RIVER KENNET
CATCHMENT MANAGEMENT PLAN
FINAL REPORT

NRA

National Rivers Authority
Thames Region
April 1994

THE VISION

In preparing the catchment vision, the NRA has defined what it would wish the catchment to be and the principle we will follow in working towards that vision. The catchment vision may not be something that can be achieved in the next five years but something we can all work towards.

The River Kennet is the largest tributary of the Thames contributing almost half the summer flow downstream of their confluence in Reading. The Kennet is fed by seven major tributaries.

The River Kennet is a river of good water quality supporting excellent coarse and game fisheries and a public water supply from Fobney in the lower catchment. The still waters of the lower Kennet valley are a valuable recreational and ecological resource which, combined with the Kennet and Avon Canal, provide angling, bird watching, walking, nature conservation and picnic facilities. In the upper reaches of the catchment groundwater is abstracted and provides a source of supply for, amongst others, Swindon, Marlborough and Ogbourne St. George.

Development pressure will continue to be a perceived threat and conflicts between the Canal's users will need to be addressed and an acceptable balance achieved.

The management of flood risk too is a key objective and NRA activities in the catchment should reduce the risk of flooding in urban and semi-urban areas.

To achieve a sustainable policy of conservation of water resources and environmental enhancement, the NRA will work in partnership with Local Authorities and other key participants. This Plan will provide an important focus for this partnership. Our aim is not only to maintain the existing values of the water environment of the Kennet catchment but also to provide improvements to flood defences and degraded habitats, to create open green spaces, and to improve public access (where appropriate). The NRA will work to ensure the Kennet and its tributaries are well-managed watercourses of natural appearance forming attractive green corridors connecting the countryside with urban areas.

FOREWORD

This plan constitutes the first comprehensive, integrated Catchment Management Plan for the National Rivers Authority (NRA) Thames Region. Its main purpose is to identify the current status and values of the water environment in the River Kennet catchment and the issues and problems related to the water environment, and to draw up Action Plans which will safeguard and enhance the existing values and will tackle issues and problems within the wider concepts of sustainability and environmental capacity.

A comprehensive process of public consultation has brought together Local Authorities, statutory bodies, environmental organisations, interest groups and the NRA with a common commitment to conserve and enhance the River Kennet catchment. We wish to continue to consult and communicate as much as possible on a face-to-face basis in order to convert this commitment into the implementation of actions outlined in this Plan. The NRA will also use the Plan to make appropriate inputs to its West Area Sector Plans and the Region's Corporate Plan.

We are aware that adopting Action Plans in sequence (catchment by catchment) could lead to a higher priority than is deserved being given to those catchments which are dealt with first. We are also aware that more urgent needs may exist in other catchments and exert demands on limited resources. To help overcome this problem, we have embarked on the production of Catchment Reviews and will be undertaking annual reviews of all completed CMPs. The Catchment Reviews will be produced for all catchments within the next 18 months and will help set priorities for the production of Catchment Management Plans and for the implementation of actions. In addition all the participating organisations have limited resources and powers. If resources are not available due to budget shortcomings or other priorities, then the actions indicated cannot be executed within the allotted timescale.

The Kennet is a relatively high quality catchment and, while we may seem ambitious in setting detailed Action Plans, we are also keeping a close watch on the issues and priorities for other catchments.

The River Kennet Catchment Management Plan and subsequent plans for other river catchments in the Region will represent a shared vision for the future and play a key role in the protection of our water heritage while recognising the ever competing pressures on the river environment.

S. J. Darby

Stuart Darby
Area Manager (West)
NRA Thames Region

RIVER KENNET CATCHMENT MANAGEMENT PLAN
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ACKNOWLEDGEMENTS

Many individuals and organisations have contributed to the development of this report. Those with a major role in the production of this document include:

(1) Local Authorities, environmental organisations, statutory bodies, groups and individuals who responded to the NRA during the period of informal and formal liaison and consultation. A full list of consultees is available on request.

(2) The Department of Highways and Planning at Berkshire County Council for the provision of digital data for the synoptic maps.

(3) Ordnance Survey on whose maps some of the information shown on the synoptic maps is based.
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SECTION 1 - INTRODUCTION

1.1 INTRODUCTION

The National Rivers Authority *- 'Guardians of the Water Environment'*

Established in 1989, the NRA is the principal agency responsible for safeguarding and improving the water environment in England and Wales. The NRA have statutory responsibilities for water resources, water quality and pollution control, flood defences, fisheries, recreation, conservation and navigation.

