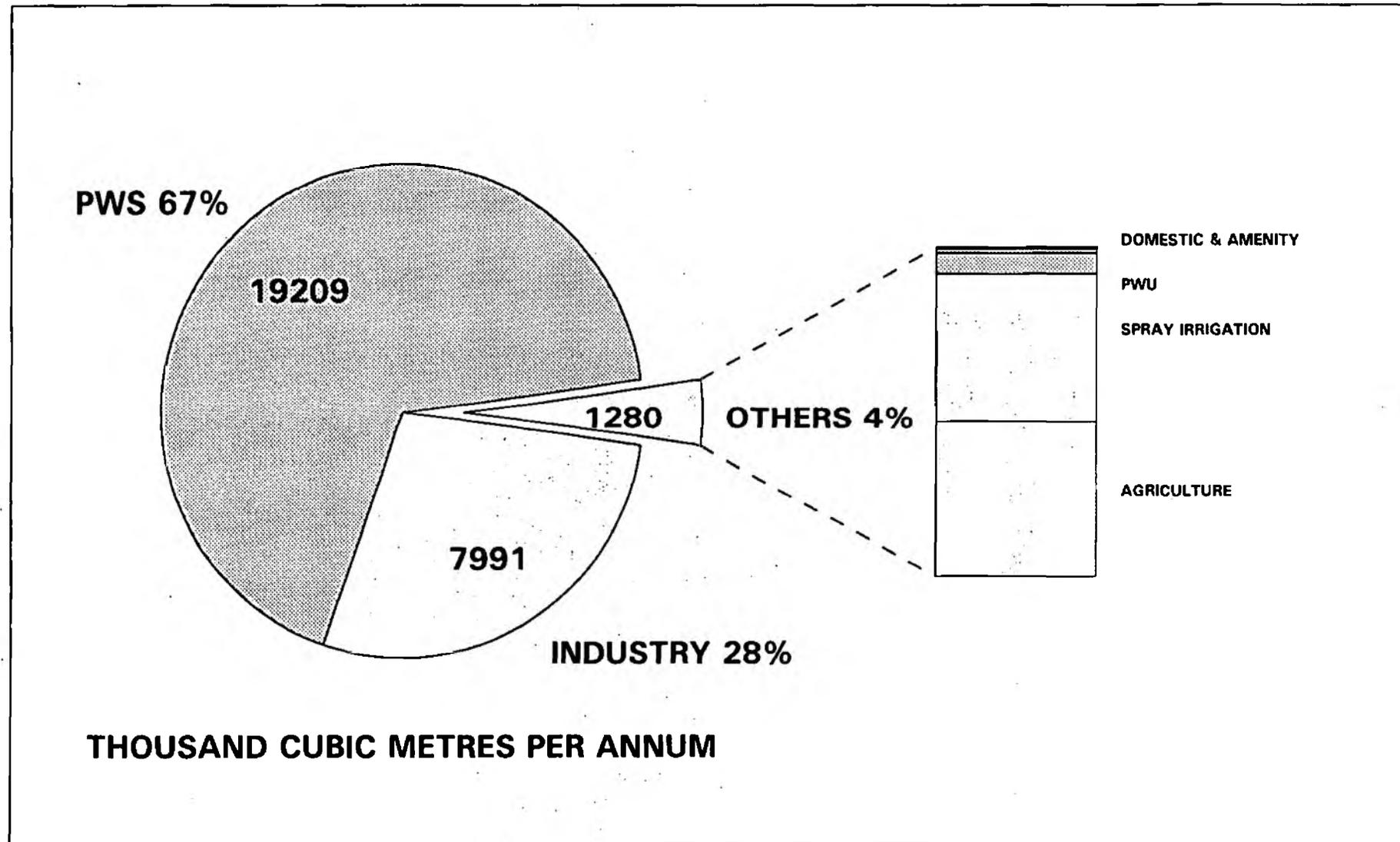


FIG 3

NUMBER OF LICENCES IN THE UPPER OUSE CATCHMENT

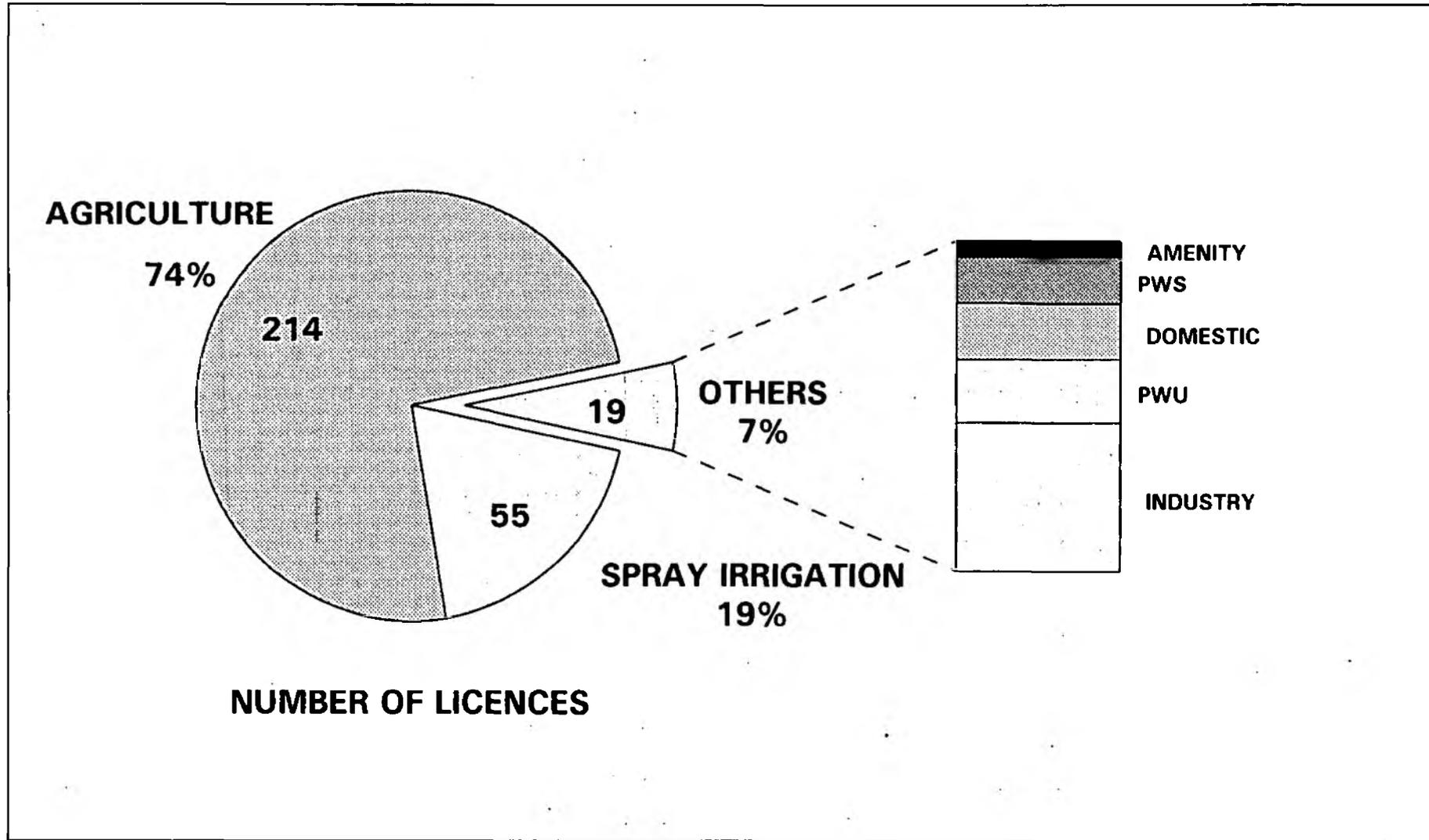


FIG 4

Livestock Watering

Most watercourses in the catchment are used or have the potential to be used for livestock watering.

3.5 INDUSTRIAL ABSTRACTION**3.5.1 General**

This use describes the abstraction of water from ground and surface waters for industrial purposes. This is in addition to PWS supplies to industry. Industrial abstractions include water used for industrial processing, cooling and sand and gravel washing (see 3.4.1).

3.5.2 Local Perspective

Industry is centred around the main urban areas of this catchment and is largely light manufacturing and engineering based with a generally low demand for new water. Much of the industrial demand for water is supplied by the water companies rather than from private licences.

There are 19 licensed industrial abstractors in the catchment abstracting almost 7991 thousand cubic metres per year (Map 10). Industrial abstraction represents 25 % of total licensed abstraction in the catchment. A large percentage of the water used by industries such as mineral washing is returned to the rivers.

A major abstraction of groundwater is made for the brewing industry in Bedford from the Oolite. Industrial groundwater abstractions are also made from river and glacial sands and gravels, with the water primarily used for mineral washing. Surface water abstractions are also made along the River Ouse for mineral washing.

3.6 POTABLE WATER SUPPLY - SURFACE WATER ABSTRACTION

3.6.1 General

This use relates to the abstraction of surface water (ie, rivers and springs) for domestic or industrial potable use.

Anglian Water Services Limited (AWS) is the only water supply company to make surface water abstractions in the catchment. In addition individual householders may abstract from springs for their own domestic use (see 3.4.1).

3.6.2 Local Perspective

Public Water supply abstractions by AWS make up 67% of the water licensed for abstraction in the Upper Ouse. Surface water abstractions by AWS from the Upper Ouse (Map 11) represent 41% of the total quantity of water licensed for abstraction within the catchment (figure 3).

AWS are licensed to abstract 54.5 thousand cubic metres per day (tcmd) from the River Ouse at Clapham, near Bedford. This includes an option to abstract up to 6.8 tcmd from groundwater in the Oolite.

AWS are also licensed to abstract 13.6 tcmd from the River Ouse at Foxcote, to fill the Foxcote reservoir although this is not actively used.

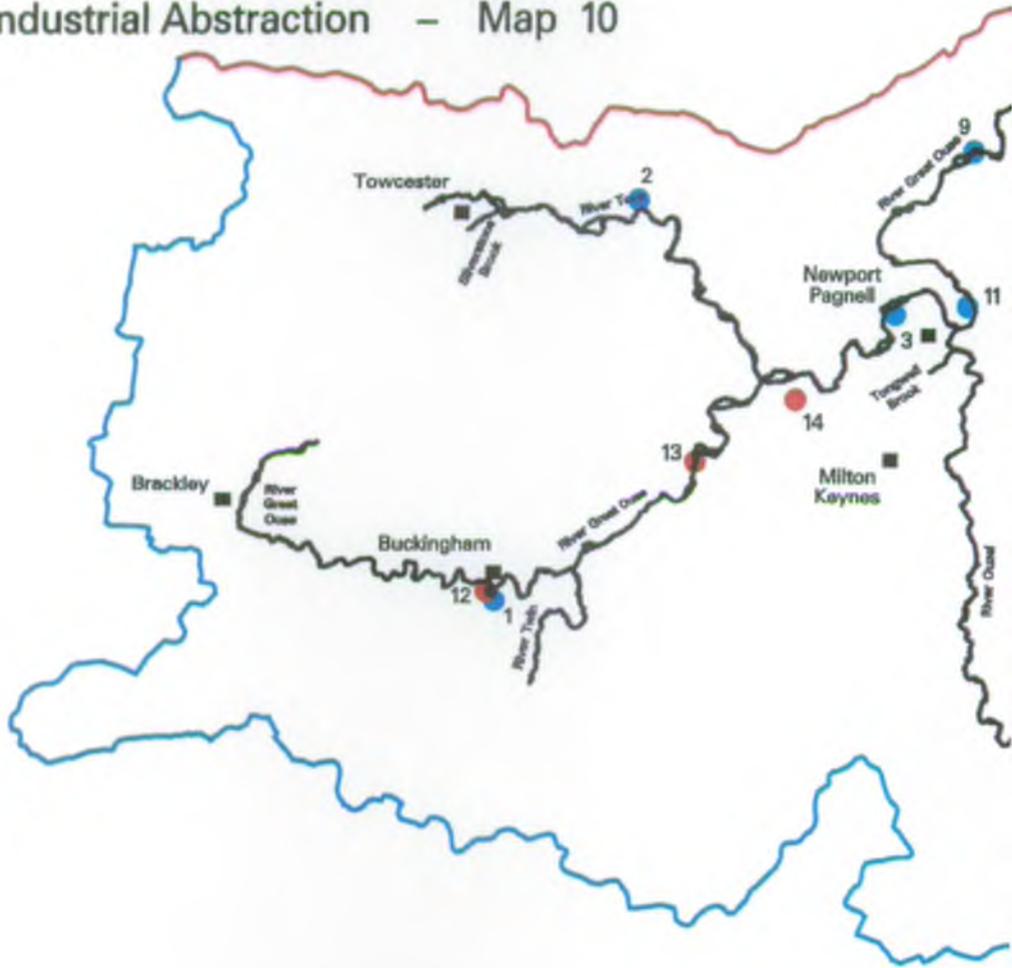
In addition to these two public water supply abstractions, there is a much larger supply scheme which has an impact on the catchment - AWS are licensed to abstract 459 tcmd from the River Ouse at Offord, near Huntingdon, Cambridgeshire to fill Grafham Water reservoir. The water from Grafham Water is used to supply a wide area including Milton Keynes where water is returned to the Upper Ouse in the form of treated sewage effluent discharges. To ensure the reliability of the water supply for Grafham Water, new licences granted in the Upper Ouse are likely to be subject to cessation conditions, usually based on river flows.

As well as large abstractions for public water supply, there are a number of spring sources within the catchment which provide private domestic water supplies.

Upper Ouse

Catchment Management Plan

Industrial Abstraction - Map 10





KEY

 Catchment Boundary

 Region Boundary

 Main River

 Towns



 Groundwater Abstraction

1. University of Buckingham
2. Pianoforte Supplies Ltd
3. G.F.X. Hartigan
4. Carnos UK Ltd
5. Tunnel Cement (Pitstone) Ltd
6. Hepworth Mineral & Chemical Ltd
7. G. F.X. Hartigan Ltd
8. Charles Wells Ltd
9. W E & J Pebody Ltd
10. Tusting Burnett Ltd
11. G.F.X. Hartigan Ltd

 Surface Water Abstraction

12. University of Buckingham
13. Harcros Chemicals UK Ltd
14. British Waterways Board
15. Carnos UK Ltd



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3.7 POTABLE WATER SUPPLY - GROUNDWATER ABSTRACTIONS

3.7.1 General

This relates to the use of groundwater for domestic purposes, such as drinking, cooking and washing and for industry (see 3.4.1). The water is abstracted from wells and boreholes constructed into the underground rocks (called aquifers).

3.7.2 Local Perspective

The major sources of ground water in the Upper Ouse are the Lower Greensand and Great Oolite. The Chalk aquifer to the south of the catchment is used for water supply in the neighbouring Thames Region. Minor abstractions are made from the local sand and gravel deposits.

Abstractions are made by AWS for public water supply and also by individual householders who abstract from wells or boreholes for their own domestic use.

Four borehole sites are operated by AWS, making up 26% of the total quantity of water licensed for abstraction in the catchment (20.9 tcmd from the Lower Greensand at Sandhouse, Battlesden and Birchmoor and 6.8 tcmd from the Oolite aquifer at Clapham) (see figure 3 and Map 11).

A limited number of groundwater sources in the catchment are used for private domestic supply. Such abstractions are principally from the Chalk and Lower Greensand aquifers, but there are some shallow wells into local sand and gravel deposits. The majority of this use is exempt from licensing under the Water Resources Act (1991). The small amount that is licensed accounts for less than 1% of the total licensed for abstraction in the catchment.

3.8 RAW WATER TRANSFER

No raw water transfers are operated by the NRA in this catchment. British Waterways take water from the River Tove in this catchment to help maintain levels in the canal. Under the present legislation, British Waterways do not require an abstraction licence to transfer this water.

Upper Ouse

Catchment Management Plan

Public Water Supply Abstraction – Map 11





KEY

 Catchment Boundary

 Region Boundary

 Main River

 Towns



Surface water

1. Foxcote
2. Clapham

Groundwater

 Greensand

1. Sandhouse
2. Battlesden
3. Birchmoor

 Oolite

Clapham



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3.9 EFFLUENT DISPOSAL

3.9.1 General

Water Resources Act consents for new discharges are set to ensure that the receiving water remains acceptable for its many uses. Some discharges have consents issued in the past which are less stringent than that required by current standards, but are under review for future improvements.

Discharges from certain activities or processes are controlled by the Environmental Protection Act 1990 as part of the Government's policy on Integrated Pollution Control (IPC). In cases where all of the waste-water is from a process prescribed under IPC, the NRA consent will be revoked.

In addition to consented discharges, a significant amount of pollution in watercourses can be caused by surface water drainage from urban areas and also spillages from a range of domestic, commercial, agricultural and industrial activities. Many of these pollution incidents could be prevented. The NRA is pro-active in making pollution prevention site visits to identify high risk areas and offers pollution prevention advice.

The NRA has discretionary powers to issue "notices" which can set conditions for discharges of surface water to watercourses or effluent discharges to land. Where the risk of pollution is high a "notice" may be served on an individual prohibiting a discharge.

3.9.2 Local Perspective - Sewage Treatment Works

Continuous Effluents:

Map 12 shows the location of Sewage Treatment Works (STW). Within the catchment, there are 44 main STWs with dry weather flows greater than 100 cubic metres per day (m^3/d) operated by AWS. All STW effluents which discharge to inland waters receive at least secondary treatment. The sewage effluents treated are predominantly of domestic origin, the consent conditions, therefore, primarily aim to control concentrations of suspended solids, ammonia and the biochemical oxygen demand, in the final effluent released to watercourses.

The largest STW in the catchment is Cotton Valley STW which serves Milton Keynes, and has a consented discharge flow of 50,000 m^3/d . The discharge is made to the River Great Ouse via lagoons between Newport Pagnell and Sherington. Dunstable STW is the second largest STW in the catchment with a consented flow of 17,000 m^3/d and discharges to the River Ouzel at Houghton Regis.

There are 6 STWs in the catchment which are known to receive significant quantities of trade effluents and consequently have limits on the concentration of metals in their consents.

Many rural areas of the catchment are not served by public sewers. In these areas

there are many, small, private STWs and septic tanks which discharge to watercourse and land respectively. Map 12 shows the private STWs within the catchment which discharge greater than 20 m³/d.

Intermittent Discharges:

Associated with the larger STWs are many sewage pumping stations, most of which have consented emergency overflows. In addition, a significant number of storm overflows are found on combined sewer systems (which are systems that combine surface and foul drainage) as well as at some pumping stations. These discharges are only permitted where damage to installations or property would result without the presence of the overflow.

See Section 5 Issue 19: Adverse impact of Intermittent discharges from CSOs and EOs

3.9.3 Local Perspective - Industrial Discharges

Continuous Effluents:

Map 13 shows the major industrial discharges within the catchment.

There are very few industrial discharges to controlled waters, because the majority of industrial trade effluents discharge to public sewer for treatment at Anglian Water's STWs.

The largest discharge is from Harcros Pigments at Deanshanger, which manufactures metal oxide pigments. The site is covered by an Integrated Pollution Control authorization issued by HMIP. The NRA carries out environmental monitoring to assess the impact of the discharge on the River Great Ouse.

Another trade effluent discharge to the River Great Ouse is from Cowper Tannery at Olney. The consented volume is for 580 m³/d of treated waste-water derived from tanning, leather dressing and site drainage.

Calvert and Newton Longville waste disposal sites, operated by Shanks and McEwan both have consented discharges to watercourses. The Newton Longville site discharges surface water and treated leachate to the Newton Longville Brook. The Calvert site has a consent to discharge 450 m³/d of treated leachate to a tributary of the Claydon Brook. Both Calvert and Newton Longville landfill sites have intermittent discharges which are controlled by consents which include toxicity based conditions.

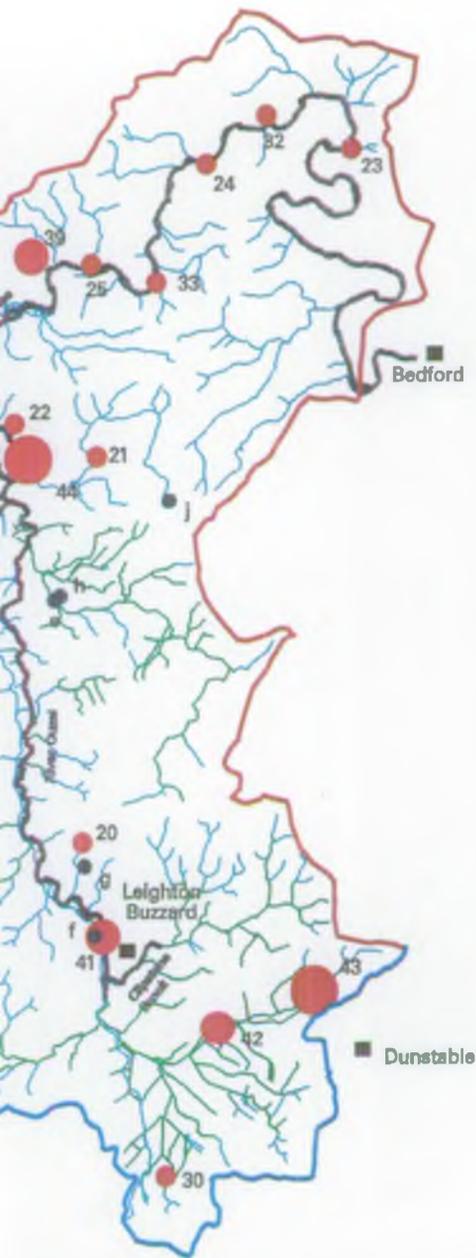
The effluent from GEC Marconi research institute at Caswell is covered by a Water Resources Act 1991 consent, but an IPC authorization controls some components of the discharge and includes conditions to ensure compliance with the Water Resources Act consent. The consented discharge of 108 m³/d is made to a tributary of the River Tove.