The NRA has defined its role in the following ***'Mission Statement':***

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

In achieving these aims, the NRA recognises the need to work with local communities, landowners, interest groups, industry and other agencies whose activities and interests interact with or include the water environment.

Catchment Management Plans (CMPs)

To help the NRA work with others in planning for the future of the water environment, a process known as catchment management planning has been established. The Consultation Report, published in March 1993 and distributed widely for review and comment started that process for the River Kennet catchment. This document marks the culmination of that process and provides the Final Report of the River Kennet Catchment Management Plan. Sufficient background and descriptive text is included to strengthen and to support the Key Issues and Action Plans and to make this Final Report a self-contained document.

The water environment (eg rivers, streams, lakes, ponds, aquifers, springs) 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 these interactions and conflicts for the overall benefit of the water environment and its users.

The Regions of the NRA are defined in terms of natural river catchment boundaries. These have provided a logical focus for managing the water environment over many years and this approach is reflected in the CMP process. The CMP provides an opportunity for the development of a sustainable policy of conservation of water resources and environmental enhancement which can be converted into a long term vision for the catchment.

Catchment Management Plans (which are themselves non-statutory) are complementary to the statutory plans of Local Authorities; by stating clearly the NRA vision, it is hoped they will make a positive input to the formal planning process, which is the responsibility of the County, Borough and District Councils.

The NRA will be using CMPs as the basis for deciding on the allocation and deployment of its resources and will look to other participants to do the same. However, it is acknowledged that resources available to the NRA and others may not allow progress to be as rapid as we would like. The annual reviews that we undertake will highlight those actions for which this proves to be the case.

SECTION 2 - OVERVIEW OF THE CATCHMENT

2.1 KEY STATISTICS

Catchment Area	1164 sq km
Population within catchment	211 000
Population within 20 km of catchment	1 000 000
Average Annual Rainfall	764 mm
Length of waterway maintained by NRA for flood defence purposes	314 km
Length of waterway with River Quality Objectives	315km

2.2 OVERVIEW OF CATCHMENT

When at its maximum length, the River Kennet rises to the north west of Marlborough and flows southwards and then eastwards to its confluence with the Thames at Reading, a distance of some 98 km (78 km designated main river), passing through the towns of Marlborough, Newbury and Thatcham.

The catchment is an unique habitat with EC designated cyprinid and salmonid fisheries. In the west and north of the catchment the watercourses, including the Kennet itself, are spring-fed chalk streams and the River Kennet upstream of Newbury supports brown trout and rainbow trout fisheries. Surveys undertaken by the NRA indicate that water quality is generally high throughout the catchment. The condition of the River Kennet between Newbury and Reading is, however, of much local concern.

Much of the catchment falls within the North Wessex Downs Area of Outstanding Natural Beauty (AONB) - a nationally recognised designation by the Countryside Commission. The high quality of the rural landscape and the archaeological importance of sites such as Avebury (designated World Heritage Site) ensure that the western part of the catchment is strongly protected from large scale development.