Upper Ouse

Catchment Management Plan

Sewage Treatment Works Discharges – Map 12





KEY

 Catchment Boundary

 Region Boundary

 Main River

 Towns



 IDB Watercourse

 Other Watercourse

 Anglian Water Services

 Private

For list of sites see over



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Sewage Treatment Works Discharges

Anglian Water Services

DWF 100 – 999 m³/d

1. Blakesley
2. Greens Norton
3. Wappenham
4. Silverstone
5. Helmdon
6. Syresham
7. Evenley
8. Fritwell
9. Westbury
10. Stowe
11. Tingewick
12. Twyford
13. Steeple Claydon
14. Padbury
15. Great Horwood
16. Oving
17. Swanbourne
18. Whaddon
19. Wing Cublington
20. Great Brickhill
21. North Crawley
22. Sherington
23. Bletsoe
24. Chellington
25. Lavendon
26. Stoke Goldington
27. Castlethorpe
28. Hanslope
29. Stoke Bruerne
30. Mingham
31. North Marston
32. Odell
33. Turvey
34. Ardley

DWF 1000 – 9999 m³/d

35. Brackley
36. Towcester
37. Ashton
38. Maids Moreton
39. Olney
40. Winslow
41. Leighton Linlade
42. Stanbridgeford

DWF >10,000 – 50,000m³/d

43. Dunstable
44. Cotton Valley

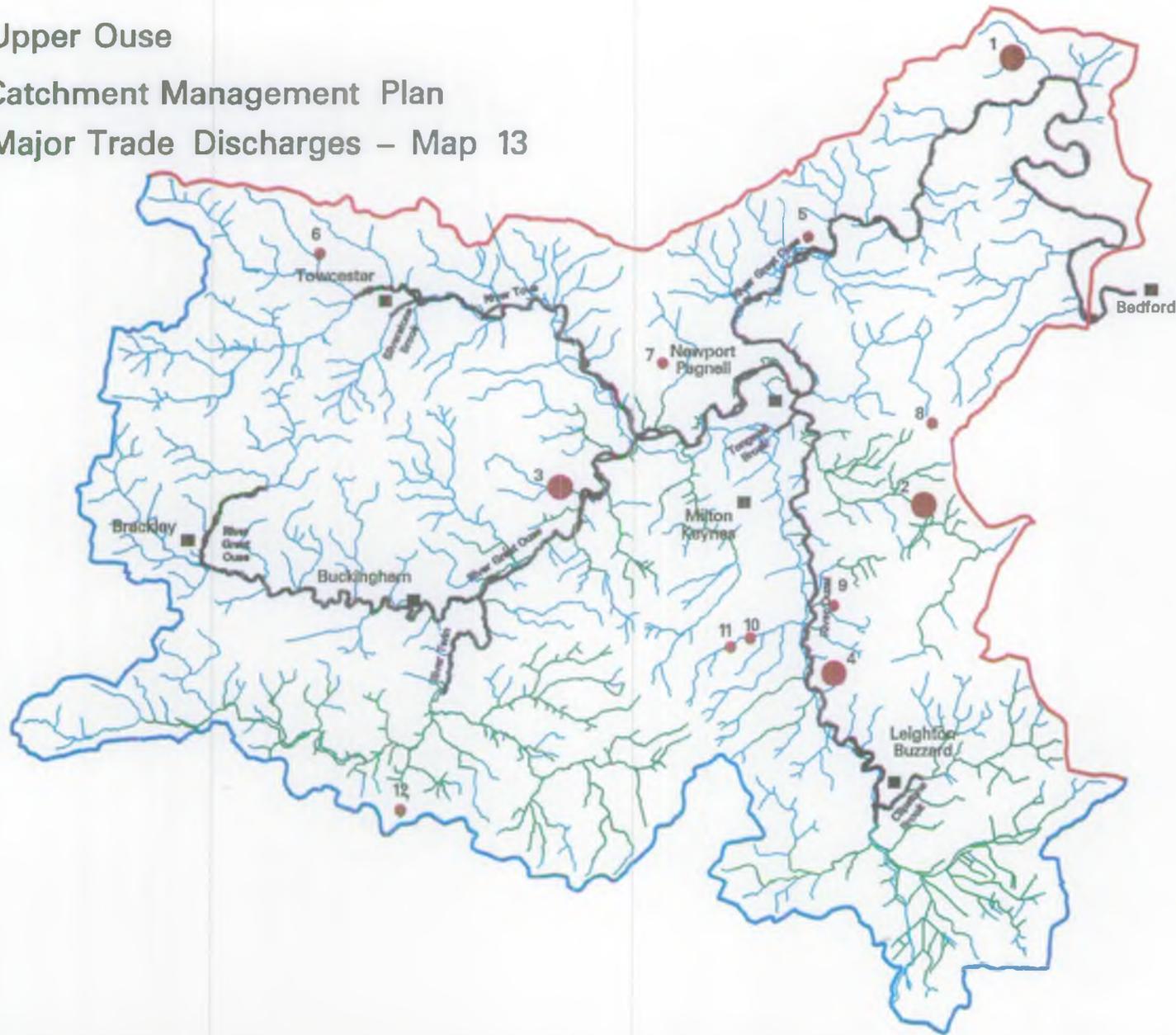
Private Sewage Treatment Works DWF >20 m³/d

- a. Seven Gables
- b. Horwood House
- c. Thornton College
- d. Hatton Court, Hanslope
- e. Broughton Lodge
- f. Globe Inn, Linlade
- g. Stockgrove Park School
- h. Ravenstone House
- i. Tyringham Clinic
- j. Cranfield University
- k. Gayhurst House

Upper Ouse

Catchment Management Plan

Major Trade Discharges – Map 13



KEY

-  Catchment Boundary
-  Region Boundary
-  Main River
-  Towns
-  IDB watercourse
-  Other watercourse



 > 1000m³/d

- 1 – Unilever Research
- 2 – Crayfish Farm Hulcote
- 3 – Harcros Pigments
- 4 – Orchard Mill Trout Farm

 < 1000m³/d

- 5 – Olney Tannery
- 6 – GEC Marconi, Caswell
- 7 – Foreign & Commonwealth Office
- 8 – BHRA Cranfield
- 9 – Reckitts
- 10 – Newton Longville Waste Disposal Site
- 11 – Newton Longville Waste Disposal Site
- 12 – Calvert Waste Disposal Site



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There are several other research institutes within the catchment which includes Cranfield University which has a consent to discharge 675 m³/d of fully treated domestic sewage and laboratory waste to the Chicheley Brook. The British Hydromechanics Research Association is situated on the University campus and also discharges treated trade effluent to the Chicheley Brook. Unilever Research at Sharnbrook has a consent to discharge 1136 m³/d of treated trade and domestic effluent to the Sharn Brook. Prior to discharging to the brook, the effluent passes through lakes within the grounds of Colworth House.

Intermittent and Diffuse Sources:

Modern agricultural techniques sometimes have detrimental effects on water quality if appropriate guidelines and best practices are not followed. This applies particularly to the intensive rearing of livestock, manufacture of silage, use of artificial fertilisers and the use of herbicides and pesticides.

Agricultural effluents from silage and intensive rearing of livestock are potentially highly polluting and prohibitively expensive to treat. For these reasons discharges to watercourses of effluent from agriculture are discouraged and disposal should be in accordance with the MAFF Codes of Good Agricultural Practice for the Protection of Water, Soil and Air. The Code should also be used in areas of arable farming where careful timing in the application of nitrates and pesticides is important. Heavy rainfall can result in nitrate and pesticide residues from arable farming being washed into rivers. Similarly, pesticides applied during wet periods or prior to heavy rain can result in river pollution at any time of the year.

See Section 5 Issue 13: Concentration of Pesticides on the River Great Ouse at Clapham

Until recently, the disposal of agricultural spray rinsings has often been to soakaways. This practice is no longer acceptable and application of rinsings to land or the use of treatment plants using carbon filtration is encouraged.

The Padbury and Claydon Brook areas are predominantly heavy clay. Consequently the land is prone to waterlogging and is therefore often underdrained. Because the land is more suitable for grass than arable crops, there is a high density of dairy and beef farms. If the farms have insufficient dirty water storage, effluent (from cattle) has to be disposed of to land when the fields are likely to be water logged. Surface water pollution may occur due to runoff through land drains or from the surface of the fields. The use of farm waste management plans is encouraged. These can help farmers to identify suitable areas of land for the application of farm waste.

Accidental spillages and surface water run off from industrial sites may have a significant impact on water quality. The occurrence of spillages can be reduced by pollution prevention measures and the NRA's programme of pollution prevention visits is intended to identify where improvements can be made. Site operators and developers are encouraged to protect water quality by providing adequate pollution

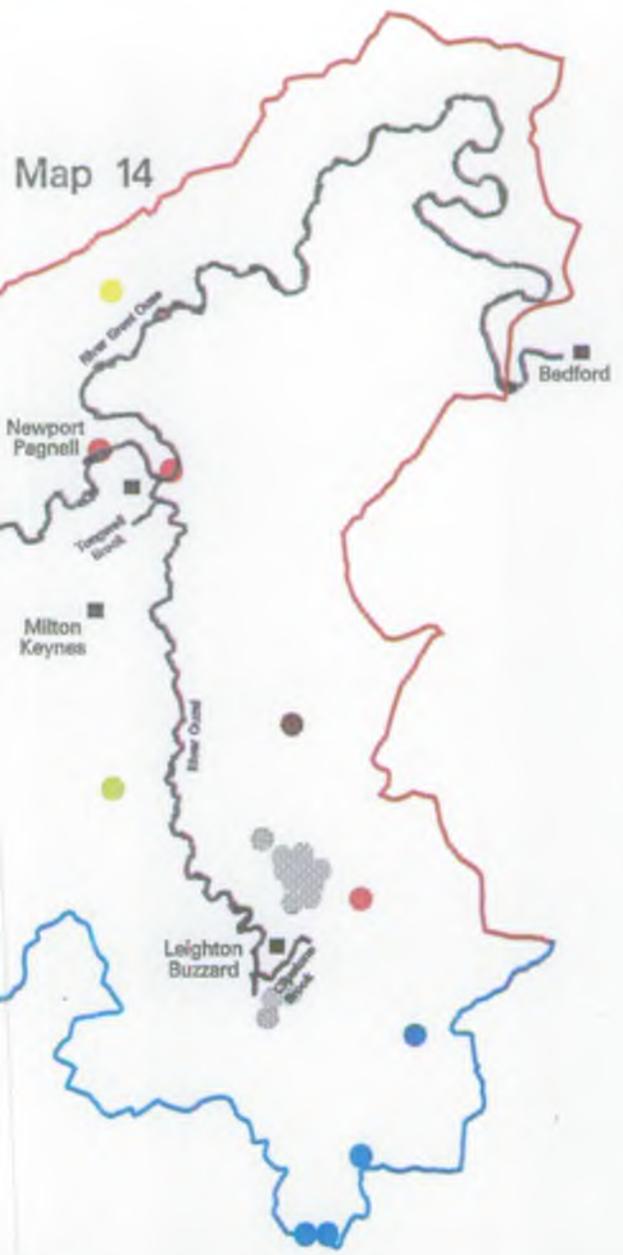
Upper Ouse

Catchment Management Plan

Active Mineral & Gravel Extraction Sites



Map 14



KEY

-  Catchment Boundary
-  Region Boundary
-  Main River
-  Towns



-  Fullers Earth
-  Chalk
-  Sand & Gravel
-  Greensand
-  Brickclay
-  Limestone



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prevention measures such as bunding oil and chemical tanks and the installation of oil interceptors where appropriate.

See Section 5 Issue 20: Oil Pollution Incidents

3.10 MINERAL EXTRACTION

3.10.1 General

Under the Water Resources Act 1991, dewatering of mineral workings is exempt from the need to obtain an abstraction licence. However, under Section 30 of the Act, the NRA can issue a "Conservation Notice" to the Mineral Extraction Company in order to conserve water in the dewatering process, but these powers are limited, and cannot be used to prevent mineral extraction.

Mineral extraction can affect both groundwater quantity and quality. It can restrict recharge to the sand and gravel strata and divert flow, hence interruption of existing rights to abstract might occur. Subsequent use of mineral extraction sites for landfill also poses a significant threat to groundwater quality.

All County Councils within the catchment have produced Mineral Plans as required under the Town and County Planning Act 1990, in accordance with Planning Policy Guidance Note 12. The NRA, as a statutory consultee, makes representation to any Mineral Plans.

3.10.2 Local Perspective

The majority of the 27 active mineral extraction sites in the Upper Ouse lie along the main river corridors of the Rivers Ouse and Ouzel (see Map 14). Most of the extraction is from sands and gravels (18 sites), particularly in the Heath and Reach and Leighton Buzzard areas.

Extraction of Chalk occurs in the Chilterns area bordering the south east corner of the catchment at Tottenhoe, Pitstone and Ivinghoe.

Quarrying of the Oolite takes place in the areas to the north of Bedford.

Clay, sands and gravels are extracted in the River Ouzel catchment, including brick clay. There is a Fullers Earth quarry at Aspley Guise.

Demand for aggregates reflects the economic climate. Although the NRA has issued "Conservation Notices" for dewatering at a number of sites in the past, there are none which are currently in force.

3.11 WASTE DISPOSAL

3.11.1 General

Land within the catchment may be used for waste disposal either by landfills or by spreading wastes directly onto the ground. Previously a policy of "dilute and disperse" was applied. Providing that the leachate generated would not adversely affect the use of an aquifer or watercourse, natural attenuation mechanisms were considered acceptable. However, as a result of a number of problems with "dilute and disperse" sites the emphasis has changed to "engineered containment" of wastes.

Protection of groundwater quality against discharges of dangerous substances is required by the EC Directive (80/68/EEC). Currently all new sites taking any potentially polluting matter must be engineered to contain and control leachate generation to protect all groundwaters. This is also required to meet the requirements laid down in the NRA's Groundwater Protection Policy.

The NRA is a statutory consultee on all activities that require a waste management licence. Licences are issued under the provision of the Environmental Protection Act 1990, in accordance with the new Waste Management Regulations that came into force in May 1994.

There is NRA involvement in waste disposal at three levels:

- On the Waste Disposal Plan which each County Council Waste Regulation Authority (WRA) is required to produce;
- On the Planning Application for individual sites; this allows consideration of the principle of a waste disposal activity at a particular location and includes aftercare considerations;
- On the Site Licence; this covers the operation of the site.

A wide range of operations require a licence; for example, transfer stations, waste storage facilities and scrapyards. All of which have the potential to pollute water.

In practice, any disposal site in use prior to 1972 could have taken virtually any type of waste as there was no control of dangerous wastes. The records of wastes disposed and the location of old sites are poor or non-existent.

Following the transfer of disposal responsibilities for domestic waste to the County Councils in 1974, waste disposal was concentrated in fewer large sites, and it is these that may pose a longer-term risk to water quality rather than the large number of small sites.

Disposal of sludges and slurries to land is controlled by a complex legislative framework. Operators are required to notify the WRAs of their intention to spread waste onto particular sites. The disposal of sludge from sewage and industry is

regulated by the 1994 Waste Management Licensing Regulations. Provided that the sludge is of "benefit to agriculture" and is within a maximum quantity they are exempt from licensing. Further controls are applied to sewage sludge from municipal sewage treatment works and these are subject to statutory provisions in the Sludge (Use in Agriculture) Regulations 1994, which is monitored by HMIP.

3.11.2 Local Perspective

Map 15 shows the waste disposal sites within the catchment.

Currently, the main sites for the disposal of domestic waste are at Calvert and Newton Longville in Buckinghamshire. Both sites are licensed to take special wastes.

In addition to these, there are a large number of sites spread throughout the catchment, licensed as smaller domestic waste sites, inert waste sites, scrapyards and transfer stations.

There are also many closed sites within the catchment which pose a lower, but still significant threat to local groundwater resources. The risk is very much dependent on the hydrogeology and rock type beneath the sites. This varies considerably throughout the catchment and ranges from low permeability blue clay to highly permeable sands and gravels and fissured chalk.

A major waste disposal site has been proposed by Castle Cement at their chalk quarry at Pitstone, within the Chiltern Hills. The planning application was rejected and an appeal by Castle Cement has been lodged. The outcome of the appeal is unknown at the time of writing. The NRA is supporting the County Council objection to this waste site.

See Section 5 Issue 25: Pitstone Cement Quarry

3.12 LANDSCAPE AND ARCHAEOLOGY

3.12.1 General

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

This includes specific duties with respect of areas formally designated as being of value, eg, Areas of Outstanding Natural Beauty and Scheduled Ancient Monuments. In addition, the NRA also has a general duty to protect areas which although valuable in landscape or archaeological terms are not formally protected. There include a number of non-statutory archaeological sites found in the catchment.

3.12.2 Local Perspective

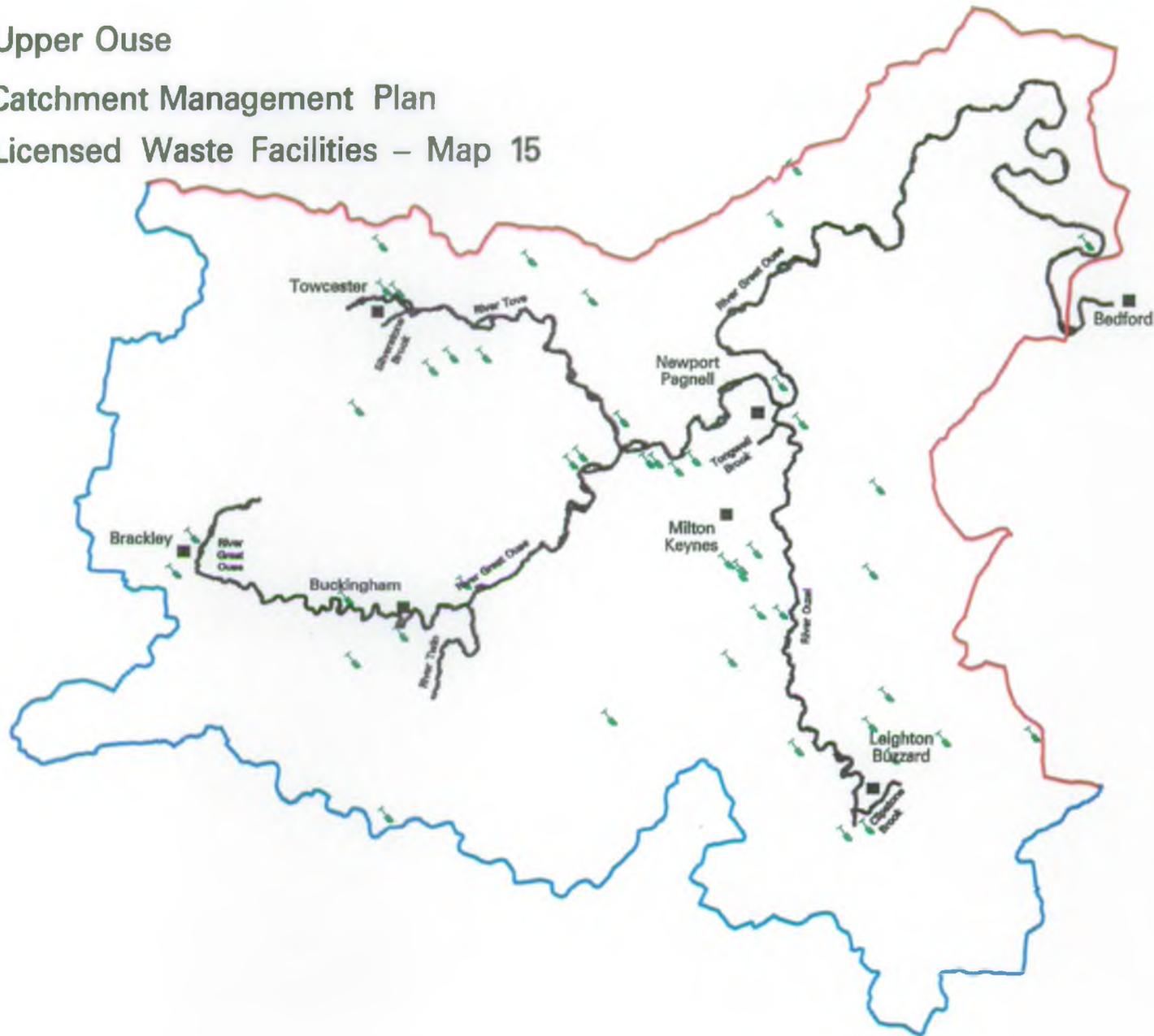
Within the catchment there are 48 water-related sites designated as Scheduled Ancient Monuments. (SAM). The location of the SAMS within the catchment are shown on Map 16.

The archaeological sites most affected by the work of the NRA are those sensitive to changes in ground water level or those within the river itself, eg, the Paved Ford on the Great Ouse at Kempston (NGR TL017477) which comprises of slabs and wooden piling on the river bed. Other sites affected include those which may become dry if water tables are reduced in any way.

Upper Ouse

Catchment Management Plan

Licensed Waste Facilities – Map 15



KEY

-  Catchment Boundary
-  Region Boundary
-  Main River
-  Towns
-  Licensed Waste Facilities

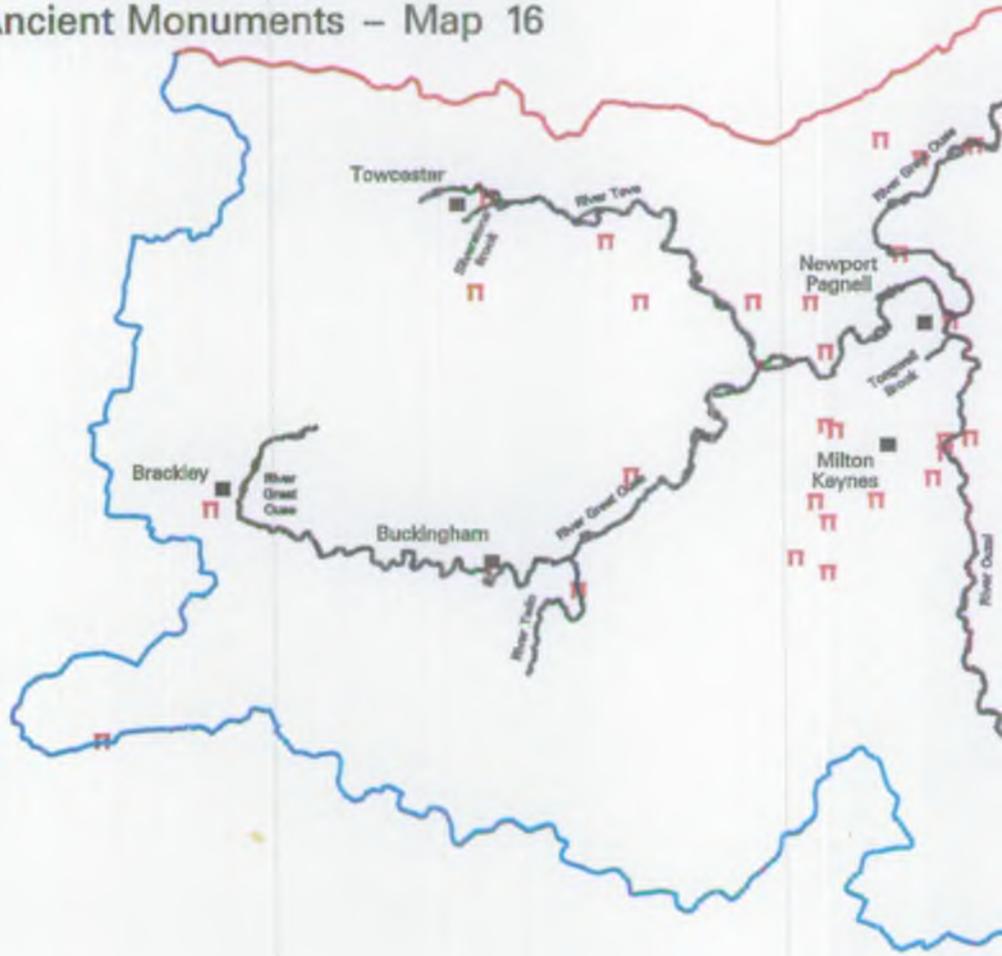


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Upper Ouse
Catchment Management Plan
Ancient Monuments – Map 16





KEY

-  Catchment Boundary
-  Region Boundary
-  Main River
-  Towns



-  Water Related Ancient Monuments



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3.13 ANGLING AND COMMERCIAL FISHING

3.13.1 General

This relates to the recreational use of the fishery.

3.13.2 Local Perspective

This catchment supports predominantly riverine coarse fisheries with a small amount of syndicate water being used for brown trout river fishing. The catchment also provides a wide array of stillwater angling opportunities for both coarse fish and stocked trout. The major coarse and trout fisheries are shown on Map 17.

Riverine trout fishery is restricted to the narrower upstream sections of the River Great Ouse between Water Stratford and Radclive, although this is mainly restricted to private syndicates.

Organised coarse fishing on the River Great Ouse begins at Buckingham where the water is controlled by Buckingham and District Angling Association. Because of the narrow nature of the channel, angling is usually undertaken from just one bank. The characteristic riffle and pool nature of the channel means that angling catches in the upper sections of the Great Ouse are dominated by chub, roach, dace and pike with an occasional shoal of common bream in the deeper slower flowing areas. As the river widens towards the centres of population of Milton Keynes and Newport Pagnell, organised fishing takes place from both banks with popular clubs including Deanshanger Angling Club, The Milton Keynes Angling Association and Newport Pagnell Fishing Association. Popular species on this area again include roach, dace and chub but there is also considerable interest in the recently increased stocks of barbel.

Between Newport Pagnell and Bedford the River Great Ouse meanders through a fairly sparsely populated rural area yet because of the excellent habitat and healthy fish population, the majority of the riverbanks are fished both by smaller village clubs as well as larger clubs from further afield such as Luton and Northampton. These waters have been particularly popular in the more recent years with specimen barbel anglers who have taken fish to 14lbs, although stocks of chub and roach are also particularly healthy.

One problem seasonally encountered on this reach is the abundant growth of both marginal emergent reeds and in-stream macrophytes during summer which can make angling difficult. Weedcutting activities are currently limited as this river is not maintained as a statutory navigation. The lower reaches of the Padbury Brook are fished by Buckingham and District Angling Association with excellent sport for roach.

Towcester and District Angling Association control fishing rights on the River Tove which is popular between Towcester and Grafton Regis. This river produces some specimen perch, roach, chub and dace.

Upper Ouse
Catchment Management Plan
Angling – Map 17





KEY

-  Catchment Boundary
-  Region Boundary
-  Main River
-  Towns
-  IDB Watercourse



-  Lake Fisheries Coarse Fishing
-  Lake Fisheries trout fishing
-  Coarse fishing
-  Trout fishing
-  Grand Union Canal fished from towpath



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The River Ouzel is the other major tributary joining the Great Ouse at Newport Pagnell. Most organised angling takes place between Stoke Hammond and Newport Pagnell and catches include roach, chub, dace, pike, perch and bream.

Part of the Grand Union Canal flows through this catchment between Ivinghoe and Stoke Bruene and fishing rights are let by British Waterways. This watercourse, the most important fishing above Milton Keynes, is a popular venue for match fishing and numerous competitions take place.

Former gravel extraction sites provide a diversity of angling opportunities along the river valleys and these include Hyde Lane Lakes, Buckingham; the Linford Complex at Milton Keynes; Swan and Bailey Pits at Newport Pagnell, as well as pits at Emberton Odell and Radwell. The balancing reservoirs of Milton Keynes such as Willen, Furzeton and Teardrops are also very popular venues around this major centre of population.

Stillwater trout fishing takes place at a number of waters including Vicarage Spinney (Little Linford), Kingfisher Farm (Deanshanger), Alders Farm (Great Brickhill) and Church Hill Farm (Mursley).

There is no significant Commercial Fishing activity in this catchment.

3.14 THE WATER ENVIRONMENT AS HABITAT

3.14.1 General

This 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.

These habitats support a diverse range of plants and animals ranging from those species wholly dependent on open water to species which exploit river corridors and wetlands as valuable refuges. The maintenance and enhancement of species diversity in these areas will depend on the future management regimes balancing the level and flow needed to maintain wetland sites of interest, the "in river needs", and water quality.

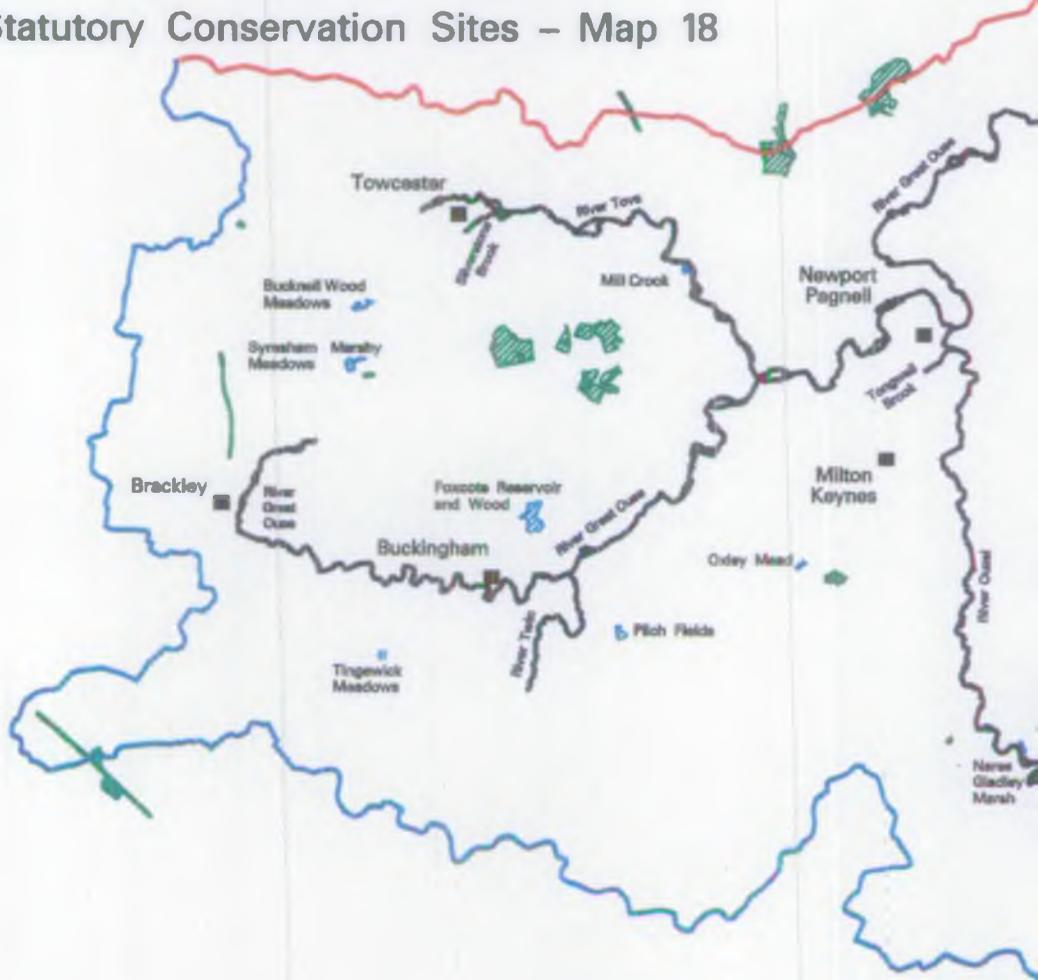
In terms of ecosystem conservation, the "in river needs" can be defined as the flow regime and the quality of water necessary for the conservation and enhancement of aquatic and riparian communities, to maintain the requirement for effluent dilution, and provide periodic erosive flows for flushing of silt from river beds.

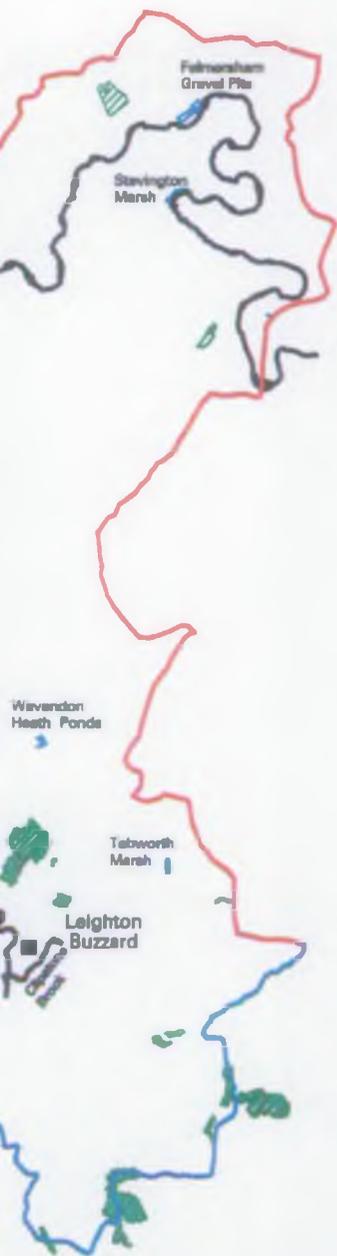
Wetland sites exist where the geomorphology, geology and land use allow a concentration of surface and groundwater flows and levels. The area that contributes groundwater to a wetland site is termed the wetland groundwater catchment area. The NRA is seeking to protect wetland sites of conservation interest by controlling future abstraction which would affect these areas.

Upper Ouse

Catchment Management Plan

Statutory Conservation Sites – Map 18





KEY

-  Catchment Boundary
-  Region Boundary
-  Main River
-  Towns



-  Wetland SSSI
-  Non-Wetland SSSI



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The NRA is specifically required to consult outside organisations where NRA work or consent is likely to impact on sites of high conservation value such as National Nature Reserves (NNR), County Wildlife sites (CWS), and Sites of Special Scientific Interest (SSSI).

3.14.2 Local Perspective

Freshwater Habitats

The catchment is predominantly clay leading to spate flows - (high flows during winter and low flows in the summer months).

The River Tove starts upstream of Towcester and joins the Great River Ouse above Milton Keynes. The meandering river is predominantly "glides" with a number of riffles and pools along its length. The river flows through mainly semi-improved or improved pasture with the associated problems of restricted marginal vegetation due to grazing livestock poaching the banks.

The margins are open with scattered shrubs and ancient decaying willows. Marginal vegetation is dominated by reed sweet grass and branched bur-reed whilst in channel vegetation includes water crowfoot and starwort.

The River Ouzel rises near Billington and joins the Ouse at Newport Pagnell. A meandering river - predominantly glides with riffles and pools. River flows for the majority of its length through improved and semi-improved pasture land. Open river margins with scattered scrub dominate.

The narrow marginal fringe is dominated by branched bur-reed, sweet reed grass and water forget-me-not. In channel vegetation includes arrowhead foals watercress and unbranched bur-reed.

The Padbury and Claydon Brooks meet at Padbury and join the Great Ouse downstream of Buckingham. These meandering watercourses with shallow riffle pool sequences become wider and deeper towards their confluence with the Ouse. The main land use in the area is improved or semi-improved pasture, with occasional arable. The uppermost reaches of Claydon Brook have lengths of scrub adjacent to the watercourse, elsewhere however margins are open.

Marginal vegetation is predominantly sweet reed grass and reed canary grass and on Padbury Brook the in river vegetation includes milfoil and water dropwort.

Clipstone Brook flows through Leighton Buzzard to join the River Ouzel. Amenity grassland and housing developments are found on either side. Marginal vegetation included branched bur-reed and reed canary grass.

The Great Ouse rising upstream of Brackley to Newport Pagnell is a meandering riffle pool sequence. Downstream of this habitat becomes less diverse and the river widens significantly. The river predominantly flows through semi-improved or improved

pasture with the occasional woodland, arable and urban area. Throughout Bedfordshire, the River Great Ouse is listed as a County Wildlife Site.

The NRA undertakes fish population surveys, on a three year rolling programme, of all the important river fisheries, as an assessment of the fish stock in its own right and as indications of environmental quality. A total of 24 species of fish have been recorded within the Upper Ouse Catchment.

The catchment contains 33 SSSI's, 15 of which are wetland dependant. The location of these Statutory Conservation Sites, including SSSI's are shown on Map 18. The catchment also contains numerous County Wildlife Sites.

3.15 NAVIGATION, BOATING AND IMMERSION SPORTS

3.15.1 General

The legal framework under which NRA exercise its powers as navigation authority is given in the Anglian Water Authority Act (1977). Recreational byelaws are also made under this act to regulate matters such as boat registration, boat safety and speed limits.

The use "Boating and Immersion Sports" deals with water based recreational activities such as sailing, canoeing, rowing, water skiing and swimming.

The NRA discourage swimming in all rivers, primarily because of the risk of drowning, but also because of the possibility of contracting water borne diseases. It is also recommended that those involved in any watersport, take sensible precautions to avoid such diseases.

The NRA acknowledges the existence of the Zone One Strategy report for Water Recreation, prepared by the Eastern Council for Sport and Recreation, which covers a small part of this catchment.

3.15.2 Local Perspective

There is no statutory right of navigation upstream of Kempston on the River Great Ouse nor any of the other rivers within this CMP area. The only statutory navigation is on the Grand Union Canal between Stoke Bruene and Ivinghoe which is popular with pleasure cruisers and narrow boats and is managed by British Waterways.

See Section 5 Issue 31: Canal River Link, Issue 32: Public Right of Navigation at Felmersham

Water-based recreation within the Upper Ouse largely takes place on former mineral extraction sites along the river valley or within specially designed surface-water

balancing lakes in Milton Keynes. Here, South Willen lake south of the River Ouzel supports a popular sailing club and a small amount of water skiing takes place on other lakes within Milton Keynes.

A low level of canoeing has historically taken place on the River Great Ouse between Newport Pagnell and Bedford although this activity requires the consent of riparian owners as on any other non-statutory navigation. There are no known sub-aqua groups using still waters within this area.

See Section 5 Issue 33: Boating access upstream of Bedford
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3.16 RECREATION AND AMENITY

3.16.1 General

Navigation, boating and angling are major recreational activities and are covered elsewhere in this plan. This use deals with other recreational and amenity facilities such as walking, horse riding, caravanning, camping and tourism on sites of interest within the water environment and on land owned by the NRA.

The NRA's principal aim in relation to recreation is:

- to develop the amenity and recreational potential of inland waters and associated lands.

Legal duties under the Water Resources Act (1991) include the duty to promote amenity and recreational use and to incorporate, where possible, recreational facilities into programmes resulting from the requirements of other NRA functions.

3.16.2 Local Perspective

All of the local authorities within this catchment promote tourism, some of which may be indirectly linked to the Water Environment. This is particularly true around the major centre of population in Milton Keynes where access is encouraged to a wide array of areas managed by the Milton Keynes Parks Trust and includes footpaths close to rivers and water meadows along the River Great Ouse, Ouzel and the Grand Union Canal where the towpath provides both a long distance footpath and numerous circular walks. A popular riverside caravanning park is found at Cosgrove close to the confluence of the River Great Ouse and River Tove and other riverside Country Parks with open public access include Emberton Country Park and Harrold and Odell Country Park on the River Great Ouse, both of which are popular for walking and bird-watching.

Former mineral extraction pits at Linford have also become a popular site for visitors

to the Wildfowl Centre and parts of this complex have also been developed for angling.

There is presently no long distance footpath along the River Great Ouse in this area. However, there are considerable numbers of routes close to large centres of population that follow waterside routes, particularly around Milton Keynes. The Eastern Region Sports Council Water Recreation Zone 1 Report recognises opportunities to improve links between Leighton Buzzard and the Grand Union Canal towpath with additional footbridges over the River Ouzel.

3.17 HYDROPOWER

Hydropower constitutes a non-polluting source of renewable energy and its further development will assist in reducing harmful gaseous emissions. In support of the Government's policy to enhance the use of renewable energy sources, the NRA encourages the use of hydropower and aims to cooperate with the developer in accordance with its duties, powers and available resources. One of the NRA's aims is to manage water resources to achieve the right balance between the needs of the environment and those of the abstractors. Therefore, it is necessary that the NRA considers the range of potential impacts that may arise from hydropower development, some of which may be significant. These will be considered by the NRA when it is approached about a scheme.

In order to fulfil its duties, it is necessary for a promoter to provide the NRA with adequate technical information so that the impact of a proposed scheme may be assessed in terms of water resources, water quality, flood defence, land drainage and the general water environment. Although a wide range of issues need to be taken into account in the promotion of a hydropower development, the NRA will do its utmost to match the level of effort required to the significance of the proposed installation upon the water environment.

The NRA and the relevant local planning authority should be contacted at an early stage to discuss whether a proposal is likely to be acceptable and how the necessary information should be prepared so that adequate account can be taken of all relevant factors.

There has been no hydropower development in this catchment to date. Due to the number of Mill sites and other structures (see Map 7), there is deemed to be some potential (although small) for the development of this use.

SECTION 4
NRA OBJECTIVES & STATUS

4.0 INTRODUCTION

This section describes the current state of the water environment in the catchment resulting from the use made of it and the NRA's activities within it. It is assessed against the NRA's objectives in managing the water environment. The shortfalls between the current state and the objectives are identified as issues which may need to be addressed in the future management of the catchment.

4.1 FLOOD DEFENCE OBJECTIVES

The NRA aims for flood defence are to:

- Provide effective defence for people and property against flooding from rivers (and the sea);
- Provide adequate arrangements for flood forecasting and warning.

The NRA has commissioned a review of flood defence standards of service for Main River (and Sea Defence) while existing maintenance standards are based on historically determined criteria return periods and frequencies. This review will assess "Land Use" by considering agricultural or urban content within the flood plain along lengths of river divided into 4-7 km reaches. For each element (eg, road, house, grazing) a score is given, with the score measured by a single unit called a "House Equivalent" and by the score achieved, the reach is placed into one of several Land Use Bands to guide assessment of priorities when determining maintenance programmes. This review will, therefore, influence maintenance requirements for the future and provide a rational basis for future flood defence priorities.

The NRA has identified areas of inadequate flood protection level which will be considered for improvement subject to the recommendations covered within the 1993 MAFF Strategy for Flood Defence in England and Wales. This strategy prescribes that improvement schemes are appraised on the criteria of technical, environmental and economic soundness. The MAFF Indicative Standards of Protection are used in conjunction with National Rivers Authority Target Levels of Service to determine standards of design (see appendix B). Maps 19 and 20 show existing and target protection levels.

Flood defences do not provide absolute protection, but alleviate flooding up to a particular level of severity. The standard of protection provided normally relates to the land use of the area concerned, where urban defence attracts a high priority.

The detailed objectives for this activity are:

- To provide effective defence for people and property against flooding. The standard of protection to be appropriate to the land use, where this is economically viable;
- To control development and works in or adjacent to the Main River in accordance with the NRA's Flood Defence byelaws such that the risk of flooding is not increased;

- To ensure that the river topography remains suitable for the efficient passage of high flows and that control structures are adequately operated and maintained (for both flood and normal flows);
- To provide adequate arrangements for flood forecasting and warning; and,
- To carry out maintenance in Main River where necessary to protect people and property to the appropriate standard.
- To carry out flood defence works with reference to the environmental needs and requirements.

4.2 FLOOD DEFENCE STATUS

4.2.1 Flood History

Historical flooding in this Catchment (see Map 8) has affected urban housing, industrial sites, roads and agricultural land that lie within the natural flood plain of watercourses.

The most serious flood events on statutory main river occurred principally during:

March 1947 - Highest ever recorded flood event, November 1974, December 1979, April 1981 and more recently, the September 1992 intense rainfall event in the southern section of the Catchment, caused property flooding in both Leighton Buzzard and Newport Pagnell.

Various improvement works have been undertaken to both control structures and river channel since 1947. In recent years flood protection schemes have been undertaken in Towcester and Buckingham during the 1970's and 80's to reduce the incidence of flooding for these towns.

4.2.2 The Continuing Flood Risk

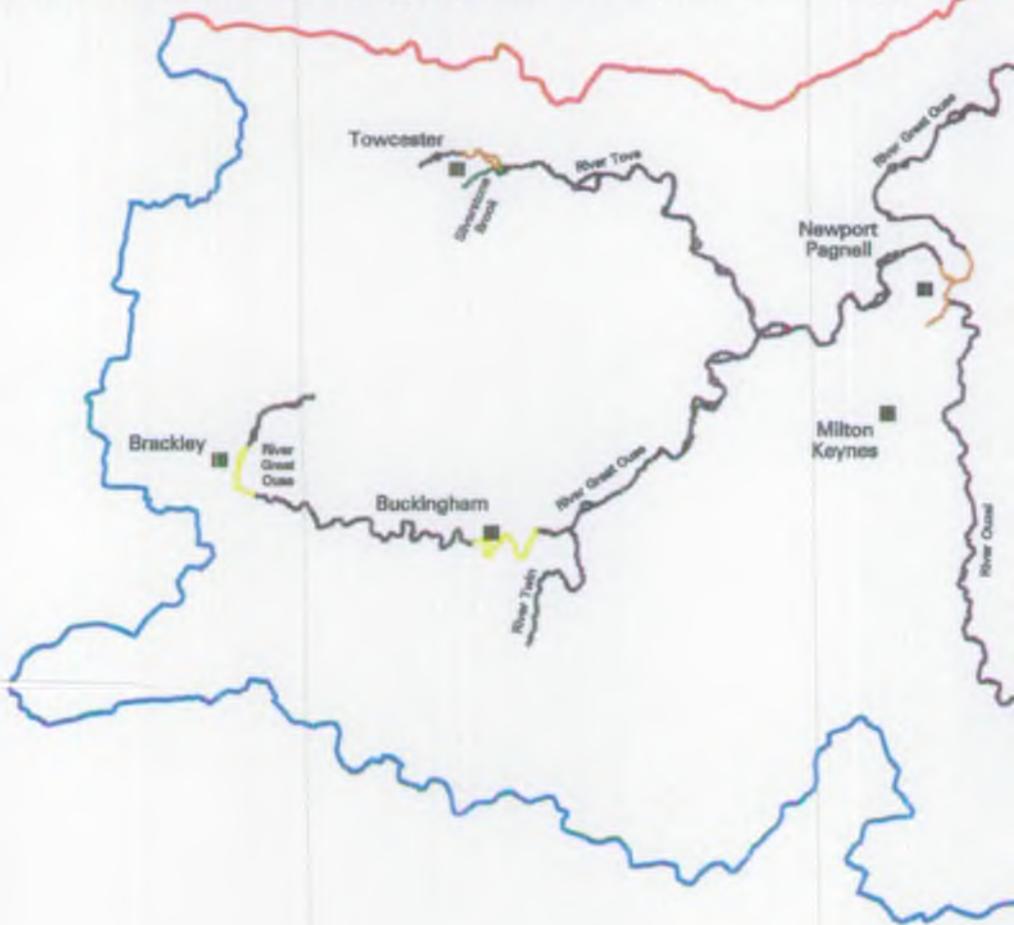
Since the major floods of 1947, some structures have been enlarged/replaced with corresponding improvements in channel capacity where necessary. These improvements offer an enhanced level of flood defence up to certain economic return periods, but do not remove entirely the risk of flooding, ie, schemes which protect urban conurbations to a return period of say 50 years should be considered still to have a medium risk of flooding, whilst a 100 year scheme will present a low risk.

The flooding difficulties experienced in Leighton Buzzard and Newport Pagnell during September 1992 have been investigated by consultants, who will produce a feasibility report, if possible, identifying any economic engineering options to alleviate the flooding. However, for an improvement scheme to be successfully promoted, it must first meet defined cost to benefit ratios specified by the MAFF.

Upper Ouse

Catchment Management Plan

Flood Defence Existing Levels of Service – Map 19





KEY

- Catchment Boundary
- Region Boundary
- Towns



Levels of Service

- < 10 Years
- 10 - 20 Years
- 20 - 50 Years
- 50 - 100 Years



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See Section 5 Issue 1: Flooding in Newport Pagnell,
Issue 2: Flooding in Leighton Buzzard

The recent investigations of flooding within Leighton Buzzard indicate that additional run-off is being directed into the upper reaches of the River Ouzel beyond the end of main river. Depending on the scale of this additional in-flow, it may have an adverse effect on the present flood risk areas within Leighton Buzzard. Further evaluation is therefore required to establish the consequences of this situation.

See Section 5 Issue 3: Increased Surface Water Discharge into the Upper Ouzel

The flood plain is an essential element of the overall river system within the Catchment to convey flood flows. In a major event, water is "stored" temporarily in the flood plain thereby decreasing peak flows downstream. Overall it cannot be overstated the importance of retaining the natural size of flood plains, otherwise flood risk sites will increase in both area and number.

See Section 5 Issue 4: River Maintenance Standards,
Issue 5: Flood Defence & Conservation

In order to sustain the present state of the Catchment's flood defences, it is necessary to continue an established programme of maintenance works. This regime of maintenance works is kept under constant review in order to overcome possible conflicts of interest between the need to maintain both a robust defence and sensitive conservation interest.

4.2.3 Future Maintenance and Management

The NRA is close to completing the regional Standards of Service exercise which is expected to be made available during 1996, this will allow a reassessment of maintenance priorities and improve identification of flood defence needs.

The better clarification of flood defence needs will improve the decision making process regarding the ideal balance of priorities between conservation and flood defence interests. This will change present maintenance regimes towards a focus on urban and industrial areas as the main flood defence priority.

There are several afforestation initiatives on land adjacent to the river corridor being proposed by local conservation and wildlife organisations. Where these proposals coincide with the flood plain, careful evaluation and sympathetic design will be required to avoid adverse impacts on areas of flood risk and standards of service.

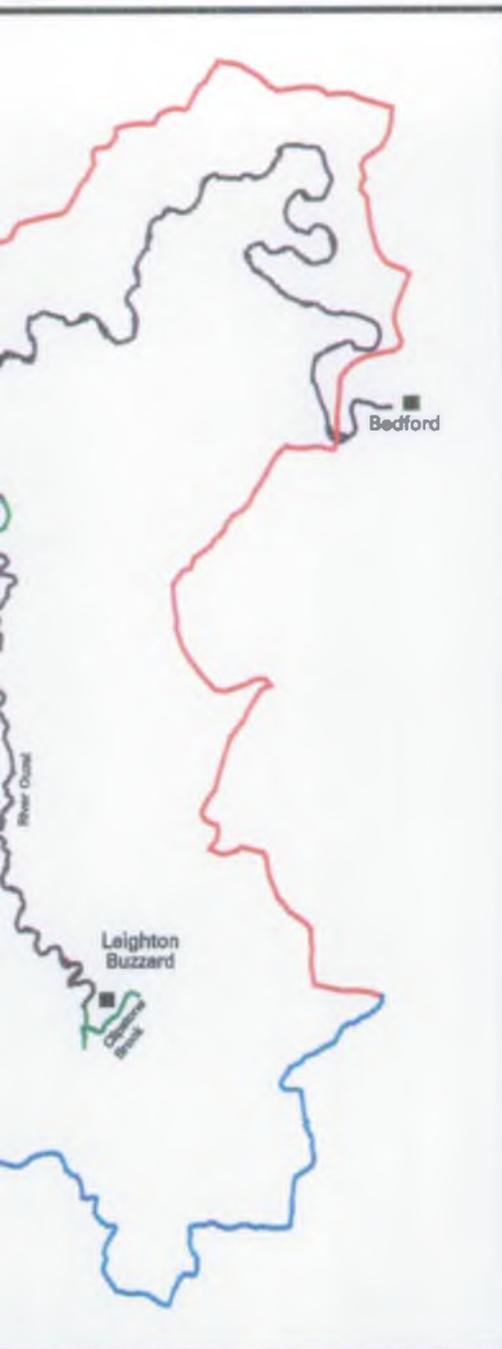
See Section 5 Issue 6: Maintaining the Flood Plain

Upper Ouse

Catchment Management Plan

Flood Defence Levels to be achieved – Map 20





KEY

— Catchment Boundary

— Region Boundary

■ Towns



Levels of Service to be achieved

- < 10 Years
- 10 - 20 Years
- 20 - 50 Years
- 50 - 100 Years



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Inspection of river control structures have revealed that several structures are potentially reaching the end of their asset life. If historical retention levels are to be maintained for recreation, fishing, mill heads, water fences and abstraction, replacement/refurbishment will be required for Turvey, Lavendon, Ravenstone Sluices and Harrold Weir to maintain levels of service.