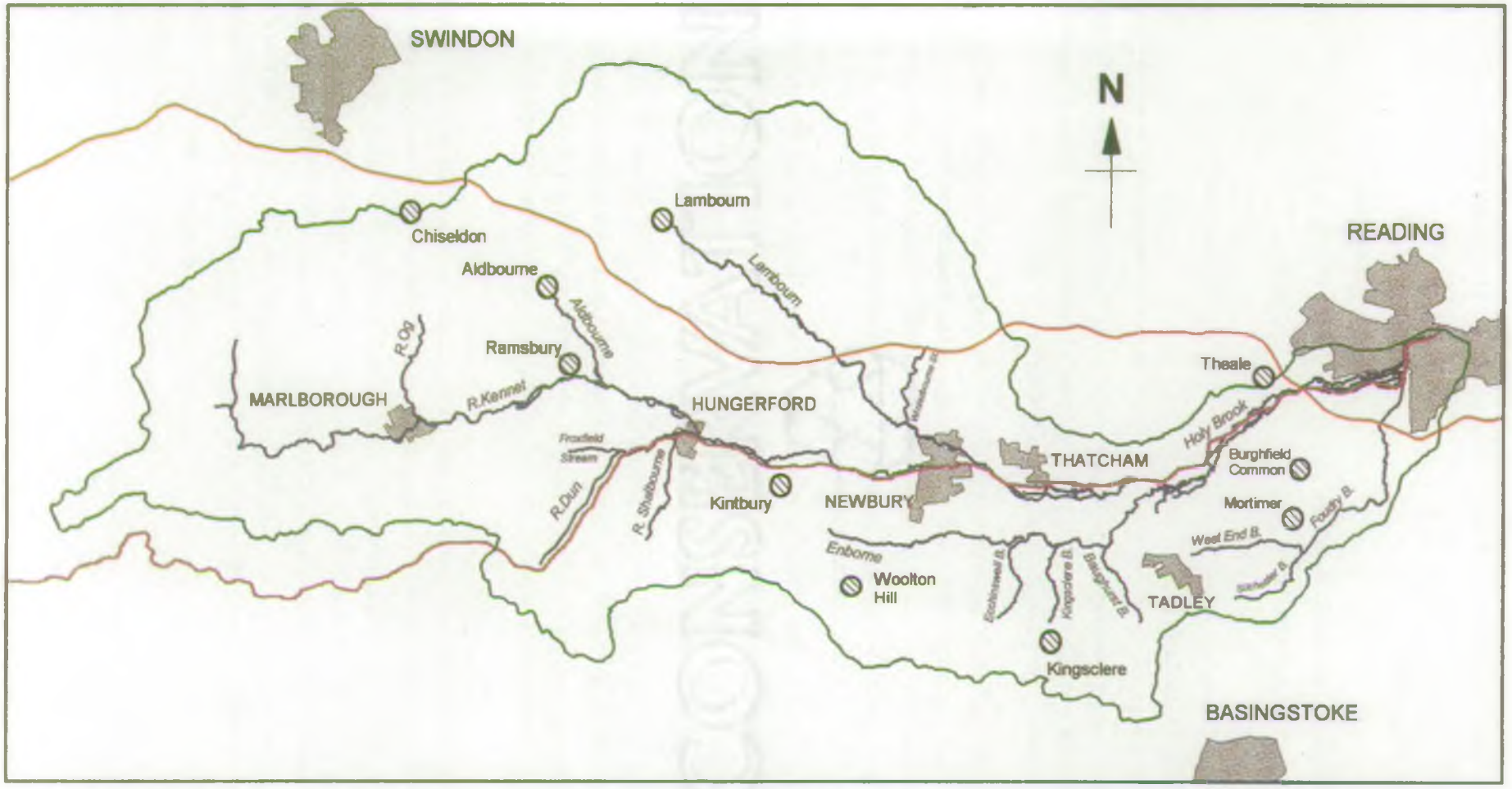
Further east, however, the Kennet valley has seen significant change over the last 40 years with urban development at Newbury, Thatcham, Tadley, Theale and Reading and mineral extraction at numerous sites between Newbury and Reading. Pressure for urban expansion and mineral extraction is continuing and while having a major impact on the landscape of the valley, can also offer opportunities for enhancement of the water environment.

The Kennet and Avon Canal was reopened in 1990 and forms an important environmental corridor providing a variety of benefits including recreation, fisheries and wildlife. British Waterways (BW) own and operate the canal which has historically suffered from a lack of water in its summit reaches to the south of Marlborough. The eastern half of this navigation falls within the boundary of the Kennet catchment, a length of 58 km incorporating 53 locks. East of Newbury, the Kennet and Avon Canal is a canalised river with alternate lengths of the navigation in the original river channel and in specially cut canal sections. While accepting that areas of conflict will exist, BW aim to achieve a sensible balance between commercial and environmental considerations.

National Rivers Authority
Thames Region

River Kennet
Catchment

OVERVIEW OF CATCHMENT



KEY										
SCALE 0 — 10 km	Catchment Boundary		Urban Area							
	Main River		Town / Village							
	Kennet and Avon Canal									
	M4 Motorway									

2.3 TOPOGRAPHY

The boundary of the catchment has been taken as the topographic divide and so includes all land which drains surface water runoff to the River Kennet and its tributaries which include the River Lambourn, River Enborne, Foudry Brook, River Dun, Aldbourne, Shalbourne and River Og.

The Kennet catchment is bounded by the Marlborough Downs to the west, the Berkshire Downs to the north and the Hampshire Downs to the south. Both the Marlborough Downs and Hampshire Downs reach heights in the order of 200 m AOD with the highest points exceeding 270 and 290 m respectively. The Berkshire Downs are 150 m high on average in the east but rise to 200 m AOD on average in the west.

The main rivers drain eastwards towards the confluence of the River Kennet with the River Thames at Reading. Flowing for over 90 km, the River Kennet falls from 190 m AOD at its highest point to the north-west of Marlborough to 130 m AOD at its perennial head at Marlborough and 50 m AOD at Reading.