See Section 5 Issue 7: River Control Structures

Within urban areas watercourses both main river and non-main river are suffering increased levels of littering and dumping, eg, shopping trolleys. If unchecked, this will lead to obstructions in flow of the watercourses and cause localised flooding.

See Section 5 Issue 8: Litter on urban watercourses

The Catchment contains the River Ouse fluvial warning site at Newport Pagnell, which is linked by telemetry to a modern flood warning system which provide warnings downstream of Newport Pagnell. This site is supported by additional upstream and tributary gauging stations allowing additional evaluation of fluvial events in the upper reaches of the Catchment.

There is an increasing number of non-main river urban flooding difficulties that have been brought to the Authority's attention, ie, Tiffield, Thornborough and, Ravenstone, the necessary powers to carry out works lie with the Local Authorities, but with reduced levels of available public money relief for these locations may be seriously delayed. Internal Drainage Boards may also be involved with relief of flooding within their administrative areas.

See Section 5 Issue 9: Non-Main River Flooding

4.3 SURFACE WATER QUALITY OBJECTIVES

The NRA National Aim for surface water quality is to *achieve a continuing overall improvement in the quality of rivers, estuaries and coastal waters, through the control of pollution.*

Until recently the Anglian Region has assessed water quality using the following criteria:

- Compliance with relevant EC Directives;
- National Water Council (NWC) scheme;
- Compliance with non-statutory River Quality Objectives (RQO); and,
- Biological target classes.

EC Directives set standards for relevant parameters which the Directives seek to control, for example, the Surface Water Directive (abstraction for drinking water), Fisheries Directive (protection of fish) and Dangerous Substances Directive. The government is responsible for ensuring compliance with these standards.

In order to ensure that EC Directives are met and water quality is maintained and where necessary improved, the Department of the Environment has published proposals for a statutory scheme of Water Quality Objectives (WQO).

The WQO scheme establishes clear quality targets to provide a commonly agreed planning framework for regulatory bodies and discharges alike. The proposed WQO scheme is based on the recognised use to which a river stretch may be put. These include:

- River Ecosystem;
- Special Ecosystems;
- Abstraction for Potable Supply;
- Agricultural/Industrial Abstraction; and,
- Water Sports.

The standards defining the five-tiered River Ecosystem (RE) use classes, which address the chemical quality requirements of different types of aquatic ecosystems, were introduced by the Surface Waters (River Ecosystem) (Classification) Regulations 1994. The criteria used in the RE classes are shown in Appendix B. Although the classes do not refer to fish, the following descriptions may be helpful to gauge target water quality:

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

Standards for the further uses are still under development.

For the rivers in this plan, WQOs are being used alongside EC Directives, and Regional RQOs for those components of the DoE scheme which are still being developed. For each stretch of river, a target RE class has been assigned. The targets have been derived by translating existing RQO's and have taken into account planned investment in the catchment. These targets are considered achievable within the short to medium term (up to ten years). Map 21 shows the water quality targets for the catchment.

However, until WQO's become statutory, having been formally established by legal Notice served by the Secretary of State, they will be applied on a non-statutory basis.

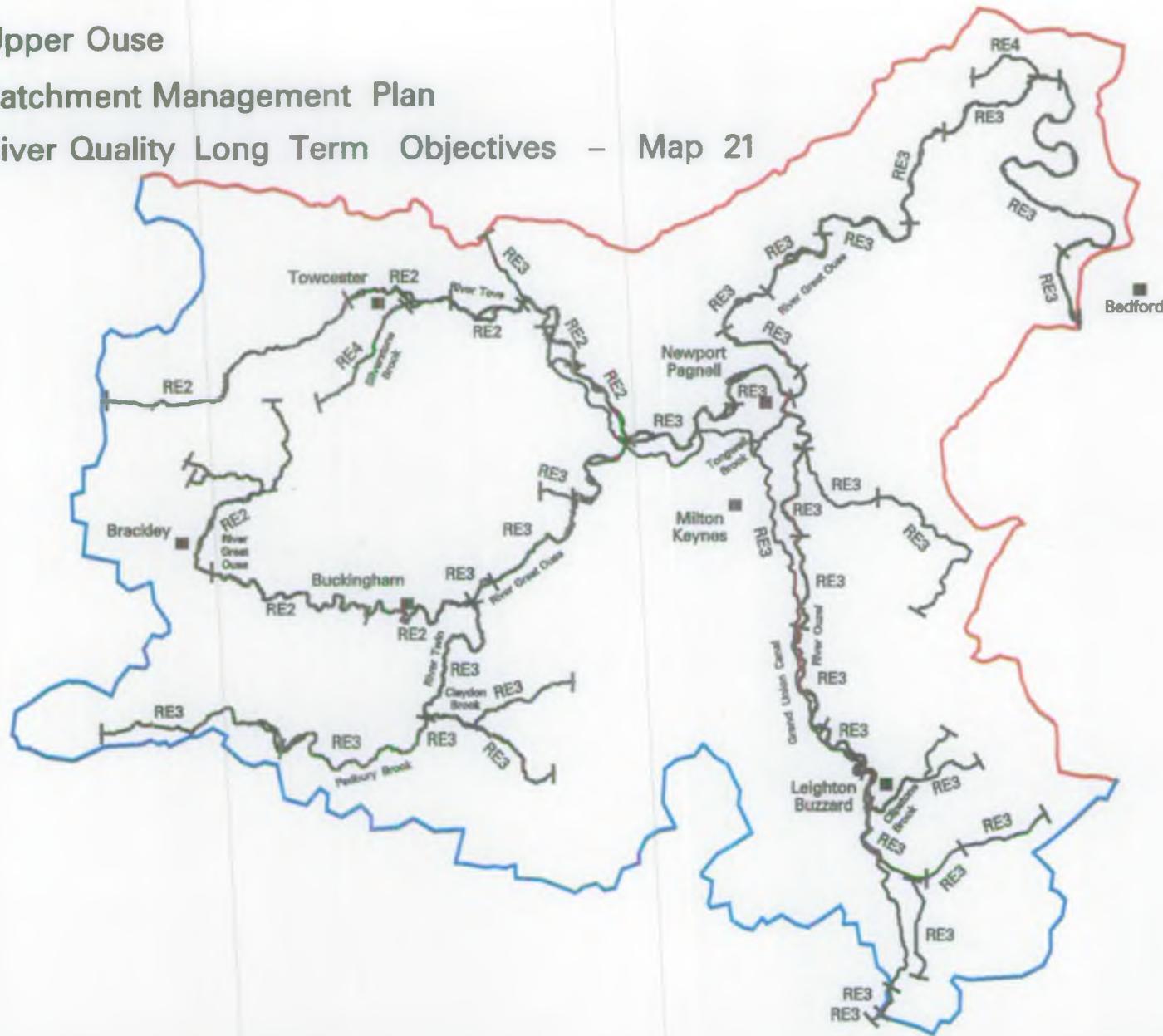
4.4 SURFACE WATER QUALITY STATUS

Map 21 shows the long term objectives for water quality. The objectives are derived from existing EC Directives, proposed Water Quality Objectives (WQO's) and River Quality Objectives (RQO's). An assessment of current quality has been made by considering three years data (1992-1994 calendar years). An allowance has been made for the effects of algal BOD in some stretches. The current quality has then been compared with long term objectives and compliance with long term objectives is shown on Map 22, which identifies the stretches as compliant, marginal failure or significant failure.

There are no reported failures of the EC Fisheries Directive or Dangerous Substances Directive. There have been failures of the EC Surface Water Abstraction Directive (75/440/EEC) for nitrates at Clapham Water Treatment Works intake in 1992 and 1995.

See Section 5 Issue 12: Exceedance of Nitrate Limits at Clapham abstraction,
Issue 14: Protection of Clapham WTW abstraction

Upper Ouse
 Catchment Management Plan
 River Quality Long Term Objectives – Map 21



KEY

- Catchment Boundary
- Region Boundary
- Towns



RE4 River Ecosystem Class



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River Ouse: Headwaters to Newport Pagnell (confluence with River Ouzel)

The river is of good quality and complies with REC 2 objective upstream of the confluence with the Padbury Brook and the REC 3 objective between the confluence with the Padbury Brook and confluence with the River Ouzel. Biological quality is generally good.

River Ouse: Newport Pagnell to Kempston

Water quality is fair to good and complies with REC 3 objective. Biological quality is excellent with the exception of one site at Harrold Bridge where biological quality is moderate, the reason for which is thought to be due to the scouring effects of high flows. Nitrate concentrations at Clapham water treatment works river intake fails to comply with the limit of 50mg/l under the EC Surface Water Abstraction Directive (75/440/EEC).

River Tove: Headwaters to Cosgrove Park (confluence with River Great Ouse)

The River Tove, upstream of Towcester is of good quality and complies with REC 2 objective. The middle reaches, downstream of Towcester from Towcester STW to Castlethorpe is of fair quality but fails to meet REC 2 target for dissolved oxygen. The stretch from Castlethorpe to the confluence with the River Great Ouse complies with the REC 2 objective. Routine invertebrate sampling on the River Tove has indicated generally good to excellent quality.

See Section 5 Issue 15: Failure to meet target on River Tove

Padbury/Claydon Brook: Headwaters to River Great Ouse

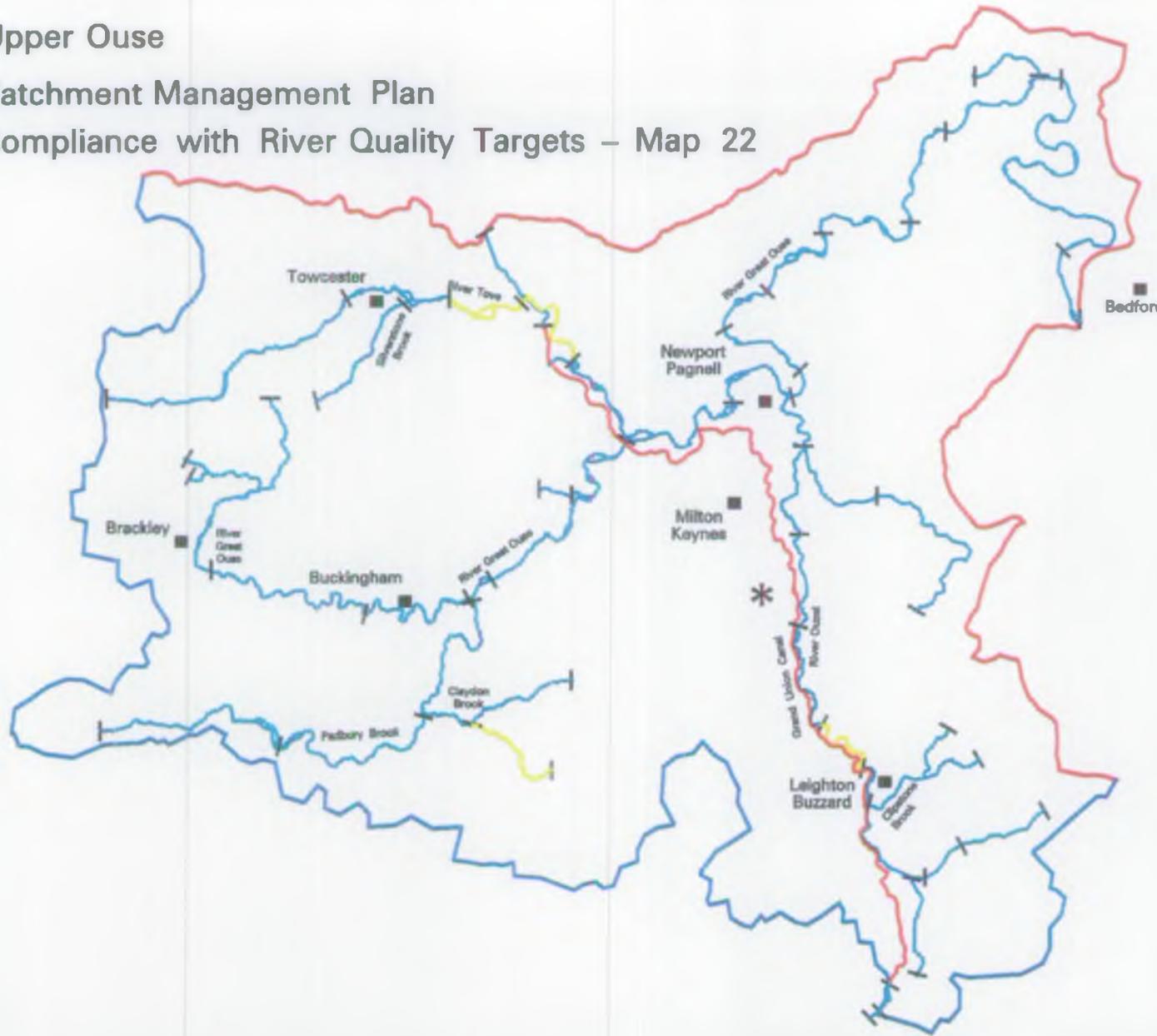
Routine monitoring of the Padbury Brook shows good water quality and compliance with REC 3 objective. Biological quality is good. The upper reach of the Claydon Brook is of fair water quality but marginally fails to meet the REC 3 objective for Dissolved Oxygen. However, biological quality on the Claydon Brook is good to excellent. The lower reaches of the Claydon Brook, after the confluence with the Horwood Brook, is fair quality and complies with the REC 3 objective.

See Section 5 Issue 16: Failure to meet target on Claydon Brook

River Ouzel: Houghton Regis to Newport Pagnell (confluence with River Great Ouse)

Water quality is fair and generally complies with the REC 3 objective. The only exception is a 4.5km stretch downstream of Leighton Buzzard to Stapleford Mill, which marginally fails for Biochemical Oxygen Demand (BOD). Biological quality in the tributaries of the River Ouzel is generally moderate whereas the main River Ouzel is good to excellent quality.

Upper Ouse
 Catchment Management Plan
 Compliance with River Quality Targets – Map 22



KEY

- Catchment Boundary
- Region Boundary
- Towns



- Significant Failure
- Marginal Failure
- Compliant

* An allowance has been made for algal BOD along the Grand Union Canal



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See Section 5 Issue 17: Failure to meet target on River Ouzel

Grand Union Canal: Marsworth to Blisworth

Water quality is fair. The Grand Union Canal from Marsworth to Great Seabrook and from Grafton Regis to Blisworth complies with REC 3 objective. The intermediate stretch between Great Seabrook and Grafton Regis significantly fails REC 3 objective for dissolved oxygen. However, recent biological surveys have indicated good quality for the entire length of the Grand Union Canal. *An allowance has been made for algal BOD which affects the measurement of water quality in the summer time.*

See Section 5 Issue 18: Failure to meet target on the GUC

Foxcote and Grafham Reservoirs: Designated Sensitive Area (Eutrophic)

Foxcote and Grafham Reservoirs were designated as Sensitive Areas (Eutrophic) under the UWWTD in 1994. As a consequence of these designations, phosphate removal is required at certain STWs serving a population greater than 10,000. The qualifying discharges where phosphate removal is required by 1998 are Brackley and Cotton Valley.

See Section 5 Issue 10: Algal Blooms at Foxcote Reservoir, Issue 11: Eutrophication of the Ouzel and Ouzel

4.5 GROUNDWATER PROTECTION OBJECTIVES

There are at present no general criteria for assessing groundwater quality, but the NRA is about to undertake work to define baseline water chemistry against which current quality may be compared. Where water is abstracted for potable supply many of the parameters in the EC Drinking Water Directive are used.

In order to ensure no unacceptable deterioration in ground water quality, the NRA introduced its Groundwater Protection Policy in December 1992. It provides a framework on which to build individual policies covering all types of threat to groundwater from point and diffuse sources, and by both persistent and degradable pollutants.

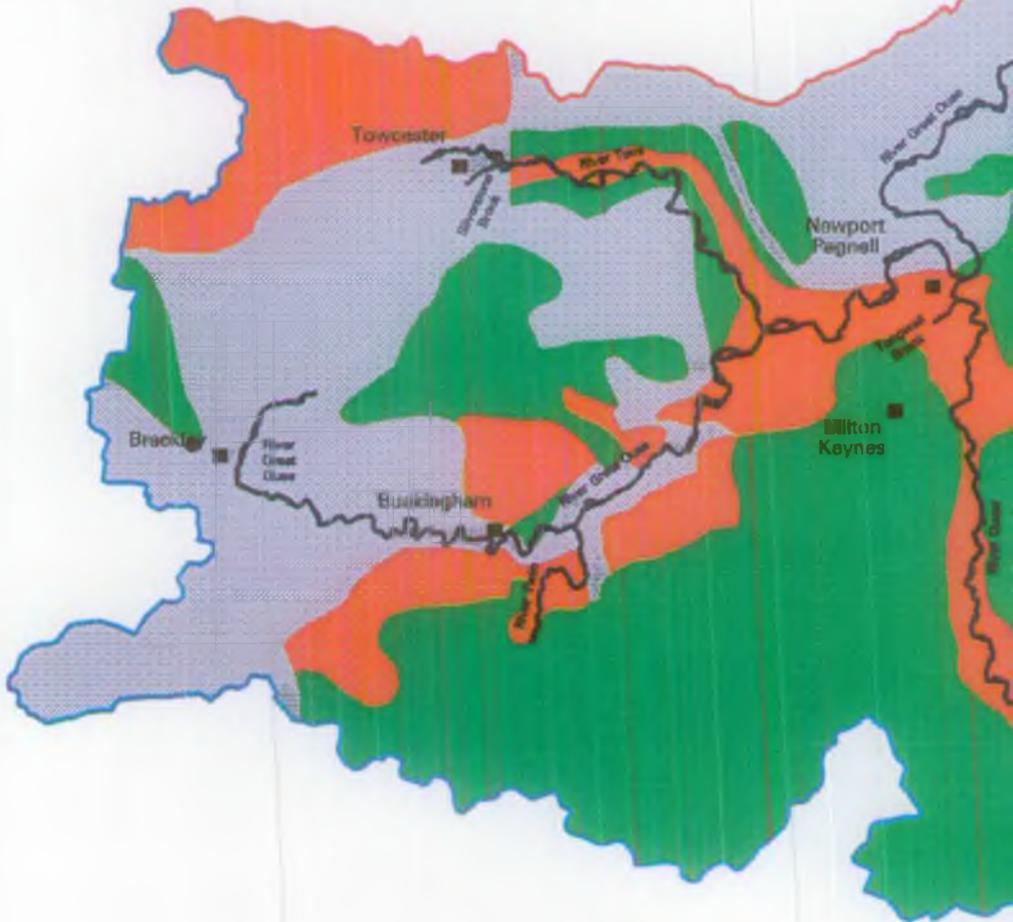
In particular, it sets three principal NRA National Aims:

- Ensure that all risks to groundwater resources from both point source and diffuse pollution are addressed within a common framework;
- Provide a common basis for decisions affecting groundwater resources within and between NRA regions;

Upper Ouse

Catchment Management Plan

Groundwater Vulnerability – Map 23





KEY

 Catchment Boundary

 Region Boundary

 Main River

 Towns



Aquifer

 Major

 Minor

 Non-aquifer

Public Water Supply

 Groundwater Sources

 Birchmoor Nitrate Sensitive Area

NB The River Lann, Charwell & River Great Ouse proposed Nitrate Vulnerability Zone covers much of the Catchment.



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- Encourage compatibility of approach between the NRA and other bodies with statutory responsibilities for the protection of groundwater.

The Groundwater Protection Policy also sets out detailed objectives which will achieve the principal aims and these cover the following aspects of groundwater protection:

- Physical disturbance of aquifers affecting quality and quantity
- Waste disposal to land
- Contaminated land
- Disposal of sludges and slurries to land
- Discharges to underground strata
- Unacceptable activities in the inner protection zone
- Diffuse pollution.

The various objectives are related to the risk posed by the activity at particular locations, thus maps are being prepared for the whole country identifying the vulnerability of major, minor and non-aquifers.

The aspects listed below are important considerations in terms of the identification of protection objectives in the region.

Source Protection Zones

The proximity of an activity to a groundwater abstraction is one of the most important factors in assessing the risk to an existing groundwater source. Source Protection Zones will be sub-divided into three zones of increasing risk for the aquifers and public water supply abstraction points shown on Map 25. The orientation, size and shape of these zones are determined by hydrogeology and abstraction practice.

The highest level of protection is within the Inner Source Protection Zone which is identified as all areas of land within a 50 day travel time of groundwater to the source subject to a minimum distance of not less than 50m from the source. The Groundwater Protection Policy identifies specific activities within this zone which will be opposed through the Town and Country Planning process.

Physical disturbance of aquifers

The NRA will seek to control physical disturbance, where appropriate, through its own licenses and consents. For activities outside the NRA's legislative framework the authority seeks to influence the proposals through its role as a statutory consultee under the Town and Country Planning process.

Waste disposal to land

The NRA is a statutory consultee of the WRAs and therefore liaises closely with these authorities to minimise the risk of pollution from landfills throughout the life of the site. It will seek to use the planning and waste licensing processes to regulate the post-operative and aftercare of the site.

Contaminated land

The NRA will seek appropriate controls to protect the water environment from redevelopment of contaminated land by liaison with Local Planning Authorities. The NRA will also liaise with HMIP to promote Integrated Pollution Control.

Disposal of sludges and slurries to land

The NRA will seek consultations with the relevant Authorities to ensure that spreading of these sludges does not result in pollution of surface or groundwater. It is essential, whether or not spreading is subject to statutory control that the operator always follows the MAFF "Code of Good Agricultural Practice for the Protection of Water". This code is voluntary at the present time.

Discharges to underground strata

Controls vary according to the nature and vulnerability of the aquifer and whether there are public water supply abstraction boreholes in the vicinity. The NRA will seek to control such discharges using its own legislative framework in conjunction with its role as a consultee to local planning authorities.

Diffuse pollution

This is pollution not attributable to a direct or point source and is therefore principally influenced by land use and land management.

The EC Nitrate Directive (91/676/EEC) requires the identification of groundwaters which have nitrate levels in excess of 50mg/l. The directive proposes to reduce water pollution by nitrates from agricultural sources. Plans to control the input of nitrate will then be required; including the introduction of statutory NVZs. Pesticide use also poses a risk of diffuse pollution. At present this can only be controlled by voluntary cooperation from pesticide users. The NRA will prepare and publish national and regional groundwater vulnerability maps and promote awareness of risks to groundwater amongst industry and agriculture. The NRA will also seek to have the concepts of groundwater vulnerability incorporated in the regulations and guidelines of other governmental and regulatory bodies, trade associations, and planning authorities.

4.6 GROUNDWATER PROTECTION STATUS

Groundwater quality throughout the catchment is routinely monitored from a network of Groundwater Monitoring boreholes. In addition, data collated by the water companies for public supply abstractions is also used to make assessments. The Chalk, Lower Greensand and Oolite provide a vital source of generally high water quality. However, it is susceptible to pollution which is very difficult to clean up. The alternative is to provide expensive treatment at the abstraction point.

At present groundwater protection zones (GPZs) have been defined for the sources which have high nitrate problems (see Map 24). Modelling of sites not subject to high nitrate will commence shortly and groundwater protection zones will be defined.

Waste disposal to land

This takes place at a number of locations in the catchment, as shown on Map 15. Waste disposal sites have the potential to contaminate both surface and groundwaters with leachate if not carefully managed. There are many old domestic sites within the area which were operated on the dilute and disperse principle which may pose a risk to local groundwater.

Contaminated Land

Investigations prior to redevelopment of derelict industrial sites have shown localised contamination, primarily of land, but with potential for contamination of surface and groundwater, in a number of locations in the Catchment. Action has been taken by the developers to remove the contamination prior to the commencement of work. Of particular note is the Reckit and Colman site at Bletchley where pigment manufacture has contaminated the site. The site is currently vacant and a clean-up operation is planned to minimise the immediate risk. However, in the long term further remediation will be necessary prior to redevelopment.

See Section 5 Issue 21: Redevelopment of Contaminated Land

Discharge to underground strata

A large part of the catchment is clay and as a consequence soakaways do not work. Historically there have been considerable problems with septic tanks. The NRA advises at the consultation stage of the Town & Country Planning Act regarding the suitability of areas of land for septic tanks and soakaways.

Diffuse Pollution

The AWS potable supply borehole at Birchmoor has been affected by levels of the pesticide Bentazone in excess of the EC Drinking Water Directive standard. Although a number of investigations have taken place, no conclusive evidence has been found to identify the source. AWS have installed treatment at the works to ensure that the water abstracted meets legal drinking water requirements.

High levels of nitrate are also found at Birchmoor within the Lower Greensand and the area has been declared a NSA and NVZ. It is hoped that compliance with the Code of Good Agricultural Practice, and measures to reduce nitrate leaching in this area proposed by the MAFF will enable these Lower Greensand groundwater sources to meet the requirement of the EC Nitrate Directive.

4.7 WATER QUANTITY OBJECTIVES**4.7.1 National Objectives**

The NRA National Aim for water resources is to:

- Manage water resources to achieve the right balance between the needs of the environment and those of the abstractors.

This is implemented by adherence to the general NRA statutory objectives:

- To protect aquifers and surface water from over-commitment and ensure water abstraction does not have an unacceptable effect on existing abstractors and on the environment;
- To ensure the proper use of water resources;
- To conserve water resources; and,
- To augment and/or redistribute water resources, where appropriate to meet water demands to appropriate standards of reliability.

4.7.2 Catchment Status (general)

Where there are valid requirements for water abstraction and competition arises with other river uses, there is a need to strike a balance between the various interests to secure an optimum development of resources. This must be undertaken within a framework to satisfy proper protection of the natural environment.

There is an existing high demand for water use for drinking water, industry and agriculture, and this demand is increasing. Future development must not cause any unacceptable detriment to the environment.

It is important to remember that as the population of the area continues to increase, so will the volume of water returned to the rivers through discharges from the sewage treatment works. Therefore as dry weather flows increase, there may be some future flexibility in the allocation of summer water resources.

4.8 WATER QUANTITY STATUS

The following relates to the status of the catchment as compared to each of the above objectives.

4.8.1 Objective 1

To protect aquifers and surface water from over commitment and ensure water abstraction does not have an unacceptable effect on existing abstractors and on the environment.

The specific objectives include:

- The NRA will provide the best practicable assessments of resource availability.
- The NRA will define the appropriate water levels, flows and quality required to maintain and enhance the water environment including washland and wetland sites of conservation interest (in order to ensure that unacceptable abstraction will not be authorised). As a result of this work, the NRA will set River Flow Objectives for the rivers in this catchment.
- To protect all groundwater as a potential future resource in accordance with NRA Groundwater Protection Policy.

4.8.2 Local Status

(i) Surface water resources in the Upper Ouse

Surface water availability in the Upper Ouse is limited due to the impacts of Public Water Supply abstractions at Foxcote, Clapham and the scheme serving a much larger area at Offord (downstream of St Neots, Cambs.), filling Grafham Water (section 3.6). Cessation conditions exist for all three of these public water supply intakes to protect low flows, in-river needs and other licence holders. Any new abstractions in the Upper Ouse can have an affect on the minimum maintained flow at Offord, therefore new licences between 5 to 20 thousand cubic metres per year are subject to cessation conditions (usually levels) to protect low flows, in river needs and other licence holders.

Winter water is available throughout the catchment if it is required for winter storage schemes, whereby surface water is abstracted during periods of high winter flow and stored in an off-stream reservoir for subsequent use.

In some parts of the Upper Ouse, the hydrology is complex and poorly understood: This is particularly so in the upper part of the River Ouzel catchment.

See Section 5 Issue 26: Hydrology of the Ouzel Watershed

(ii) **Groundwater resources in the Upper Ouse**

Groundwater reserves in this area come from the Lower Greensand in the south of the catchment (Leighton Buzzard area) and the Bedford Oolite, to the north of Bedford. Recharge of the Bedford Oolite is thought to occur to the north of Bedford, with a groundwater flow direction to the south-east. Studies are currently in progress to establish more details of the hydrogeology and resource balance of the Oolite in the Bedford area. Current NRA policy is to limit new abstractions from the Bedford Oolite aquifer to meeting local needs (less than 20 cubic metres per day).

The need for proper and sustainable management of groundwater resources has led to the establishment of new monitoring stations in the Bedford Oolite aquifer.

Section 5 Issue 23: Future demand for groundwater in the Bedford Oolite

In its role of protecting groundwater as a resource, the NRA is involved in the consultation process where new developments occur. One example of this in the Upper Ouse is at Pitstone quarry.

The current assessment of the Lower Greensand aquifer shows that no additional resources are available (Greensand groundwater unit 1) (NRA Water Resources Strategy, 1994).

The assessment for the Chalk aquifer to the south of Leighton Buzzard, referred to as the Ouzel Chalk (Unit 1) in the NRA Water Resources Strategy (1994), shows apparent surplus of water, although data from British Waterways show that the majority of this is made up in practice by water which is imported into the catchment via the Grand Union Canal.

Some water is available from glacial sands and gravels along the main river corridors.

4.8.3 Catchment Objective 2

To ensure the proper use of water resources

4.8.2 Local Status**(i) Water Resources Availability**

The NRA will define a framework within which water users can plan to meet their needs, and will advise on possible constraints. The continued assessment of water resource availability following on from the Regional Water Resource Strategy (1994) may have implications for the Upper Ouse, such as the change in availability of groundwater from the Lower Greensand.

See Section 5 Issue 27: Rising Groundwater levels in the Lower Greensand

(ii) Water Resources Planning

The NRA will advise Planning Authorities on water resources aspects of their development plans, in accordance with the Regional and National Water Resource Strategy.

The NRA will promote the wise use of water and demand management. There is an future demand for abstraction from summer water.

See Section 5 Issue 22: Future demand for abstraction from summer water

The NRA will ensure that the future requirement for water meets "reasonable needs". This includes maintaining a watching brief on climate change. Water abstraction licence applications must show consideration of alternative supplies, demand management or recycling. Specific requirements according to each use, are as follows:

- **Public Water Supply**

The licensing horizon is currently 2011. It is not considered reasonable to allocate water for needs beyond this. The water company must have demonstrated that they have carried out effective demand management, reduced leakage to economic rates and, where water resources are under stress, considered metering of domestic use before extra water resources are allocated.

- **Spray irrigation and Agriculture**

For spray irrigation licences the requirements of water needed with respect to the type of crops and soil conditions are taken into account. For agricultural licences the numbers and type of animals kept may be important in determining requirement.

- **Industrial**

For industrial licence applications the process is considered as well as the expected life of the industrial plant.

4.8.5 Catchment Objective 3

To conserve water resources

Specific objectives include:

- The NRA will give priority to existing rights to abstract and to established environmental needs before allocating any further water for abstraction.
- The NRA will adopt the principles of sustainable development and exercise the precautionary principle when assessing the requirements for further development of the water resources of the catchment.
- The 1989-92 drought has served to develop better practice of water resource management both by the NRA and the abstractors, for example, the NRA will encourage the storage of winter surface water in reservoirs.

4.8.6 Local Status

(i) **Hydrometric Monitoring in the Upper Ouse**

Baseflows in the rivers of the Upper Ouse catchment have increased during recent years due to increased discharges from sewage treatment works as a result of the rise in urban populations in the Region. This may lead to the availability of further surface water to be licensed.

If the use of water is to be optimised, increased monitoring of artificial influences such as STW discharges may be required in future.

See Section 5 Issue 24: Hydrometric monitoring network
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4.8.7 Catchment Objective 4

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

Specific objectives include:

The Authority will periodically review the need for augmentation schemes in catchments with low flows.

The NRA will support appropriate standards for each use of water as follows:

- Public Water Supply

The NRA accepts the operational standards given by OFWAT for public water supply. These are a hosepipe ban not more than once every 10 years. The need for voluntary savings of water on average not more than once in 20 years and the risk of rota cuts or use of standpipes on average not more than once in 100 years. These may be subject to formal review over the next few years.

- Spray irrigation

The Region's target level of service for spray irrigation is that there should be risks of shortages not more than once in 12 years on average.

- Others - Industrial, Agricultural, etc.

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

4.9 ENVIRONMENTAL FEATURES OBJECTIVES

Environmental Features relates to the NRA's Fisheries, Recreation, Conservation and Navigation functions.

Specific objectives which relate to these are given below;

4.9.1 Conservation

The NRA has a statutory duty to further the conservation of flora and fauna when carrying out its duties. The NRA will carry this out by adhering to the following specific conservation objectives:

- To establish a system of classification to identify environmental condition and conservation value of river corridors, inland waters, estuaries, and wetlands. This will be carried out initially by the analysis of data collected using survey methods including the Rivers Environmental database, and river habitat surveys;
- To ensure that the NRA's regulatory, operational and advisory activities take full account of the need to safeguard the water environment and further conservation;
- To sustain, and where appropriate, enhance or restore the habitat diversity within the water environment;
- To provide an environmental assessment and recommendations to ensure the maintenance and enhancement of conservation interest to flood defence;
- To ensure that river management does not adversely affect sites of archaeological importance; and,
- To protect the ecology of sensitive wetland sites the NRA will, in consultation with English Nature and others, produce site specific water level management plans which will define the control water levels to be achieved.

4.9.2 Fisheries

Specified fisheries are designated under EC Fisheries Directives which set water quality criteria according to fishery type

- Game fisheries; that is the maintenance of breeding populations of salmonid fish species, namely brown trout and sea trout in this catchment.
- Coarse fisheries; that is the maintenance of breeding populations of cyprinid fish species.

These fishery types are objectives, over all aims for the environment defined by their

water quality and not by the species composition. Specific Fisheries objectives are:

- To protect and conserve Salmonid and Cyprinid fisheries;
- To maximise the fish biomass to the realistic potential carrying capacity for each channel, based on the suitability of habitat and channel size;
- To maintain appropriate species diversity by the protection and suitable enhancement of in-stream habitat, and by restocking to rehabilitate damaged fisheries; and,
- The NRA will quantify the total extent of all fisheries, providing a detailed description of the resource to be managed and instituting a fisheries classification scheme.

4.9.3 Angling

With others, the NRA seeks to maintain and improve angler access, balancing the legitimate needs of all river users, and environmental sensitivity.

The Authority will also advise anglers on methods to minimise damage to river banks caused by illegal excavation, to comply with Land Drainage Byelaws.

4.9.4 Navigation

The NRA will develop a suite of "model" navigation byelaws to achieve consistent, practical, legal and environmental sense on a national and regional scale.

The Authority will maintain and improve navigation fairway, facilities and standards with a view to encouraging the use of rivers for navigation but taking into consideration the rights of land and fisheries owners and the NRA's conservation duty.

With District Councils, the Eastern Council for Sport and Recreation and boat users the NRA will seek to influence the strategic development of navigation facilities.

4.9.5 Recreation and Amenity

The NRA will take account of recreation potential in development proposals relating to any NRA activity; for example flood banks footpaths, information boards, and access points to the waterway.

The NRA will promote and safeguard existing public access to rivers and where appropriate, on land owned by the NRA commensurate with the needs of conservation and safety.

With others the NRA will promote the appropriate recreational use of waterways by, where appropriate, the creation of new facilities and provision of information.

4.10 ENVIRONMENTAL FEATURES STATUS

4.10.1 Fisheries

The National Rivers Authority has duties to maintain, improve and develop fisheries and to further the conservation of fish species. The fishery provides a resource for a number of catchment uses such as angling and the environment. Fish populations are affected by the quality and quantity of water as well as by the availability of suitable physical habitat features. Fish are therefore important indicators of the overall health of the river.

The extensive data collected on fish populations allows the fisheries to be classified on a scale of A to D dependent on biomass estimates. Map 24 shows the fishery classification scheme of rivers in this catchment.

The principle coarse fisheries within this catchment are the River Great Ouse, River Ouzel and River Tove. The River Great Ouse from its source near Brackley to Newport Pagnell is typified by meandering riffle pool sequences over a gravel substrate. Since routine surveys began in the early 1980's, the coarse fish population in this section has remained a biomass category "A/B" fishery, dominated by pike, roach and chub. Juvenile brown trout have been recorded in the upper reaches confirming the presence of a breeding population. The River Great Ouse between Newport Pagnell and Bedford continues to a lesser extent in a riffle glide sequence but widens significantly. Between 1982 and 1992 this section of the Great Ouse has removed a stable but moderate category "B" biomass fishery. In 1994 the biomass has improved to 22.5 grammes per square metre (gm^{-2}): a biomass category "A" fishery. This is partly the result of an increase in the barbel population recorded in 1994 (now 19% of total weight of fish recorded) as well as increases in the roach population.

The River Ouzel, between its source near Billington and its confluence with the River Great Ouse at Newport Pagnell is a series of riffle pools with fine gravels over a clay substrate. Fish populations are dominated by chub, pike and roach and the 36 kilometres of river surveyed has remained a biomass class "A" fishery since the mid 1980's.

The River Tove rises upstream of Towcester and joins the River Great Ouse north of Milton Keynes. It is dominated by riffle pool and glide sequences which are an ideal habitat for the chub which are ever present throughout the entire length. The River Tove has had a relatively stable fish population since the mid 1980's and has continued to remain a biomass category "A" fishery.

The Padbury and Claydon Brooks meet near Padbury and then join the River Great Ouse downstream of Buckingham. The upper reaches where the substrate is mainly clay has suffered over the past few summers from low flows limiting fish populations. Downstream of the Claydon Brook confluence the river deepens, forming riffle-glide sequences and it is in these areas that the habitat is suitable for species such as roach and pike.

Since the early 1990's the Padbury Brook has remained a good category "A" biomass fishery and the Claydon Brook is a moderate category "A/B" biomass fishery dominated by roach, pike and chub.

The Grand Union Canal is managed by British Waterways and is primarily a navigation channel with limited physical habitat features suitable for fish. However, the canal is an important match fishing venue with a moderate category "B" biomass classification dominated by small roach, perch and common bream.

The following sections of river are designated under the EC Fisheries Directive and all of them comply with the requirements of the Directive.

RIVER	STRETCH	LENGTH (KM)
Padbury Brook	Twyford Mill to River Great Ouse	19.5
Claydon Brook	Hogshaw Tributary to Padbury Brook	4.5
River Tove	Sulgrave and Helmdon Brook Confluence to River Great Ouse	27
River Ouzel	U/S Leighton Linlade STW	8
River Great Ouse	D/S of Harrold Mill to Catchment Boundary (designated down to Bedford STW)	37.2 (of 41.2)
TOTAL		96.2

(N.B. All rivers above are classified as cyprinid fisheries).

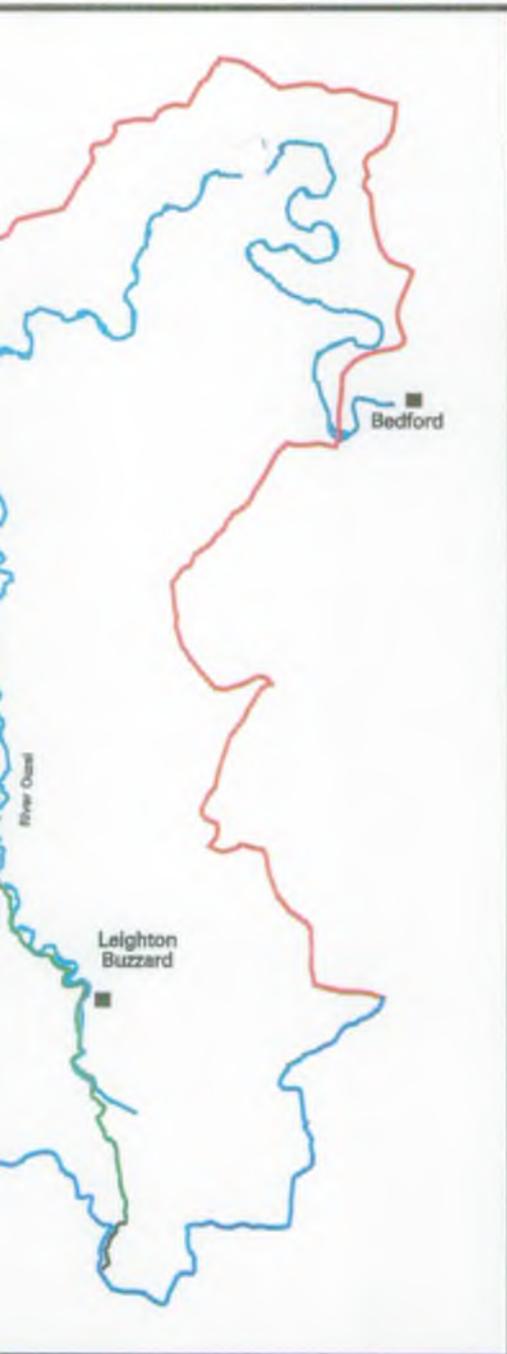
4.10.2 Conservation of the Water Environment

Freshwater Habitats

It is recognised that the environmental value of certain channels has been adversely affected by past land drainage activities. General conservation value would be improved by appropriate habitat enhancement or restoration. Morphological features such as riffle-pool sequences should be retained and restored where past activities have adversely affected them.

See Section 5 Issue 28: Restoration of degraded rivers,
Issue 37: Enhancement of Backwaters & Mill streams

In rivers plant growth is an important habitat feature. Weed control for flood defence requires careful balance with environmental needs. It is therefore appropriate to review weed control practices to ensure that correct balance is achieved to satisfy all needs.



KEY

 Catchment Boundary

 Region Boundary

 Towns



 Class A >20gm³

 Class B <20gm³

 Class C 5 - 10gm³

 Class D <5gm³

 River lengths not surveyed



NRA

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Anglian Region

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See Section 5 Issue 36: Management of Macrophytes and Emergent Vegetation

Analysis of the River Environmental Database (REDS) determines the environmental status of the river corridor (ie. the river itself and generally 50m either side of the river) within the CMP area. Conservation targets for each 500m stretch of the river fall within the following three categories:

- **Conserve:** Contains rare plant or animal species and/or important plant communities and/or high plant diversity.
- **Enhance:** May be poor for one element of the river corridor ecology whilst maintaining good characteristics as well. Enhancement work may therefore need to improve the ecological shortfalls of a section whilst conserving the features of specific interest.
- **Restore:** Ecologically degraded - low plant and animal diversity and no rare species present.

Map 25 shows that 64% requires conservation measures, 35% a requires enhancement, and 1% requires restoration.

In addition, the habitat based River Corridor Survey (RCS) methodology has been developed and appears as NRA Conservation Technical Handbook No. 1. It highlights important features which need protecting and identifies opportunities to rehabilitate and enhance degraded habitats.

See Section 5 Issue 35: Protection of Native Cray fish

Willow trees are a prominent landscape feature and habitat resource in the catchment. Many of these trees are no longer managed which in turn is leading to their decline. RCS will help highlight areas where tree management is a priority and allow development of plans for their maintenance.

See Section 5 Issue 29: Management of Bankside Trees

The NRA is also developing a National River Habitat Survey (RHS) methodology which will classify the environmental conditions of rivers with respect to the physical features of wildlife value, for example, riffles, pools, wet shelves and cliffs.

Extensive ecological and hydrological studies are required to define the existing ecology of the river system and to establish the "In River Needs". River Habitat Surveys have an important role in establishing the appropriate habitat features for all rivers within the CMP area.

Upper Ouse
Catchment Management Plan
Environmental Status of River Corridor
1990 Data - Map 25





KEY

-  Catchment Boundary
-  Region Boundary
-  Class I (conserve)
-  Class II (Enhance)
-  Class III (Restore)
-  Towns



NRA

National Rivers Authority
Anglian Region

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Throughout the catchment, watercourses support a diverse and abundant invertebrate fauna; including Ephemeroptera (Mayfly), Trichoptera (Caddis Fly) and in the slower flowing reaches Odonata (damselfly/dragonfly) which reflects the diversity of habitat within the rivers in the catchment.

4.10.3 Water Level Management Plans

The "Conservation Guidelines for Drainage Authorities" produced by MAFF/DOE state that plans should be produced for areas where water levels are managed and that priority should be given to water level dependent SSSIs.

These Water Level Management Plans provide a means by which water level requirements for a range of activities in a particular area (eg, agriculture, flood defence and conservation) can be balanced and integrated. Once the plans have been completed, these will be incorporated into CMPs.

See Section 5 Issue 30: Water Level Management Plan

The NRA is deemed to be the operating authority for three such sites in this catchment; Felmersham Gravel Pits (medium priority), Nares Gladley Marsh and Stevington Marsh (both low priority). The IBDs will also be completing plans for other SSSIs in the catchment.

Initial investigations have shown the following:

Felmersham Gravel Pits SSSI contains a series of flooded pits which have developed tall fen communities, grassland and scrub. This habitat supports a diverse flora including rare species such as Dragonfly Odonata. The pits also have rich insect, Amphibian and bird communities. The main issue appears to be flood risk to the site.

Nares Gladley Marsh SSSI is one of the best wetland sites in Bedfordshire and boasts fen meadow, rush pasture, wet marsh, swamp and grassland communities. The main issue which will be addressed in the plan is the maintenance of spring flows to the site and water level control in the River Ouzel.

Stevington Marsh SSSI supports a rich combination of wildlife habitats; limestone grassland and wet marsh vegetation. Future water level management will be concerned with maintaining the value of the site with winter/spring flooding and through spring flows.

4.10.4 Biodiversity Action Plans (BAPs)

Biodiversity encompasses the whole range of variation found in living organisms. Conserving biodiversity is not just about rare and threatened species and habitats but all wildlife. Since the 1992 Earth Summit in Rio, governments, organisations and people throughout the world have been discussing the subject. In early 1994, the

government published the " Biodiversity in the UK action plan". The next step is to produce BAPs on a locally, eg, on a county basis. This is being facilitated by County Wildlife Trusts in association with English Nature, RSPB, local authorities and the NRA.

These focus on the conservation of key habitat types, eg, lowland heathland, fens and reedbeds and key species such as white-clawed crayfish, water vole and european otter. The action plans will identify activities, timescales and responsibilities and will be incorporated in to the CMPs, where appropriate, in due course.

"PPG 9 - Nature Conservation" echoes the this initiative and explains how local authorities can contribute through their planning role. Local Agenda 21 (sustainability), with which local authorities are deeply involved, is seen as encouraging local consultation on the environment and local projects in support of biodiversity are expected to result from this process.

See Section 5 Issue 35: Protection of Native Crayfish,
Issue 38: Biodiversity Action Plans

4.10.5 Marston Vale Community Forest

A small part of the Forest can be found in this catchment. This is an initiative of the Countryside Commission and Forestry Commission in partnership with Beds County Council, Mid Beds District Council and Bedford Borough Council. The initiative includes tree and scrub planting, creation of walks, wetland and woodland creation.

See Section 5 Issue 34: Marston Vale Community Forest

4.11 DEVELOPMENT CONTROL OBJECTIVES

Development control objectives both in terms of responses to Development Plans or specific planning applications should be derived from the adaptation of NRA policies, as contained in the NRA guidance notes for Local Planning Authorities, in Local Authority Development Plans.

These will aim to ensure that:

Flood Defence

- The flood plain integrity is maintained.
- New development is not at risk from flooding and does not put other areas at risk of flooding which could endanger life and damage property.
- Any work which is needed to reduce the risk of flooding created by a new development is paid for by the developer and not the public.
- On statutory "main river" adequate access exists for the proper maintenance of watercourses and structures and that future flood defence schemes are not precluded.

Water Quality

- New development does not cause pollution of surface and groundwaters.
- Developments comply with the NRA Groundwater Protection Policy.

Water Quantity

- Development does not cause unacceptable effects on surface water and groundwater resources.
- The existing rights of those who abstract water are protected.

Conservation and Enhancement of the Water Environment

- The water environment is safeguarded from any detriment due to development (including change of character due to the discharge of concentrated run-off).
- The enhancement of the conservation, recreation and amenity value of the water environment occurs where possible in conjunction with development.

4.12 DEVELOPMENT STATUS

The major population centres in the catchment; Brackley, Buckingham, Leighton Buzzard, Newport Pagnell, Towcester and the new city of Milton Keynes are all situated on or adjacent to watercourses and have properties situated within flood plain and at risk from flooding. The flood plain limit is generally defined by the 1947 flood. This having been modified where significant channel improvement or modifications to the drainage system have taken place since, notably, the Rover Ouzel in Leighton Buzzard and Milton Keynes. Flood plain loss has taken place in all areas since 1947; this is now resisted by the NRA through the Town and Country planning process as the loss of flood plain reduces the dampening effect on flood peak discharges thus raising flood levels.

See Section 5 Issue 41: Surface Water Runoff from Milton Keynes

The potential rapid and concentrated surface water discharge from Milton Keynes was catered for from the onset of development by the progressive construction of surface water balancing facilities situated notably on the River Ouzel and Loughton Brook, these being operated by AWS, theoretically, to maintain the land drainage status quo.

All of the settlements discharge treated sewage effluent to watercourses, which is a significant contribution to flow during periods of dry weather and drought.

Development has a major influence on the water environment in terms of its capacity to concentrate surface water run-off, its polluting potential, its need for water supply and its impact on the water based ecosystem.

SECTION 5
CATCHMENT ISSUES AND OPTIONS

5.1 INTRODUCTION

The identified issues are discussed and where possible some options for their resolution are proposed. The options which are presented represent a range of alternative courses of action and are not generally mutually exclusive. Some options may be more feasible in one part of the catchment than others. Some options which are considered feasible will only be implemented following a full project appraisal. The section concludes with a tabulated summary of issues and options which identifies the organisation responsible and also some benefits and constraints of the suggested options.