2.4 GEOLOGY

The dominant geological formation in the catchment is Chalk which is overlain in the east by the clays and sands of the western end of the London Basin syncline. The structure of this syncline (or natural basin) is such that the overlying strata dip gently from the north-west to the south-east over most of the catchment. However, the syncline rises sharply on the southern edge of the catchment exposing the older Upper Greensand which underlies the Chalk.

The Lower Chalk outcrops along the northern boundary of the catchment. Moving in a south easterly direction progressively younger rocks outcrop. These include the Middle Chalk, Upper Chalk and finally the Tertiary clays and sands of the Reading Beds, London Clays and Bagshot Beds.

Drift or surface deposits occur in the form of Plateau Gravel capping some of the higher Tertiary outcrops (eg Bagshot Beds), valley gravel and alluvium along the river valleys (notably the River Kennet east of Newbury), and as Head and Combe deposits in the higher dry valleys of the Marlborough and Berkshire Downs. Some of the chalk ridges are capped by Clay with Flints.

The gravel deposits in the lower River Kennet and on the Tertiary Strata outcrops are an important mineral resource (see Section 3.11, FC4) whose use is of significance to the water environment.

2.5 GROUNDWATER

The Chalk is the major aquifer in the catchment. In the north and west of the catchment, where the Chalk outcrops at the surface, the aquifer is unconfined (ie there is no overlying rock strata and therefore rain can percolate directly through to the aquifer) and the flow in the rivers that drain the area is largely dependent on discharges from it. In the east, where the Tertiary clay and sand overlay the Chalk, the aquifer is confined and the streams draining the area do not usually have a direct connection to the aquifer.

National Rivers Authority
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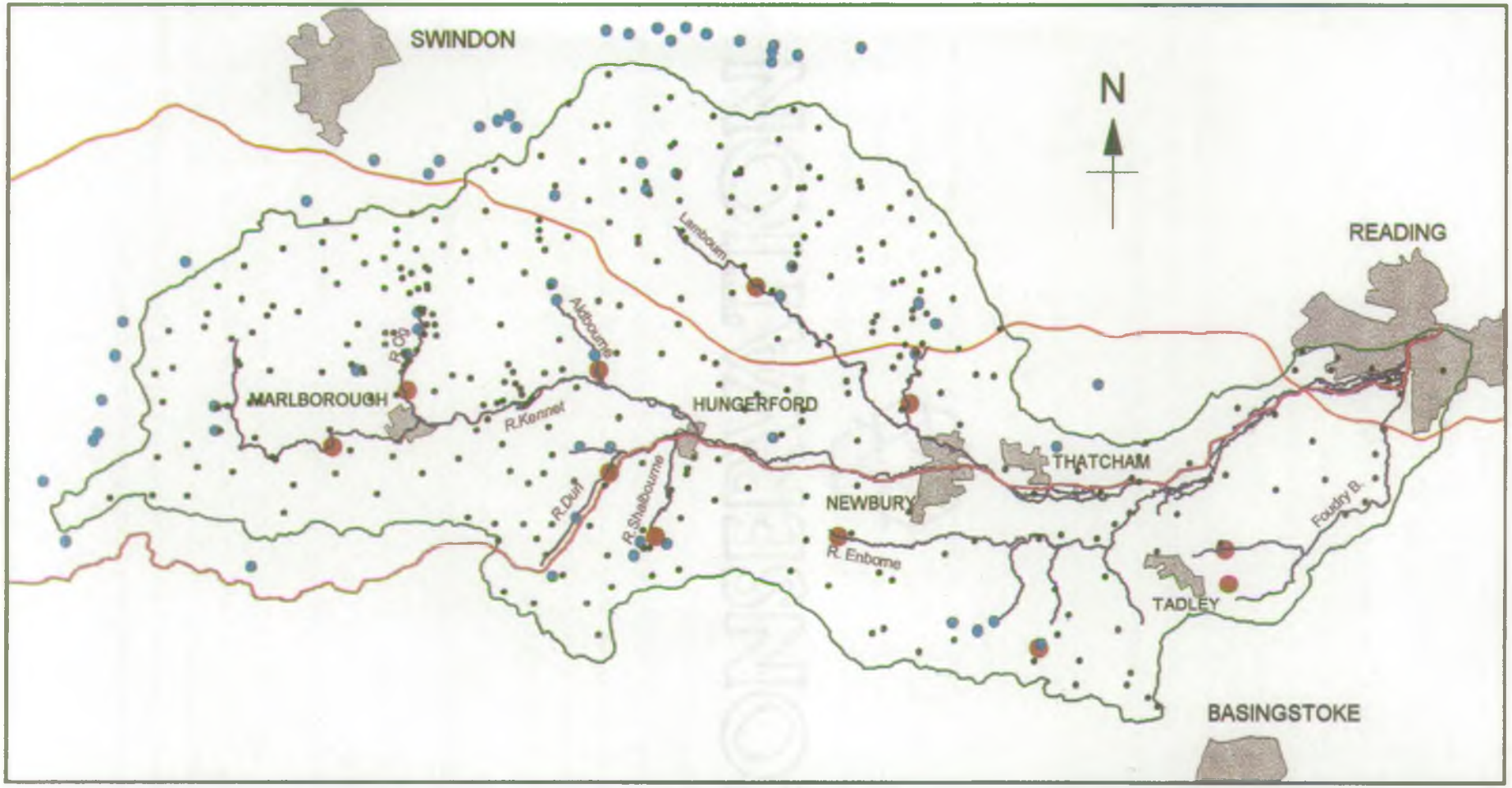
River Kennet
Catchment