5.2 FLOOD DEFENCE ISSUES

Issue 1 Flooding in Newport Pagnell

Problem Flooding difficulties from the River Ouzel were experienced in parts of the town during September 1992, where housing, commercial property and access were all adversely affected.

Option Consultants have been appointed to carry out a thorough investigation of the flooded areas within Newport Pagnell. A report will be prepared, if possible, identifying any economic options including conservation considerations, to alleviate the flooding along with suitable costs and benefits that would allow the promotion of a capital improvement scheme.

Options	Responsibility	Benefits	Constraints
Assessment and execution of main river works	NRA	Improved levels of urban flood protection	Costs

Issue 2 Flooding in Leighton Buzzard

Problem Floodwaters from both the Clipstone Brook and River Ouzel affected housing, commercial property and access, causing widespread disruption to the town in September 1992.

Option Consultants have been appointed to undertake an investigation of the flooded areas within the town. A report will be prepared outlining economic options to alleviate the flooding along with suitable costs and benefits that would allow the promotion of a capital improvement scheme.

Options	Responsibility	Benefits	Constraints
Assessment and execution of main river works	NRA	Improved levels of urban flood protection	Costs

Issue 3 Increased Surface Water Discharge into the Upper River Ouzel

Problem To alleviate surface flooding in parts of Dunstable, AWS are proposing to renew surface water sewers. These will discharge into the upper River Ouzel which may adversely affect flood risk areas downstream, ie, Leighton Buzzard.

Option Thorough investigation of proposals by the River Ouzel IDB/NRA will be required to identify any potential flooding affects on downstream land use. Continued discussions with AWS.

Options	Responsibility	Benefits	Constraints
Hydraulic study	NRA/IDB	Identify impacts of additional surface water to downstream land use	Costs

Issue 4 River Maintenance Standards

Problem The better clarification of flood defence needs will improve the decision making process regarding the ideal balance of priorities between conservation and flood defence interests. This will change current maintenance regimes towards a focus on urban and industrial areas as the main flood defence priority.

Option To apply the standards of service criteria to flood defence maintenance activities in the CMP area in order to achieve best value for money, taking fully into account environmental considerations.

Options	Responsibility	Benefits	Constraints
Complete Standards of Service Review	NRA	Better able to identify criteria and targets for expenditure	Difficulty of translating standard of service to attend maintenance activities
Apply criteria to Flood Defence maintenance	NRA	Value for money can be identified to effective targeting of resources	May reduce level of service where this exceeds target level

Issue 5 Flood Defence and Conservation Priorities

Problem The best balance between Flood Defence and conservation needs is not always achieved.

Option Improve procedures to build in longer lead in times to allow consultation with conservation bodies and other parties which may be affected.

Options	Responsibility	Benefits	Constraints
Identify Flood Defence priorities	NRA	Safeguard urban flood risk areas	Staff costs
Identify Conservation priorities	NRA	Achieve most practical balance, real enhancements towards restoring the flood plain	Staff costs

Issue 6 Maintaining the Flood Plain

Problem Potential impacts on flood plain, particularly proposed development, land raising and afforestation initiatives.

Option Thorough evaluation and consultations with the NRA, on all proposals, prior to project programming - so that potential impacts can be assessed.

Options	Responsibility	Benefits	Constraints
Evaluation of proposals	NRA	Safeguard limits of flood plains areas, improve attenuation effects of flood peaks	Staff costs
Enforcement of byelaws	NRA/Planning Authorities	Protect storage capacity and extent of flood plain for flood risk areas	Staff costs

Issue 7 River Control Structures

Problem Several river control structures are potentially reaching the end of their asset life.

Option Structural inspections will be required to determine condition of structures, with refurbishments or replacement undertaken as appropriate subject to need and cost appraisals.

Options	Responsibility	Benefits	Constraints
Replace structures	NRA	Maintain established water levels for recreation, farming and conservation	Costs
Allow structures to decay and fail	NRA	Costs	Loss of accepted water levels by all customer groups

Issue 8 Litter on Urban Watercourses

Problem The NRA often receives complaints from members of the public regarding general littering and dumping in both main river and non-main watercourses within urban areas. Litter can cause blocking and subsequently flooding.

The NRA has a responsibility only to remove litter from sites within its ownership, which is centred within this Catchment on river control structures, ie, sluices and weirs that have land within a perimeter fence.

Option Littering laws need to be enforced where appropriate. Local Authorities need to be advised by the NRA of their responsibilities where there are riverside owners. Promote a campaign to educate riverside owners of their duties prescribed by legislation.

Options	Responsibility	Benefits	Constraints
Advise riverside owners and potential obstruction sources of their obligations	NRA/Local Authorities	Maintain channel capacity and visual appearance	Costs
Encourage Local Authorities to act within public areas containing a river frontage	NRA	Maintain channel capacity and visual appearance	Costs

Issue 9 Non-Main River Flooding

Problem There is a marked escalation in the number of non-main river urban flooding events due principally to lack of maintenance or extreme weather patterns overwhelming the local surface drainage system, ie, Ravenstone, Tiffield, Thornborough.

The Water Resources and Land Drainage Acts 1991 impose a duty upon the

NRA to exercise a general supervision over land drainage matters within its area. For main river watercourses, the NRA's role is set out in 3.1.1. For other watercourses, the Act identifies local Authorities or Internal Drainage Boards as having appropriate powers.

However, with regard to these ordinary watercourses, it is not practicable for the NRA to actively promote action other than through persuasion of other parties. The NRA is not empowered to require a local Authority to carry out works on non-main river watercourses.

Option To clarify and re-state the respective roles of the County Councils, Local Authorities, IDB and Water Companies. This will ensure that, as far as possible, the public receives a satisfactory service from the relevant drainage Authority.

The NRA has corresponded with all local authorities on the issue of non-main river responsibilities. The following authorities have responded positively to the NRA's interpretation of the situation:

Milton Keynes Borough Council
Aylesbury Vale District Council
Bedfordshire County Council
South Bedfordshire District Council
Buckinghamshire County Council.

Although many expressed that they may/wish to use their permissive powers, they feel unable to promote short-term solutions due to funding constraints.

Options	Responsibility	Benefits	Constraints
Clarify the roles and responsibilities of the various Drainage Authorities	Local Authority NRA IDB's	Reduction in flooding risk Improved level of service	Availability of resources for undertaking remedial works

5.3 WATER QUALITY ISSUES

Issue 10 Algal blooms at Foxcote Reservoir

Problem Algae are a natural part of lakes and reservoirs but under certain conditions, in particular high levels of nitrogen and phosphate, their numbers become excessive. Typically this can be recognised by the water turning green and "blooming" and by the occurrence of blue-green algal "scums" along the shoreline. Algal blooms, including Blue-Green algae (Aphanizomenon and Microcystis) have been found at Foxcote reservoir.

Option Foxcote reservoir was designated a Sensitive Area (Eutrophic) under the UWWTD (91/271/EEC) in 1994. Designation as a Sensitive Area (Eutrophic) requires the installation of treatment to reduce phosphate concentrations from Brackley STW discharge.

Options	Responsibility	Benefits	Disadvantage
Reduction of phosphate from Brackley STW discharge.	AWS	Potential reduction in the frequency and magnitude of algal blooms.	Cost. Uncertainty of achieving a reduction in algal blooms.
Removal of phosphate at the inlet to the reservoir.	AWS	Potential reduction in the frequency and magnitude of algal blooms.	Cost. Uncertainty of achieving a reduction in algal blooms.

Issue 11 Eutrophication of the River Great Ouse and River Ouzel.

Problem Phosphate levels in the River Great Ouse from Brackley to Bedford and River Ouzel from Dunstable to Newport Pagnell exceed the concentrations in the DoE guidance for the identification of Sensitive Areas (Eutrophic) under the UWWTD. Symptoms of eutrophication vary throughout the catchment, but include filamentous algal growths, algal blooms in the water column and associated extreme diurnal variation in dissolved oxygen levels. Foxcote Reservoir was designated a Sensitive Area (Eutrophic) in 1994. Another review of data for designations of Sensitive Areas (Eutrophic) is due to take place in 1997.

Option Review of data for potential designation as a Eutrophic Sensitive Areas under the UWWTD. If the river is designated as a eutrophic sensitive area then discharges equivalent to a population of more than 10,000 are required to meet limits for phosphate. Buckingham, Dunstable and Leighton Linlade STW's may require phosphate removal if the River Great Ouse and River Ouzel is designated as Sensitive Areas (Eutrophic).

Modelling of potential impact of phosphate control at sewage treatment works.

Options	Responsibility	Benefits	Constraints
Consider designation as a Eutrophic Sensitive Area under the Urban Wastewater Treatment Directive.	NRA DoE	Provide framework to control nutrient inputs.	
Develop programme for nutrient reduction, possibly at STWs.	NRA	Reduction in nutrient inputs.	Cost.
Modelling of potential impact of nutrient control at STWs.	NRA	Improved Knowledge.	Model may not represent true picture.

Issue 12 Exceedence of Nitrate limits at Clapham abstraction point for public water supply.

Problem The EC Nitrate Directive (91/676/EEC) requires Member States to designate as NVZs all land areas which drain into waters upstream an abstraction point for public water supply where the nitrate concentrations exceed, or could exceed 50mg/l. All of the Upper Ouse upstream of Clapham Water Intake, with the exception of Whistle Brook, has been proposed as an NVZ. This has been based on 1992 data for the River Great Ouse at Clapham where fewer than 95% of samples complied with the 50 mg/l limit and for sample points upstream of Clapham, where it is 95% certain, from data for 1988 to 1992 that the 50 mg/l limit has not been complied with.

Option Designation of NVZs and reduction in application of organic fertiliser within these zones.

Public Water Supply Companies to install Nitrate Removal Plants or blend with low nitrate water to achieve compliance with the Drinking Water Directive standards.

"More stringent treatment" is required by 1998 for discharges from Brackley, Buckingham, Dunstable, Leighton Linlade and Cotton Valley sewage treatment works to meet the requirements of the Urban Wastewater Treatment Directive (91/271/EEC).

Options	Responsibility	Benefits	Constraints
Designate NVZs	MAFF	Protection of potable supplies Compliance with EC Nitrate Directive.	Uncertainty of achieving reduction in nitrate concentrations.
Reduction in application of organic fertiliser within these zones.	MAFF NFU Manufacturers	Reduction in nitrates in controlled waters.	May take a long time for reduction in nitrate concentrations to be measured.
Installation of nitrate removal plants.	AWS	Removes nitrates from potable supplies. AWS will comply with legal commitments.	Cost.
Blending with low nitrate water at water treatment works.	AWS	Dilutes nitrate concentrations in potable supplies. AWS will comply with legal commitments.	Cost.
More stringent treatment at certain sewage treatment works.	AWS	Reduction of nitrate concentrations in river.	Cost.

Issue 13 **The concentration of pesticides in the River Great Ouse at Clapham**

Problem The EC Drinking Water Directive (80/778/EEC) sets a maximum admissible concentration of 0.1µg/l (micrograms/litre) for any pesticide in drinking water. The NRA is not directly responsible for the quality of drinking water, but must take appropriate action to safeguard resources when it is notified by water companies of any breach in the pesticide limit. In recent years, there have been exceedences of 0.1µg/l in the River Great Ouse at Clapham. As a result of this AWS has installed treatment facilities to ensure drinking water complies with the EC Drinking Water Directive.

In addition to the exceedences of the 0.1µg/l value, the herbicide Isoproturon has been recorded at levels exceeding the provisional Environmental Quality Standard of 2µg/l.

Option National strategies may offer some solutions to this problem. For example, two of the more persistent pesticides, atrazine and simazine, have been banned

from non-agricultural use. The concentration of these herbicides is expected to be significantly reduced following the implementation of this measure.

At a local level, the NRA will liaise with AWS to promote water protection issues and organise campaigns to educate pesticide users and distributors.

Options	Responsibility	Benefits	Disadvantage
National strategies to restrict the use of specific pesticides.	MAFF DoE NRA	Reduction in use of particularly harmful pesticides.	Cost. Potential change in pesticide use may result in an increase in the concentration of different pesticides.
Promote water protection issues and organise campaigns to encourage the careful use of pesticides.	NRA AWS	Reduction in the quantities of pesticides in controlled waters.	Uncertainty of achieving reduction in pesticide concentrations.

Issue 14 Protection of Clapham water treatment works surface water abstraction

Problem The potable surface water abstraction at Clapham on the River Ouse is at risk from closure as a result of pollution incidents from industrial and agricultural sources.

Option Ongoing pollution prevention inspections of high risk sites upstream of the intake. Recommendation of measures to industrialists and farmers to reduce the risk of pollution entering the river.

Continue to maintain the continuous water quality monitoring network in the Upper Ouse catchment.

Options	Responsibility	Benefits	Constraints
Pollution Prevention visits to sites in the area.	NRA	Reduce risk of pollutants entering the river.	Cost Pollution prevention advice is voluntary.
Maintain network of continuous automatic monitoring equipment.	NRA	Detection in changes of water quality immediately.	Cost.

Issue 15 Failure to meet REC target on River Tove.

Problem The stretch of the River Tove from Towcester STW to Castlethorpe fails to meet the proposed REC 2 target for DO. The available information implicates Towcester STW as the cause of the problem. The current discharge consent conditions for the works are laxer than those needed to ensure compliance with the RQO.

Option The NRA is currently discussing plans with AWS to improve the effluent quality from Towcester STW.

Options	Responsibility	Benefits	Constraints
Improve effluent quality from Towcester STW.	AWS	Will achieve compliance with RQOs.	Cost.
Maintain REC 3 in short/medium term.	NRA	Protects water quality from deterioration.	Perceived relaxation of the target.

Issue 16 Failure to meet the REC target on Claydon Brook.

Problem The stretch of Claydon Brook below Winslow STW to the confluence of the Horwood tributary fails to meet the proposed REC 3 target for dissolved oxygen.

Option Investigate the cause of low dissolved oxygen concentrations.

Maintenance of REC 4 for short/medium term objective, but retain REC 3 as long term objective.

Options	Responsibility	Benefits	Constraints
Investigate reason for low dissolved oxygen concentrations.	NRA	Better data for decision making.	May not establish source.
Maintain REC 4 as short/medium term objective.	NRA	Protects water quality from deterioration.	Perceived relaxation of target.

Issue 17 Failure to meet REC target on River Ouzel.

Problem The stretch of the Ouzel downstream of Leighton Buzzard to Stapleford Mill fails to meet the proposed REC 3 target for biochemical oxygen demand

(BOD). The high BOD levels which caused the failure occurred in winter.

Option Investigate the impact of urban drainage, including sewage effluent and storm overflows on the watercourse.

Options	Responsibility	Benefits	Constraints
Investigate urban drainage, including sewage effluent and storm sewage.	NRA	Improved information for decision making.	May not pin point cause of high BOD concentrations.
Maintain REC4 as short/medium term target.	NRA	Protects water quality from deterioration.	Perceived relaxation of target.

Issue 18 Failure to meet the REC target on the Grand Union Canal.

Problem The stretch of the Grand Union canal which flows from Great Seabrook to Grafton Regis fails to meet the proposed REC 3 target for dissolved oxygen. There is only one sample point representing this stretch of controlled water.

Option Investigate the cause of low dissolved oxygen concentrations.

Maintenance of REC 4 as short/medium term objective, but retain REC 3 as long term objective.

Review of monitoring points. Consider adding new sites to provide more information on water quality along the Grand Union Canal.

Options	Responsibility	Benefits	Constraints
Investigate cause of low dissolved oxygen concentrations.	NRA	Improved information for decision making.	May not establish reason
Examine possibility of additional monitoring points along the canal	NRA	Obtain more water quality information about the canal.	Cost.
Maintain REC 4 as short/medium term objective.	NRA	Prevents deterioration in water quality.	Perceived relaxation of target.

Issue 19 Adverse impact of intermittent discharges from Combined Sewer Overflows and Pumping Stations Emergency Overflows.

Problem Discharges from Combined Sewer Overflows (CSO) and Pumping Station Emergency Overflows (EO), although intermittent and usually short-lived, can have a significant impact on the receiving watercourse. Some CSO's and EO's operate at a greater frequency than is desirable and have an unacceptable impact on the receiving watercourse.

Option A list of unsatisfactory CSOs and EOs has been agreed with AWS for improvements over the 5 year period, 1995 to 2000.

Options	Responsibility	Benefits	Constraints
Uprate sewerage systems to eliminate unsatisfactory overflows.	AWS	Improve water quality.	Cost.
Uprating of pumping stations, including improved emergency storage capacity at sensitive locations.	AWS	Protection of water quality.	Cost.

Issue 20 Oil pollution incidents and discharges of oil from surface water sewers.

Problem Incidents of oil pollution are widespread throughout the catchment, but are of particular problem around the Leighton Buzzard and Milton Keynes areas. At Milton Keynes, most incidents are associated with discharges from public surface water sewers, which are controlled by AWS.

Option Problem surface water sewers controlled by Anglian Water have been identified where there is likely to be a need for the installation of oil interception.

Joint NRA/AWS investigations and inspections to give advice on pollution prevention, eg, oil interception at individual premises.

Options	Responsibility	Benefits	Constraints
Installation of oil interceptors.	Industry/AWS	Contain oil and prevent spillage to watercourse.	Cost.
Pollution prevention visits.	NRA/AWS	Prevent oil spillages at source.	Cost. Pollution prevention advice is voluntary.

Issue 21 The Redevelopment of Contaminated Land

Problem A major consideration in the redevelopment of industrial land is the possible contamination of the site and its potential for polluting the water environment.

Option Prior to redevelopment of a site, through the planning process, the NRA will require that a detailed site investigation is carried out to assess the degree and nature of the contamination. If contamination is shown, measures to prevent the pollution of groundwater and surface water will be required.

Options	Responsibility	Benefits	Constraints
Identify degree and nature of contamination.	NRA LPA Developer.	Increased knowledge will enable prioritization of affected sites.	May not be possible to identify contaminant. May not be able to identify all possible sites.
Agree measures to prevent pollution.	NRA LPA Developer.	Protection of the water environment.	Cost.

5.4 WATER RESOURCES ISSUES

Issue 22 Future demand for abstraction from summer surface water

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

Option The NRA Anglian Region Water Resources Strategy (1994) identified a range of options, some of which could have implications for the Upper Ouse catchment:

- (a) Increase use of winter stored water for industrial and agricultural purposes.
- (b) To examine increasing abstraction from gravel and other minor aquifers.
- (c) To transfer water to the Ouse and the Nene via the canal system, which is under investigation, but is unlikely to be cheap.

Options	Responsibility	Benefits	Constraints
Increased use of stored winter water	Licence applicants	Improved sustainability of water resources.	Subject to licence conditions
Increased abstraction from gravel and minor aquifers	NRA	Possible additional water availability	Cost of monitoring studies.
Transfer water via canal system	NRA, British Waterways	Additional Water availability	Cost

Issue 23 Future demand for groundwater in the Bedford Oolite

Problem Initial monitoring studies on the Bedford Oolite (Blisworth Limestone Formation) indicate that the water-bearing aquifer zone is relatively thin with little storage capacity and limited recharge. Springflows from the Oolite aquifer are therefore thought to be very vulnerable to any changes in licensed abstraction patterns in the aquifer.

Option Carry out further studies on the aquifer, along with measurement of springflows in order to establish future licensing policy.

Options	Responsibility	Benefits	Constraints
Further studies on Oolite aquifer eg, monitoring	NRA	Sustainable use of aquifer	Cost

Issue 24 Hydrometric monitoring network

Problem The hydrometric monitoring network in the Upper Ouse is relatively sparse and further monitoring sites may be needed in future if it is required to measure artificial influences, such as discharges from STWs, more accurately. This additional monitoring may be required if additional resources resulting from increased sewage effluent flows, or from existing resource units are to be used wisely for water resources purposes.

Option Key sites should be identified which contribute significantly to surface water flows (eg major STWs). These sites should be prioritised for installation of new flow measuring equipment.

A similar approach should be used to identify any points in the catchment where significant ungauged areas are required to be monitored by establishment of gauging stations.

The coverage of groundwater and rainfall stations within the catchment should be reviewed to ensure that it meets all anticipated needs.

Options	Responsibility	Benefits	Constraints
Install flow gauges to measure artificial influences (eg STWs)	NRA	Optimised usage of resources, improved licensing policy.	Cost
Flow gauges to monitor ungauged catchment areas	NRA	Optimised usage of resources, improved licensing policy.	Cost
Identification of sites where groundwater and rainfall measurement required	NRA	Sustainable use of resources, data for modelling studies, planning, licence determination.	Requires results of NRA R&D project on hydrometric networks

Issue 25 Pitstone cement quarry

Problem The proposal to turn the former cement quarry at Pitstone, to the south of the catchment on the Chalk outcrop, into a landfill site, or to re-open the workings for Chalk extraction may have implications for groundwater resources and quality. Renewed extraction of Chalk would lead to further dewatering of the Chalk aquifer with discharge to the Grand Union Canal.

Option The Pitstone application is the subject of a Public Enquiry currently in progress at the time of going to press with this Plan.

Options	Responsibility	Benefits	Constraints
Convert Pitstone quarry into landfill	Bucks County Council	Outcome of Public Enquiry - possible deterioration in Chalk groundwater quality and quantity	
Re-open Pitstone quarry for Chalk extraction	Bucks County Council	Outcome of Public Enquiry - possible deterioration in Chalk groundwater quality and quantity	

Issue 26 Hydrology of the Ouzel Watershed

Problem Significant unquantified inputs to the River Ouzel are thought to be derived from the (1) Grand Union Canal, and (2) highway runoff from new bypasses (such as Aylesbury bypass, Berkhamstead bypass and Aston-Clinton bypass. These inputs leave considerable uncertainty in the Water Resource availability balances for the Ouzel catchment.

Option Increased monitoring and hydrological studies may be required to determine the interaction of the new bypasses with groundwater recharge into the Chalk aquifer. The springflows from the Chalk should be monitored to ensure that resources are being used in a sustainable way.

Similarly, studies are required to quantify the inputs from the Grand Union canal and bypasses into the river system, in partnership with Thames Region NRA, British Waterways and other NRA functions such as Planning Liaison, Flood Defence, and Water Quality.

Options	Responsibility	Benefits	Constraints
Increased monitoring to identify hydrological inputs to the Upper Ouzel catchment	NRA, AWS, British Waterways, IDBs	Improved management of water resources and flood warning	Cost
Do Nothing			

Issue 27 Rising groundwater levels in the Lower Greensand (Woburn Sands Formation)

Problem NRA monitoring has shown that in recent years groundwater levels in the Lower Greensand (Woburn Sands Formation) in the Upper Ouse have risen due to decreased volumes of industrial usage. The exact pattern and extent of this rise are not known, and its effect is likely to vary from place to place.

Option Increased monitoring of Greensand groundwater levels and springflows may be required in future, along with possible action plans to prevent adverse effects due to locally high groundwater levels. Preliminary studies have already been carried out, but more work is required.

Options	Responsibility	Benefits	Constraints
Monitoring studies on Groundwater levels	NRA	Improved management of groundwater resources	Cost
Do Nothing			

5.5 NATURE CONSERVATION AND RECREATION ISSUES

Issue 28 Restoration of Degraded Rivers and Habitats

Problem Past river management activities and development have had an adverse impact on the physical characteristics and habitat diversity of many rivers both within the river channel and along the riparian zone, eg, the flood plain.

Option The analysis of the river environmental Database (REDS), the output of which is shown on Map 28, to identify the most severely degraded river reaches. From this, using other environmental data and through investigation of its river maintenance programme the NRA will develop enhancement strategies for implementation by the NRA in collaboration with other bodies and landowners.

Option	Responsibility	Benefits	Constraints
Proactive Conservation Projects	NRA, Riparian Owners	Improved river habitats, diversifying habitats for flora and fauna, retard degradation of habitat	Timing, access, cost
During flood defence maintenance works			Timing, access, cost As and when flood defence works carried out
Do Nothing	Those stretches of rivers already degraded will remain degraded		

Issue 29 Management of Bankside trees

Problem Willows are a prominent landscape feature and important habitat in the Upper Ouse Catchment. Past and current land use practices have resulted in a decline in proactive tree management as for example pollarding.

Option River corridor surveys to identify the status of bankside willows and the development of strategies for implementation by the NRA in collaboration with other bodies and landowners.

Option	Responsibility	Benefits	Constraints
River Corridor Surveys to Identify Trees for Management and need for planting.	NRA, Riparian Owners	Maintain prominent landscape feature, increased habitat value	Cost, need to identify areas for tree management
Proactive Planting in poor areas			
Do Nothing	Many of the larger willows will be lost from our landscape due to lack of management		

Issue 30 Water Level Management Plans

Problem Under guidance from MAFF, the NRA and IDBs have committed to preparing Water Level Management Plans (WLMP) for SSSIs which they operating authorities by 1998.

Option To produce of WLMPs in the catchment for the three SSSIs where the NRA is the operating Authority and according to the procedural guide - including the need for consultation with all interested parties towards joint agreement of future management of the sites.

To apply the plans to the day to day operational activities of the NRA including links with CMPs.

Option	Responsibility	Benefits	Constraints
Production of Plans Felmersham Gravel Pits by March 1997 Nares Gladley Marsh by March 1998 Stevington Marsh by March 1998	Operating Authority - NRA or IDB, local authority, EN, MAFF, land owners and managers	Integrated use of water within catchment. Written management agreement for sites of conservation interest	Time, Resources, conflicting land use priorities which may impede success

Option	Responsibility	Benefits	Constraints
Link WLMP recommendations for future action into the relevant CMP	NRA (and as above)	Added impetus to implement plans including the necessity to review the plans periodically	WLMPs are much more detailed than other entries to CMPs Responsibility for many actions lies outside NRA control Resource limitations

Issue 31 Navigation - Canal River Link

Issue Considerable interest has been expressed by the Inland Waterways Authority to the possibility of creating a Navigation Link between the Grand Union Canal and the River Great Ouse at Bedford which would greatly extend boating opportunities between the waterways of the Midlands and South East with East Anglia.

Option The proposal from the Inland Waterways Association is the subject of a bid for Millennium funding. A steering committee with NRA representation has been set up and all of the Authority's interests will be taken on board.

Option	Responsibility	Benefits	Constraints
Assessment of detailed proposals	Bedford and Milton Keynes Waterway Trust Steering Committee, IWA, BW, Planning Authorities, NRA	Increased boating opportunities through greater network of waterways for pleasure craft. Opportunities for angling, recreation and commercial transport.	Water resources availability. Impacts of increased boat traffic on environment and ecology. Feasibility of boat movement through Ouse navigation, eg. size of lock. Impact on Ouse navigation.
Do Nothing			

Issue 32 Public Right of Navigation at Felmersham

Issue There has been some discussion about the existence of a public right of navigation on the River Great Ouse at Felmersham.

Option To investigate the full extent of the claim and establish an appropriate policy for the river's future management.

Option	Responsibility	Benefits	Constraints
Investigation of status of navigation at Felmersham.	NRA	Possible enhanced navigation	Cost, ecological implications, impact on other recreation, eg, angling. Maintenance to allow statutory navigation depth.
Do Nothing			

Issue 33 Boating Access Upstream of Bedford

Problem There is some history of canoeists using the River Great Ouse upstream of Bedford although this is not currently recognised as a Navigation channel. It is necessary to obtain riparian owners permission to navigate and conflicts can arise between anglers and canoeists. A report by the Eastern Council for Sport and Recreation recommends that powered craft should not be used in the Great Ouse upstream of Bedford although some boating associations may welcome an extension to the use of powered craft.

Option NRA to assist in arbitration between canoeists and anglers and possibly to assist in access agreements.

Option	Responsibility	Benefits	Constraints
Arbitration and access agreements	BCU, NRA, Riparian Owners, Angling Organisations, Eastern Council for Sport & Recreation.	Improved recreational access for canoeists in a scenic part of the river	Conflicts with other river users, eg, anglers and conservation interests which are not easily resolvable. Disturbance to spawning areas. Safety implications of manoeuvring around river structures.
Do Nothing			

Issue 34 Development of Marston Vale Linear Park and Community Forest

Problem Considerable development is proposed in this area and recreational opportunities for footpaths and water based recreation using brickpits should be sought.

Option NRA as a statutory consultee to liaise with responsible authorities to encourage appropriate fisheries, recreation and conservation opportunities.

Option	Responsibility	Benefits	Constraints
NRA to ensure statutory consultation process with appropriate authorities.	CoCo, Beds CC, Midbeds DC, Bed BC, Forestry Commission	Enhanced FRC features and opportunities	Cost and environmental impacts.
Do Nothing			

Issue 35 Protection of Native Crayfish in Catchment

Problem A population of non-native signal crayfish is now well established in considerable numbers in the Thornborough area of the Great Ouse. This species can carry crayfish plague which will threaten native crayfish in downstream areas. Commercial exploitation of the signal crayfish for the table also needs monitoring.

Option An assessment needs to be made as to the extent of both native and signal crayfish within the catchment and the NRA's legislative powers to control exploitation of an invertebrate needs examining. Efforts should be made to prevent the spread of the non-native signal crayfish.

Option	Responsibility	Benefits	Constraints
Desktop study of species distribution within catchment	NRA, English Nature	Increased knowledge of status allowing action and management plan to be produced	Cost, time Problem of controlling non-native species spreading
Do nothing			

Issue 36 Management of Macrophytes and Emergent Vegetation.

Problem The Upper Ouse Catchment supports a diverse array of both marginal and submerged plants which form both important landscape and habitat features. These however may need to be managed for flood defence purposes and when present in large quantities can severely restrict angling opportunities. <link to issue 4>

Option Liaison with affected angling clubs when undertaking maintenance works to optimise angling whilst undertaking other statutory duties subject to an assessment of conservation needs.

Option	Responsibility	Benefits	Constraints
Liaison with affected organisations when undertaking maintenance works	NRA	Maintenance of habitat diversity and increased recreational potential	Cost. Balance between flood defence/conservation and recreational needs. Restricted to when flood defence maintenance carried out.
Do Nothing	Increase flooding and restrict recreational opportunities		

Issue 37 Enhancement and Restoration of Redundant Side channels, Backwaters, Millstreams

Problem There are a considerable number of former mills and flood defence structures on the Great Ouse between Buckingham and Bedford many on the former sites of mill channels which are now either redundant or have fallen into neglect. Opportunities may exist for re-opening some of these to afford angling facilities or helping re-create wet meadows.

Option NRA to collaborate with landowners/Countryside Commission etc to assess viable scheme and put into place river restoration programme.

Option	Responsibility	Benefits	Constraints
Look for opportunities to enhance/restore diversity of instream habitats.	NRA. Riparian Owners, Conservation organisations	Increased habitat diversity and potential for increased recreation	On-going maintenance responsibility would need to be established. Cost, Riparian Owners agreement. Subject to Capital bids.
Do Nothing	No increase in habitat diversity or increased recreation potential		

Issue 38 Biodiversity (species)

Problem Decline/possible decline of biological diversity within catchment area.

Option NRA to liaise with external organisations to produce Biodiversity Action Plans.

Option	Responsibility	Benefits	Constraints
NRA to liaise with relevant external organisations to produce Action Plans	NRA, English Nature, RSPB, Wildlife Trusts	Protection of native species wildlife habitats	Cost, time, collection of relevant information
Do nothing	Native species and habitats will continue to decline		

5.6 DEVELOPMENT ISSUES

Issue 39 Structure and Local Plans

Problem The broad objective of catchment management planning is to conserve and enhance the total water environment through effective land and resource management. However, the NRA has very little control over the mechanisms which determine land use change on a catchment wide basis, this being the responsibility of local planning authorities through implementation of the Town and Country Planning Acts. In its role of consultee, the NRA seeks to influence policies in statutory (and non-statutory plans) to conserve and enhance the water environment and associated lands.

Option As the policies in statutory development plans set out the framework for land use change and will provide the key reference in determining development applications, it is essential that the NRA's aims for the water environment are fully represented by the planning policy statements and in the location of allocated or designated development sites.

The NRA has produced "*Guidance Notes for Local Planning Authorities on the Methods of Protecting the Water Environment through Development Plans*" (currently under review) and the aim is that the objectives will be substantially replicated in each Local Authority plan.

Option	Responsibility	Benefits	Constraints
Timely (earliest possible) and authoritative input to development planning	LPA, NRA	Protection and enhancement of the water environment	Time, Resource constraints, increased risk to the water environment
Forge closer links with Development Plans and CMPs	NRA, LPA	Full consideration of water issues	Differing CMP and planning schedules, Time, resources
Do Nothing			Impact on Water Environment

Issue 40 New Roads and Bypasses

Problem The impact that road construction has on the water environment can be considerable.

From a water quality viewpoint, there are two concerns regarding highway drainage and its potential to pollute both surface and groundwater;

- diffuse contaminants, ie, tyre rubber, de-icer, vehicle emissions, etc.
- large spillages from road traffic accidents.

Water resources may be affected both during road construction and in the longer term. The use of deep cutting to reduce the visual impact of the road can impact on a resource in terms of groundwater flow and dewatering. The road forms an impermeable barrier thus reducing groundwater recharge and therefore reduces resources.

The efficient discharge of surface water from road carriageway and verges to a watercourse can cause or exacerbate flooding. Roads crossing flood plains can result in increased flood levels.

Intrusion, pollution and the change in water course flow regimes can drastically affect the ecosystem.

Option

All of the above problems associated with road construction are addressed by the NRA in its consultation role with the road promoters. It is essential, however, that the NRA is consulted at an early stage of the road design and that sufficient detail is made available to enable a meaningful response to be made.

The water quality of highway runoff can be improved by settlement and flotation, by the provision of grit traps and petrol/oil interception. Where appropriate, provision should be made for the use of surface water flow attenuation ponds which may double up as a suitable means of quality control.

To prevent pollution from road traffic accidents, the NRA requests provision of pollution containment facilities to be incorporated into the surface water drainage systems of major highways. These will collect and hold spillages up to the volume of 20 m³ and can be isolated from the drainage system. This arrangement is enhanced with strategically positioned oil interceptors.

From a resources and flood risk point of view, the NRA prefers that highways drainage discharges are to soakaway. From a water quality perspective, however, the use of soakaways is restricted and generally the disposal of highway water is to a watercourse with flow attenuation often being required to prevent flooding. Attenuation can also be a requirement on environmental grounds to maintain the flow regime status quo in the receiving watercourse.

The requirement when watercourses and their attendant flood plains are crossed by roads is that the crossing will satisfy the NRA in terms of flood conveyance, flood storage and where appropriate navigation.

Option	Responsibility	Benefits	Constraints
Early consultation and negotiating with road developers	Developer, Highways Agency, County Council, NRA	Optimum protection to water environment, flood and pollution prevention	Cost, time, design, political
Do Nothing			

Issue 41 Surface Water Run-Off from Milton Keynes

Problem In general, surface water run-off from the new town of Milton Keynes is balanced such that the land drainage situation downstream is no worse than that existing prior to development. Certain areas to the east of the designated development area drain directly to Broughton Brook, a River Ouzel Internal Drainage Board watercourse which discharges into the River Ouzel, north of Willen Lake. The problem is that the capacity of Broughton Brook is insufficient to accommodate the maximum surface water sewer discharge from this eastern development area. The consequence of which will be the unacceptable flooding of development areas and adjacent agricultural land.

Option Increase the capacity of Broughton Brook to accommodate the surface water discharge from the development or flow attenuation of the development surface water discharge. The impact on the River Ouzel will need to be considered. This is a complex issue with no straightforward solution.

Option	Responsibility	Benefits	Constraints
Increase capacity of Broughton Brook	R. Ouzel IDB, AWS, NRA, New Town Commission	Enable development to take place with acceptable flood risk and maintain agricultural land flood risk	cost, maintenance May make down stream flooding more severe
Surface Water discharge attenuation	R. Ouzel IDB, AWS, NRA, New Town Commission	as above	cost, maintenance
Do Nothing - do not offer land up for development			

SECTION 6
NEXT STEPS AND APPENDICES

6.0 NEXT STEPS

6.1 This document has been produced through internal discussion and informal liaison with external bodies principally at the meeting convened in Milton Keynes on 18 October 1995. The purpose of this Report is to consult formally with organisations, groups and individuals interested in the future of the catchment's water environment. Consultation will enable the NRA to:

- Clarify the extent and distribution of current uses of the catchment
- assess their importance, now and in the future
- expose catchment-specific issues to a wide audience and establish if there are any additional issues that need to be considered
- ensure decisions on the future management of the catchment are based on accurate information and the fullest possible range of views from interested parties.

6.2 In commenting on this plan, it is hoped that both points of detail and strategic issues will be tackled. **The most important element of this process is for the NRA to gain feedback on the issues themselves and options for management which can be fed into the next stage in the process, the Action Plan.** In particular, the following questions should be considered:

- have the current and future uses of the catchment been identified?
- have the issues been fairly addressed, what opinions do you have on them and the actions we propose? What issues are the highest priority to you?
- Has any aspect been overlooked?

6.3 The consultation period will last for three months following a formal launch in March 1996. The NRA will advertise and distribute the plans as widely as possible. During this period, comments can be submitted in writing to:

*The Planning Manager
Upper Ouse CMP
National Rivers Authority
Anglian Region - Central Area
Bromholme Lane
Brampton
Huntingdon Cambs PE18 8NE*

(After the 1 April 1996, please address to the Environment Agency)

All comments must be with us by 13 June 1996.

- 6.4 At the end of the consultation phase, results of the process will be considered in detail before producing a definitive Action Plan. The NRA also prepare a Statement on Public Consultation which is available on request which details the responses made and how perceived problems may be resolved within an integrated Action Plan.
- 6.5 In collaboration with the jointly responsible organisations, the NRA will aim to pursue and implement the activities outlined in the Action Plan (November 1996). This Action Plan will define both a strategy for the future management of the catchment and a series of planned activities for the NRA and others to implement in order to deliver the strategy.
- 6.6 It is the NRA's intention that the plan should influence the policies and the action of planning authorities and developers as well as assisting in the day to day management of the catchment. An annual review will be undertaken to monitor progress. A full revision of the Consultation Report will be carried out every five years.
- 6.7 **The information and views you provide are therefore a very important step in the overall process. It is hoped that you will respond positively to this initiative so that a shared vision for the Upper Ouse Catchment can be developed.**

APPENDICES

APPENDIX A GLOSSARY

Abstraction Licence	A statutory document issued by the NRA to permit removal of water from a source of supply. It can limit the quantity of water taken daily etc.
Acidification	The detrimental effect of acid rain on soils and freshwater.
Agenda 21	A comprehensive programme of worldwide action to achieve a more sustainable pattern of development for the next century. UK Government adopted the declaration at the UN Conference on Environment and Development (the Earth Summit) held in Rio de Janeiro in 1992.
Agrochemicals	Chemical substances used in agricultural production including fertilisers, herbicides, fungicides and insecticides.
Algae	Microscopic (sometimes larger) plants, which may be floating or attached. Algae occur in still and flowing water.
Algal blooms	Rapid growth of phytoplankton in marine and freshwaters which may colour the water and may accumulate on the surface as a green scum. Decomposing dead cells consume large quantities of oxygen in the water which may result in the waters becoming anaerobic. Some blooms (such as certain species of blue-green algae) may produce poisons.
Alluvial Deposits	Sedimentary deposits resulting from the action of rivers. Typically fine grained material carried by the river and deposited in areas such as flood plains.
Ammonia	A chemical compound found in water often as a result of pollution by sewage effluents. It is widely used to determine water quality. Ammonia detrimentally affects fish.
AMP2	An acronym for the second Asset Management Plan produced by the Water Companies for the Office of Water Services (OFWAT). It sets out the water industry investment programme for the period 1995 to 2005.
Anaerobic	The absence of oxygen. Conditions suitable only for organisms which do not require free oxygen or air for respiration.
AOD(Above Ordnance Datum)	Land levels are measured relative to the average sea level at Newlyn in Cornwall. This average level is referred to as 'Ordnance Datum'. Contours on Ordnance Survey maps of the UK show heights in metres above Ordnance Datum.
Aquatic	Pertaining to the water environment.
Aquifer	A water bearing-stratum situated below ground level. The water contained in aquifers is known as groundwater.
Attenuation	Reduce in force or amplitude, eg, pollution, flow, etc.
Augmentation	The addition of water by artificial input. (Usually to "top up" low flows in summer by either groundwater pumping or via reservoir release.)

Base Flow	The proportion of river flow that is provided by groundwater discharge from an aquifer.
Biochemical Oxygen Demand (BOD)	A standard test which measures over 5 days the amount of oxygen taken up by aerobic bacteria to oxidise organic (and some inorganic) matter.
Bio-diversity	Diversity of biological life, the number of species present.
Biomass	Total quantity or weight of organisms in a given area or volume - eg, fish biomass is measured as grammes per square metre (gm^{-2}).
Blue-Green Algae	Ubiquitous, usually microscopic plankton with properties characteristic of both bacteria and algae. In still, calm conditions they can grow to excess to form dense blooms and scums, and are known to produce chemicals toxic to mammals.
Borehole	Well sunk into a water bearing rock.
Boulder Clay	Residue deposited by glaciers as they retracted at the end of the ice ages. It consists of a mixture of rock fragments, clay, sand and gravels.
Brundtland Report	Report of the 1987 World Commission on Environment and Development.
Buffer Zone	Strip of land 10-100m wide, alongside rivers which is removed from intensive agricultural use and managed to provide appropriate habitat types.
Carr	Wet woodland usually composed of alder and willow.
Carstone	A form of <i>Lower Greensand</i> which is often more like a sandstone than a sandy deposit.
Catchment	The total area from which a single river system collects surface run-off.
Chalk	A calcium-rich rock formed from deposition of the shells of marine creatures. Groundwater is found within the fissures of the rock.
Channel Morphology	The physical shape or form of river channels arising from hydrological processes, and from basin development at the catchment scale.
Chloroform	An organic solvent commonly used throughout industry.
Coarse Fish	Freshwater fish other than salmon and trout.
Coliform (Faecal Coliforms)	A group of bacteria distinguished by their ability to degrade lactose to produce acid and gas. They are used as indicators of possible contamination of water by sewage.
Combined Sewer Overflow (CSO)	An overflow structure which permits a discharge from the sewerage system during wet weather conditions, and consists of both foul and surface water discharge.
Confined Aquifer	An aquifer which is overlain by rocks of low permeability so that the movement of water is restricted and the groundwater within the aquifer is confined under pressure. A confined aquifer is termed artesian when boreholes drilled into it overflow without being pumped.

Confluence	The point at which two rivers meet.
Consent (Discharge)	A statutory document issued by the NRA. It can authorise entry and indicate any limits and conditions on the discharge of an effluent to a Controlled Water. A land drainage consent is an approval for specified structural works in areas under NRA control.
Controlled Waste	Industrial, household and commercial waste, as defined in UK legislation. Controlled waste specifically excludes mine and quarry waste, wastes from premises used for agriculture, some sewage sludge and radioactive waste.
Controlled Waters	All rivers, canals, lakes, groundwaters, estuaries and coastal waters to three nautical miles from the shore, including the bed and channel which may for the time being be dry.
Countryside Stewardship Scheme	Scheme set up by the Countryside Commission in which land-owners are granted aid to manage their land in an environmentally sensitive manner.
Countryside Structure Plans	Statutory documents produced by County Councils outlining their strategy for development over a 10-15 year timescale.
Crown	The activities and properties owned by the Crown and Central Government are often exempt from the requirements of much of the legislation pertaining to the water environment. Exemption is likely to be removed under Environment Act.
Culvert	Drain or covered channel carrying water across or under a road, canal etc.
Cumecs	Cubic Metres per Second: equivalent to 86.4 thousand cubic metres per day.
Cyprinid fish	Coarse fish, eg, Roach, Dace and Bream.
Dangerous Substances	Substances defined by the European Commission as in need of special control. This is because they are toxic, accumulate and concentrate in plants and animals, or do not easily break down into less dangerous substances. They are classified as List I or List II.
Demand	The requirement for water for human use.
Demand Management	Activities to manage the amount of water required from a source of supply; includes measures to control waste and/or to discourage use.
Derogation	A legal term that describes a diminution of the water rights of existing water users due to a new abstraction.
Determinand	A general name for a characteristic aspect of water quality. Usually a feature which can be described numerically as a result of scientific measurement.
De-watering	Removal of groundwater to reduce flow rate or diminish pressure.
Diffuse Pollution	Pollution without a single point source eg. acid rain, pesticides, urban run-off etc.
Diffuse Source	Pollution from non-point sources.
Discharge capacity	The volume of water per unit of time able to be conveyed by a channel or pipe.

Dissolved Oxygen (DO)	The amount of oxygen dissolved in water. Oxygen is vital for life so this measurement is an important, but highly variable, indicator of the 'health' of the water. It is used to classify waters.
District Local Plans	Statutory documents produced by District or Borough Councils to implement the development strategy set out in County Structure Plans. Specific land use allocations are identified.
Drift	Transported superficial deposits, especially those transported by ice.
Dry Weather Flow (Sewage Treatment Works)	For sewage works, this is calculated by adding estimates of the domestic sewage discharge (which is the population multiplied by the per capita consumption) plus any industrial discharges plus infiltration into the sewer.
Dry Weather flow (River)	For the river, the Dry Weather Flow is taken to be what is known as the 95 percentile low flow (or Q95) which means the river is higher than Q95 for 95 percent of the time.
EU Directive	A type of legislation issued by the European Union which is binding on Member States in terms of the results to be achieved but which leaves to Member States the choice of methods.
EC Regulation	European Community legislation having legal force in all member states.
Ecology	The study of relationships between an organism and its environment.
Ecosystem	A functioning, interacting system composed of one or more living organisms and their effective environment, in biological, chemical and physical sense.
Effluent	Liquid waste from Industry, agriculture or sewage treatment plants.
Effluent Re-use	The use of effluent treatment to appropriate standards for various uses from low grade (grey water) uses to potable supply. The term generally refers to indirect use of treated effluent - effluent mixed to a large degree with other raw water.
Emergency Overflow (EO)	Discharge of crude sewage from sewerage system because of mechanical or electrical breakdown of pumps.
Emergent Vegetation	Plants with roots in the river bed but which emerge from the water. Examples include reeds, iris and bulrush.
Environmental Indicator	A measure which can be used to assess the present state of the environment by looking at trends over time.
Environmental Prescribed Flows	That flow which should not be artificially reduced if the riverine environment is to be protected.
Environmentally Sensitive Area (ESA)	An area where traditional farming methods may be supported by grant aid from the Ministry of Agriculture, Fisheries and Food (MAFF) to support distinctive landscape, wildlife habitats or historic features.
Eutrophic	A description of water which is rich in nutrients. At worst, such waters are sometimes beset with unsightly growths of algae.

Faecal Coliforms	Usually taken to be synonymous with <i>Escherichia coli</i> (<i>E. coli</i>). These are coliform (ibid) bacterial characteristic of faecal pollution of mammalian origin. These bacteria are relatively harmless but their presence indicates that harmful micro-organisms may also be found.
Fauna	Animal life.
Fish Biomass	A measure of the quality of a fishery as found in terms of surveys, weight by area ie g/m ² .
Fissure	A crack or open break in rocks.
Flash (or Flashy)	An upland river or river catchment area where rainfall moves rapidly from the land surface to the river, causing sudden high flows shortly after the peak rainfall event.
Flood Defences	Anything natural or artificial that protects against flooding, to a designed return period.
Flood Plain	This includes all land adjacent to a watercourse over which water flows or would flow but for flood defences in times of flood.
Flora	Plant life.
Fluvial	Relating to the freshwater river.
Forestry Authority (FA)	Advisory and Regulatory arm of the Forestry Commission.
Forestry Enterprise	The commercial arm of the Forestry Commission.
Freshwater Fish	For the purposes of the Salmon & Freshwater Fisheries Act 1975, fish other than Salmon, Brown Trout, Sea Trout, Rainbow Trout and Char.
Gauging Station	A site where the flow of a river is measured.
General Quality Assessment (GQA)	A new scheme replacing the NWC Classification system. It provides a means of assessing and reporting environmental water quality in a nationally consistent and objective way. The chemical grades for rivers introduced in 1994 uses BOD, Ammonia and Dissolved Oxygen limits for water quality between A (Good) and F (Bad). Other grades for estuarine and coastal waters are being developed and aesthetic components will be measured and graded by a system under trial now.
Glacial Deposits	Term used to describe all unconsolidated superficial deposits overlying solid rock left by glacial activity.
Glide	An area of deep flowing water in a river.
Groundwater	Water which saturates a porous soil or rock substratum (or aquifer). Water held in storage below ground level.
Groundwater Protection Policy	NRA policy which controls activities having the potential to pollute ground water resources.
Habitat	The customary and characteristic dwelling place of a species or community.
Herbicide	Substance used to control weeds.