GROUNDWATER



KEY

SCALE

0 10 Km

Catchment Boundary		Urban Area	
Main River		Groundwater Level Monitoring Station	
Kennet and Avon Canal		Perennial Head of Watercourse	
M4 Motorway		Spring Source	

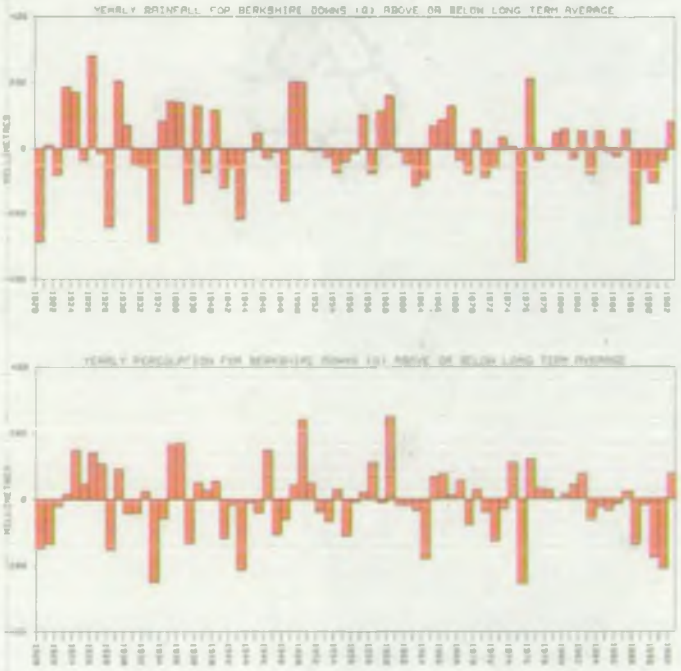
2.5 GROUNDWATER (Continued)

Percolation through these overlying impermeable strata is negligible. However, the confined chalk aquifer in this area does receive groundwater flow from the unconfined areas of chalk. Groundwater within the chalk produces a substantial springline at the base of the scarp and on the dip slope at the junction with the Tertiary strata.

Water levels in the chalk aquifer depend on the amount of rainfall that percolates into the ground and the volume of water abstracted (see Section 3.7). Changes in water levels in the chalk aquifer will affect flows in the Rivers Kennet, Og, Aldbourne, Lambourn, Winterbourne, Dun and Shalbourne. These chalk rivers have a stable base flow which is usually at its lowest in early Autumn. The upper parts of many chalk rivers will only flow during the late Autumn, Winter and early Spring. These are known as 'Winterbournes' and are quite natural. In contrast, the River Enborne, its tributaries and the Foudry Brook which rise on Tertiary deposits, have the characteristics of a clay catchment river ie lower base flow and a 'flashy' nature (rapid response to rainfall). East of Newbury, the River Kennet flows largely on the Tertiary strata and shows the characteristics of a mixed chalk and clay catchment. It should also be noted that groundwater catchments are not the same as topographic catchments - especially in the Upper Kennet.

2.6 RAINFALL AND RIVER FLOW

The average annual rainfall for the catchment is 764mm. This value varies across the catchment, due to topographic and meteorological effects, from 900mm on the Hampshire Downs to 650mm in the extreme eastern end of the catchment in the Reading area. Plots of the annual rainfall and percolation for the Berkshire Downs in relation the long-term to average are given below.