Hydrogeology	Branch of geology concerned with water within the Earth's crust.
Hydrology	The study of water on and below the earth's surface.
Hydrometric	The measurement of water.
Impounded	The holding back of water behind a dam. Strictly a structure which raises water levels above their "normal" height. May need a licence and/or Land Drainage Consent from the NRA.
Impoundment Reservoir	Surface water storage area formed by construction of a dam and supplied only by natural inflow from the upstream catchment.
In river needs	The totality of requirements for the water environment and effluent dilution before abstraction is taken into account.
Insecticide	Substances used to destroy or repel insects.
Integrated Pollution Control	An approach to pollution control in the UK which recognises the need to look at the environment as a whole, so that solutions to particular pollution problems take account of potential effects upon all environmental media. Currently administered by HMIP it applies to prescribed processes and uses the principles of BATNEEC and BPEO.
Interceptor/Separator	A device for separating oil from water and containing it, which when used as part of a drainage system limits the amount of oil discharging to watercourses and to the ground from roads and garages etc.
Internal Drainage Boards (IDBs)	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.
Invertebrate fauna	Animals which lack a vertebral column - used for biological classification. Especially macro-invertebrates (animals of sufficient size to be retained in a net with a specified mesh size).
IPC Authorization	An authorization issued by Her Majesty's Inspectorate of Pollution prescribed by the Environmental Protection Act 1990 covering certain operation of processes.
Landfill	Site used for waste disposal into/onto land.
Leachate	Liquor formed by the act of leaching.
Macroinvertebrate	Animals without backbones eg leeches, snails, worms, insects.
Macrophytes	Any plant observed by the naked eye and nearly always identifiable. This definition includes all higher aquatic plants, vascular cryptogams and bryophytes, together with groups of algae which can be seen to be composed predominantly of a single species.
Main River	The watercourse shown on the statutory 'Main River maps' held by NRA and MAFF. The NRA has permissive powers to carry out works of maintenance and improvement on these rivers.
mAOD	A measure of altitude. Metres above ordnance datum.

Mean Annual Flood	Mean of the annual peak discharges in the period of record.
Microbiology	The study of micro-organisms (eg, bacteria, viruses).
Minimum Acceptable Flow (MAF)	The minimum acceptable flow as defined in Section 21 of the Water Resources Act 1991.
Minimum Maintained Flow (MMF)	The flow at a control point downstream of an intake on a regulated river that must be maintained at all times.
Minimum Residual Flow (MRF)	Target flow set locally and not legally defined.
Models	Usually theoretical frameworks, often using computers, which use mathematical formulae to describe in a simplified way the complexity of the water environment.
Morphology	The form of the structure of plants and animals.
National Nature Reserve (NNR)	An area of national importance for nature conservation.
National Water Council Class (NWC Class)	A summary of the quality of river water based largely on the measured chemical for the purposes of classification and reporting. To be replaced at the end of 1994 by a "General Quality Assessment" scheme.
Nitrate Sensitive Areas (NSA)	An area where nitrate concentrations in sources of public drinking water exceed, or are at risk of exceeding the limit of 50 mg/l laid down in the 1980 EC Drinking Water Directive, and where voluntary, compensated agricultural measures were introduced in 1990 as a means of reducing those levels.
Nitrate Vulnerable Zone (NVZ)	An area where nitrate concentrations in sources of public drinking water exceed, or are at risk of exceeding the limit of 50 mg/l laid down in the 1991 EC Nitrate Directive, and where compulsory, un-compensated agricultural measures will be introduced from 1996 as a means of reducing those levels.
Nutrient	Substance providing nourishment for plants and animals eg nitrogen, phosphorus.
OFWAT	Office of Water Industry's Financial Regulator of Water Service Companies.
Outfall	The point at which a river discharges to a downstream source eg estuary, sea; it may also include an outfall structure to prevent sea waters backing up the system.
Permissive Powers	Powers which confer on the NRA the right to do things but not the duty.
Pesticides	Substances used to kill pests, weeds, insects, fungi, rodents etc.
pH	Quantitative expression of acidity or alkalinity of a solution.
Planning Margin	Margin of supply capacity over demand (encompasses "outage" and other factors) to ensure secure water supplies.
Pollard	To cut a tree so as to produce a close rounded head of young branches. The cut is made above the level reachable by grazing animals.

Porosity	The volume of water which can be held within a rock or soil, expressed as the ratio of the volume of the voids to the total volume of the material.
Potable Water	Water of a suitable quality for drinking.
PPG23	Planning Policy Guidance 23: Planning and Pollution Control. Notes which set out the Government's policies towards planning and pollution control which must be taken into account by Planning Authorities.
Prescribed Flow	A flow set to protect lawful downstream users and the aquatic environment.
Prescribed Process	Under IPC, processes described in regulations, that are the most potentially polluting or technologically complex industrial and other.
Prescribed Substance	Under IPC, a potentially polluting or harmful substance discharges which should be prevented, minimised or rendered harmless.
Public Water Supply	The supply of water by companies appointed as Water Undertakers by the Secretary of State for the Environment under the Water Industry Act 1991.
RAMSAR	Wetland site of International Importance that is designated under the Ramsar* convention (*a town in Iran where the international convention originally agreed in 1975 to stem the progressive encroachment on, and loss of, wetland).
Raw Water	Water in its natural state; before treatment.
Reach	A length of a river.
Recharge	Water which percolates downwards from the surface into groundwater aquifers.
Red Data Book Species	The most threatened species in Great Britain.
Red List Substance	Substance which has been selected for monitoring on the basis of its persistency toxicity and ability to bioaccumulate.
Return Period	Refers to the frequency of a rainfall or flooding event. Flood events are described in terms of the frequency at which, on average, a certain severity of flow is exceeded. This frequency is usually expressed as a return period in years, eg. 1 in 50 years.
Riffle	A shallow area in a river where the substrate is composed of gravel and the flow is faster.
Riparian	Of, or on, land contiguous to the river.
Riparian Owner	Owner of riverbank and/or land adjacent to a river. Normally owns riverbed and rights to midline of channel.
Rising Groundwater	Resulting in some locations from the natural recovery of an aquifer following a reduction in groundwater abstraction.
River Corridor	The continuous area of river, river banks and immediately adjacent land alongside a river and its tributaries.
River Flow Objectives (RFO)	A series of flows which aim to reflect the varying in river needs and the seasonality of flow patterns.

River Habitat Survey (RHS)	An inventory survey of physical features of the river and adjacent habitat.
River Quality Objectives (RQO)	The level of water quality that a river should achieve, in order to be suitable for its agreed use. Is being replaced by Water Quality Objectives (WQO's).
Rivers Environmental Database (REDS)	Comprehensive database based on 500m stretch surveys of statutory main river. It maps the physical and environmental information and provides a basic conservation resource.
Salmonid Fish	Game fish eg. trout and salmon.
Scheduled Ancient Monument (SAM)	The key sites nationally for archaeology, designated by the Secretary of State for National Heritage, through English Heritage.
Septic tank	A tank used for the treatment of sewage from properties without mains drainage. The sewage is settled and some bacterial treatment occurs. Discharge of effluent is usually to a soakaway system.
Set-Aside	The EC set-aside scheme was first introduced for the crop year 1991/92 as part of the Common Agricultural Policy reform to allow farmers to remove land from production by receiving compensation. Eligible crops are a wide range of arable crops, principally cereals.
Sewage	Liquid waste from cities, towns and villages which is normally collected and conveyed in sewers for treatment and/or discharge to the environment.
Sewerage	System of sewers usually used to transport sewage to a sewage treatment works.
Silage	A winter feed for cattle. Silage is produced throughout the summer by bacterial action on freshly cut grass or other crops stored in silos.
Siltation	At low velocities water will deposit the material being carried in suspension. 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.
Site of Special Scientific Interest (SSSI)	A site given a statutory designation by English Nature or the Countryside Council for Wales because it is particularly important, on account of its nature conservation value.
Sludge	The accumulation of solids from treatment processes. Sludge can be incinerated or spread on farm land.
Slurry	Animal waste in liquid form.
Soakaway	System for allowing water or effluent to soak into ground, commonly used in conjunction with septic tanks.
Source Protection Zones	A Source Protection Zone (SPZ) is the area over which recharge is captured by an abstraction borehole. SPZs are designated by the NRA and are delineated to protect potable water supplies against the polluting effects of human activity.
Special Protection Area (SPA)	Statutory protected habitats for wild birds under EC Regulations.
Spray Irrigation	The watering of crops by spraying. Can have a high impact on water resources.

Springs	Natural emergence of groundwater at the surface.
Statutory Consultee	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. An exception to this is where the NRA us a Statutory Consultee for IPC where the NRAs requirements would be taken as the minimal acceptable.
Statutory Powers	Powers conferred (eg on the NRA) where it has a duty to do things.
Statutory Water Quality Objectives (SWQO)	Methods of classifying waters and targets for individual waters that have been given statutory force through the issue of Regulations by the Secretary of State under the Water Resources Act 1991.
Strata	A term applied to rocks that form layers or beds. Can also be applied to successive layers of any deposited substance eg. atmosphere, biological tissue.
Substrate	The base material, usually a rock or deposit, upon which a habitat is formed.
Surface Water	Water collecting on and running off the surface of the ground.
Suspended Solids	The density of undissolved matter which is held by a water body. It will vary with the turbulence and velocity of the water.
Sustainable Development	Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.
S105 Surveys	Section 105 of the Water Resources Act 1991 allows for Standards of Service, Assets and Flood Risk Surveys.
Telemetry	A means of directly collecting data from remote sites.
Trade Effluent	Effluent derived from a commercial process/premises.
Turbidity	Measure of the light scattering properties of the water caused by suspended matter.
Unconfined Aquifer	An aquifer in which the groundwater forms a free water table within the porous rock.
Underground Strata	A term used to signify geology under the surface soil layer. If groundwater exists, or if water is being discharged to the ground, the geology underneath the soil layer is known in the various Acts of Parliament as 'underground strata'.
Velocity	The speed of movement of water past a point. Velocity i measured in metres per second (m/sec).
Watercourse	A stream, river, canal or channel along which water flows.
Water Quality Objectives (WQO)	Water quality targets to secure specific formal minimum quality standards for specific stretches of water by given dates. A new component of these is introduced by "The Surface Waters (River Ecosystem Classification) Regulations 1994"; a classification scheme to be applied by NRA to the rivers and watercourses of England and Wales. Other existing standards operate already to give effect to various EC Directives for water quality.

Water Resource	The naturally replenished flow of recharge of water in rivers or aquifers.
Water Table	Top surface of the saturated zone within the aquifer.
Weir	A dam built across a river to raise upstream levels.
Wetland	An area of low lying land where the water table is at or near the surface for most of the time, leading to characteristic habitats.
1:10 Year Drought/Flood	A drought/flood event with a statistical probability of occurring once in a ten year period (other periods may be specified in a similar way).
95%ile Limit	A numerical limit, specified in a discharge consent, which must be achieved or bettered for at least 95% of a specified time period.

ABBREVIATIONS - ACRONYMS

ADAS	....	Agricultural Development Advisory Service
ALF	....	Alleviation of Low Flows
AMP2	....	Asset Management Plan 2
AOD	....	Above Ordnance Datum
AONB	....	Area of Outstanding Natural Beauty
ARTS	....	Anglian Region Telemetry Scheme
ASPT	....	Average Score Per Taxon
AWS	....	Anglian Water Services
BASIS	....	British Agrochemical Standards Inspection Scheme
BATNEEC	....	Best Available Techniques Not Entailing Excessive Costs
BC	....	Borough Council
BCU	....	British Canoe Union
BMWP	....	Biological Monitoring Working Party
BOD	....	Biochemical Oxygen Demand
BOD (ATU)	....	Biochemical Oxygen Demand (Allylthiourea)
BPEO	....	Best Practical Environmental Option
BW	....	British Waterways
CBI	....	Confederation of British Industry
CC	....	County Council
CMP	....	Catchment Management Plans
CoCo	....	Countryside Commission
COPA	....	Control of Pollution Act 1974
CPRE	....	Council for the Protection of Rural England
CSO	....	Combined Sewer Outfall
DC	....	District Council
DO	....	Dissolved Oxygen
DoE	....	Department of the Environment
DWF	....	Dry Weather Flow
DWI	....	Drinking Water Inspectorate
EA	....	Environmental Assessment
EAAC	....	Environmental Agency Advisory Committee
EC	....	European Community (European Union)
E.Coli	....	Esherichia Coli
ECSR	....	Eastern Council for Sports and Recreation
EH	....	English Heritage

EIA	....	Environmental Impact Assessment
EIFAC	....	European Inland Fisheries Advisory Commission
EN	....	English Nature
EO	....	Emergency Overflow
EPA	....	Environmental Protection Act
ESA	....	Environmentally Sensitive Area
FA	....	Forestry Authority
FAS	....	Flood Alleviation Scheme
FC	....	Forestry Commission
FE	....	Forestry Enterprise
FTE	....	Full Time Equivalent
FWAG	....	Farming and Wildlife Advisory Group
GIS	....	Geographical Information System
gm ²	....	Grams per square metre (a unit of biomass)
GO	....	Government Office
GQA	....	General Quality Assessment
ha	....	Hectare
HMIP	....	Her Majesty's Inspectorate of Pollution
HSE	....	Health & Safety Executive
IDB	....	Internal Drainage Board
IDD	....	Internal Drainage Districts
IH	....	Institute of Hydrology
IPC	....	Integrated Pollution Control
kg	....	Kilogram
km	....	Kilometre
km ²	....	Square Kilometre
LA	....	Local Authority (County, Borough or District Council)
LNR	....	Local Nature Reserve
LPA	....	Local Planning Authority
m	....	Metre
m ³	....	Cubic metre
m ³ /day	....	Cubic metres per day
m ³ /s	....	Cumec: cubic metre per second
mg/l	....	Milligrams per litre
Ml/day	....	Mega litres per day
Ml/year	....	Mega litres per year
MAFF	....	The Ministry of Agriculture, Fisheries and Food
MAF	....	Minimum Acceptable Flow
mm	....	Millimetre
MOD	....	Ministry of Defence
MRF	....	Minimum Residual Flow
µg/l	....	Microgrammes per litre
NFU	....	National Farmers Union
NGR	....	National Grid Reference
NNR	....	National Nature Reserve
NRA	....	National Rivers Authority
NSA	....	Nitrate Sensitive Area
NVZ	....	Nitrate Vulnerable Zone
NWC	....	National Water Council
OD	....	Ordnance Datum - Newlyn - the datum for all land level survey on Britain
OFWAT	....	Office of Water Services
PCB	....	Polychlorinated Biphenyls

PHABSIM	Physical Habitat Simulation Model
PPPG	.... Policy and Practice for the Protection of Groundwater
PWS	.... Public Water Supply
PWU	.... Private Water Undertakers
Q95	.... Flow that is exceeded for 95% of the flow record
R&D	.... Research and Development
RAF	.... Royal Air Force
RCS	.... River Corridor Survey
RE	.... River Ecosystem, RE1, RE2 etc.
RFFS	.... River Flow Forecasting System
RHS	.... River Habitat Survey
RQO	.... River Quality Objective
RIVPACS	.... River Invertebrate Prediction and Classification System.
RSPB	.... Royal Society for the Protection of Birds
SAC	.... Special Areas of Conservation
SAM	.... Scheduled Ancient Monument
SERCON	.... System for Evaluating Rivers for Conservation
SI	.... Statutory Instrument
SoS	.... Standards of Service
SS	.... Suspended Solids
SSO	.... Storm Sewer Overflows
SSSI	.... Site of Special Scientific Interest
STW	.... Sewage Treatment Works
SWQO	.... Statutory Water Quality Objectives
UWWTD	.... Urban Wastewater Treatment Directive
WAMS	.... Water Archive and Monitoring System
WLPM	.... Water Level Management Plan
WTW	.... Water Treatment Works
°C	.... Degrees Centigrade
%	.... Percent
>	.... Greater than
≥	.... Greater than or equal to
<	.... Less than
≤	.... Less than or equal to

APPENDIX B BACKGROUND INFORMATION

GENERAL QUALITY ASSESSMENT (GQA)
CHEMICAL GRADING FOR RIVERS AND CANALS.

Water Quality	Grade	Dissolved Oxygen (% saturation) 10-percentile	Biochemical Oxygen Demand (ATU) ¹ (mg/l) 90-percentile	Ammonia (mgN/l) 90-percentile
Good	A	80	2.5	0.25
	B	70	4	0.6
Fair	C	60	6	1.3
	D	50	8	2.5
Poor	E	20	15	9
Bad	F ²			

¹ as suppressed by adding allyl thio-urea

² quality which does not meet the requirements of Grade E in respect of one or more determinands.

APPENDIX B BACKGROUND INFORMATION

RIVER ECOSYSTEM CLASSIFICATION

CLASS	DO	BODA	NH ₃ -N	UN-IONISED NH ₃ -N	pH	HARDNESS	DISSOLVED CU	TOTAL ZN
	% SAT 10%ile	mg/l 90%ile	mgN/l 90%ile	mg/N 95%ile	5%ile - 95%ile	mg/l CaCO ₃	µg/l 95%ile	µg/l 95%ile
RE1	80	2.5	0.25	0.021	6-9	≤10 >10 and ≤50 >50 and ≤100 >100	5 22 40 112	30 200 300 500
RE2	70	4.0	0.6	0.021	6-9	≤10 >10 and ≤50 >50 and ≤100 >100	5 22 40 112	30 200 300 500
RE3	60	6.0	1.3	0.021	6-9	≤10 >10 and ≤50 >50 and ≤100 >100	5 22 40 112	300 700 1000 2000
RE4	50	8.0	2.5	-	6-9	≤10 >10 and ≤50 >50 and ≤100 >100	5 22 40 112	300 700 1000 2000
RE5	20	15.0	9.0	-	-	-	-	-

NOTES

- a. DO Dissolved Oxygen
- BODA Biochemical Oxygen Demand
- b. % SAT % Saturation
- c. %ile Percentile
- d. pH Lower limit as 5%ile, upper limit as 95%ile

APPENDIX B**BACKGROUND INFORMATION****River Quality Objectives**

The NRA has strategic target 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 classes reflect the chemical quality requirements of different types of riverine ecosystems. In the future, RQO's may be transferred onto a legally binding basis known as the Statutory Water Quality Objectives (WQOs) scheme. The River Ecosystem use 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
RE1	Water of very good quality suitable for all fish species.
RE2	Water of good quality suitable for all fish species.
RE3	Water of fair quality suitable for high class coarse fish populations.
RE4	Water of fair quality suitable for coarse fish populations.
RE5	Water of poor quality which is likely to limit coarse fish populations.

NRA Flood Defence Standards of Service

NRA 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
A	Urban	1:50	- 1:100	1:100 - 1:200
B	Lower density urban	1:25	- 1:100	1:50 - 1:200
C	Isolated rural communities	1:5	- 1:50	1:10 - 1:100
D	Isolated properties/intensive farming	1:1.25	- 1:10	1:2.5 - 1:20
E	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.

Flood Warning The flood warning Level of Service is: *"Where possible to issue an advance 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"*

Abstraction Licensing and Water Resources

Demand for water is generally on the increase and with this increase has come growing competition for our available resources. It is the responsibility of the National Rivers Authority (NRA) to ensure that water resources are managed effectively and for the benefit of everyone. The NRA fulfils this role principally through the use of a system of water abstraction licensing. As a legal requirement under the Water Resources Act 1991 (previously the Water Resources Act 1963), almost anyone who wants to take water from a surface or underground source must obtain a licence to do so from the NRA.

As pressure on water resources in England and Wales increases, the NRA needs to have a system in place which makes sure that water resources are safeguarded and that abstraction do not disrupt or cause long-lasting changes to the environment. Without this constraint, persistent over-abstractions could lead to shortages in water supply, increased river pollution by reducing dilution of pollutants, damage to fisheries and wildlife habitats and ultimately to the loss of rivers for our recreation and enjoyment. By licensing, we can control the level of abstraction to protect both water supply and the environment.

Before granting a new licence, we look at the water requirements of the applicant to assess whether they represent a proper use of water resources. We then check that no "protected rights" will be affected (we cannot grant a licence which will derogate from an existing right except with the specific consent of the person who holds that right). We then assess the potential effect of the abstraction on river flows and groundwater resources. The effects on amenity value, public health, land drainage, navigation, fisheries and nature conservation must all be considered before a licence is granted. This ensures that river flows are safeguarded and groundwater resources are not over-abtracted.

If you want to take water from a surface or underground source you must normally hold an abstraction licence. There are a number of exceptions, the more common ones being:-

- One-off abstractions of up to 5m³.
- One-off abstractions of up 20m³ with NRA consent.
- Abstraction of 20m³ or less per day from an inland water, where the inland water runs through or borders the abstractors land, for domestic or agricultural purposes other than spray irrigation.
- Abstraction of 20m³ or less per day from underground strata for the domestic purposes of one household.

APPENDIX C**PRE-CONSULTATION MEETING**

- 1 Attended by 55 consultees and NRA staff.
- 2 Chaired by Brian Elsdon, Area Planning Manager and introduced by an overview presentation.
- 3 Issues raised:
 - Bank erosion at the AWS maturation Lagoons
 - Concern over highway run-off
 - Phosphate levels in rivers and still waters and algae
 - Habitat restoration, eg, flood plain forest
 - Flood risk, eg, Newport Pagnell
 - Surface water management
 - Flood defence and river maintenance walls, eg, effect on archaeology
 - Link between CMPs and development
 - Impact of canals and relationships with British Waterways
 - Concern over navigation in the upper reaches, canoeist and Angler conflict
 - Otters, mink and cormorants
 - Level of consultation and how responses are handled.
- 4 The following tables list those involved at the meeting

ORGANISATION/NAME	REPRESENTATIVE
ADAS	John Martindale
P E Aldred	
Anglian Water Services	R Bland Dianne Stephenson Mark Driver Geoff Taylor
Barnet & District Angling Club	J A Perkins

ORGANISATION/NAME	REPRESENTATIVE
Bedford Borough Council	D Fowler Judith Gowing (Mr Bailey)
Beds & Cambs Wildlife Trust	L Kelly
Bedford Group of Drainage Boards	J K B Easom
Bedfordshire Fire Service	David Fothergill
Bedfordshire County Council	Alec Edgar
Bedfordshire Constabulary	Mr Steven Josh
Mr Bennett (Vice Chairman)	
Buckingham & District Angling Association	Bernard Lewis
Buckinghamshire Fire & Rescue Service	R Cook
Buckinghamshire County Council	Jane Hawkes
Castle Cement	R W F Boarder
County Landowners Association	Alexander Boswell
Betty Goble	
Government Office for the Eastern Region	Carolyn Adams
HMIP (Anglian Region)	Nigel Taylor
Sally Kapadia	
MAFF (Land Use Planning Unit)	A J Adams
Shirley Marler	
Milton Keynes Borough Council	Steve Crowther
Milton Keynes Parks Trust	Mike Street
Milton Keynes Wildlife Corridor Project	Ms Nicky Wheeler
National Farmers Union	A H King
National River Authority	Clive Flaunders
Newport Pagnell Fishing Association	R D Dorril
A G F Richardson	
Salmon & Trout Association	A J Cony
South Bedfordshire District Council	George Crutcher
Swanbourne Estate	John Fremantle
Waste Regulation Authority	Paul Wright
Paul Wix	Northamptonshire County Council
J F Wright	
Vauxhall Angling Club	J R Bird
Mr Morris	
Fermor Hesketh Estates	D G Preece

NOTES

DRAFT VISION FOR THE UPPER OUSE CATCHMENT

In preparing the Catchment Vision, the NRA has defined what it would wish the catchment to be. Through consultation, we must ensure that this Vision also includes the aspirations of all the partners in the production of this plan. The Vision may not be something that can be achieved in the next 5 years, but something we can all work towards in the future.

This Vision is founded on three components; managing change, community participation and environmental sustainability. 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. 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.

The Upper Ouse catchment consists of the River Great Ouse (between Brackley and Kempston Mill) and the rivers Tove, Ouzel and Twin tributaries. Other notable water features include the Grand Union Canal. The catchment is predominantly rural with development confined to established towns such as Leighton Buzzard, Newport Pagnell and the new city of Milton Keynes.

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

The NRA's vision for the Upper Ouse catchment is not only to maintain the existing values of the catchment but to work towards a future where:

- there is a holistic approach to water environmental management. One notable example is balancing the need to provide effective flood defence in the catchment with opportunities for river habitat enhancements. The future should see a move from "traditional" methods to the increased use of the floodplain for natural flood storage;
- the abundance and diversity of water-related life in the catchment is maintained and increased. For example, all headwaters supporting a brown trout population;
- further development within the catchment, especially around Milton Keynes, may result in additional discharges and therefore, increased baseflow in the catchment's watercourses. The NRA, through monitoring and investigation, needs to be in position to judge the total water resource available and therefore, balance the needs of abstractors and environmental needs such as for wetland creation;
- improvement in the water quality downstream of urban areas and maintenance of the high quality upper reaches and groundwater is achieved and Statutory Water Quality Objectives are eventually developed: and,
- peoples' enjoyment and appreciation of the river system and catchment continues to grow.

To realise the potential value and optimise the use of the water environment in a shared vision for the Upper Ouse catchment, the NRA will work in partnership with local authorities, environmental groups and all the other interested parties and individuals. The CMP will provide an important focus for this partnership and target resources where they are needed most. Partnership and community involvement is the cornerstone to implementing this plan through improved communication, raised awareness and the promotion of active participation in environmental enhancements.