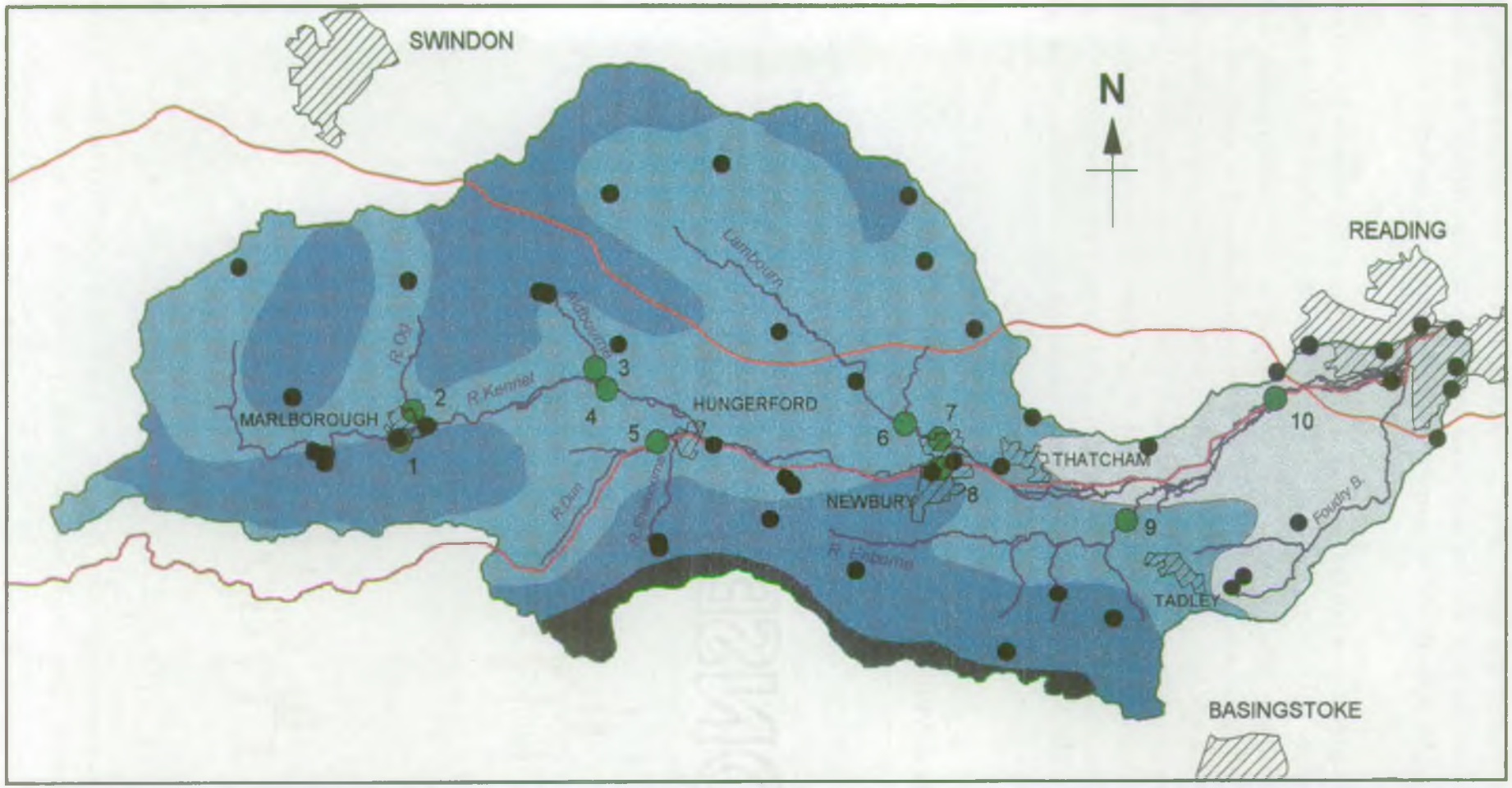


Hydrographs of the River Kennet at Knighton, the River Lambourn at Shaw and the River Enborne at Brimpton are also shown. The effects of recent drought years can clearly be seen as can the hydrological differences between chalk and clay rivers. The NRA currently monitors rainfall and river flow with records dating back to 1908 and 1962 respectively.

National Rivers Authority
Thames Region

River Kennet
Catchment

RAINFALL AND RIVER FLOW



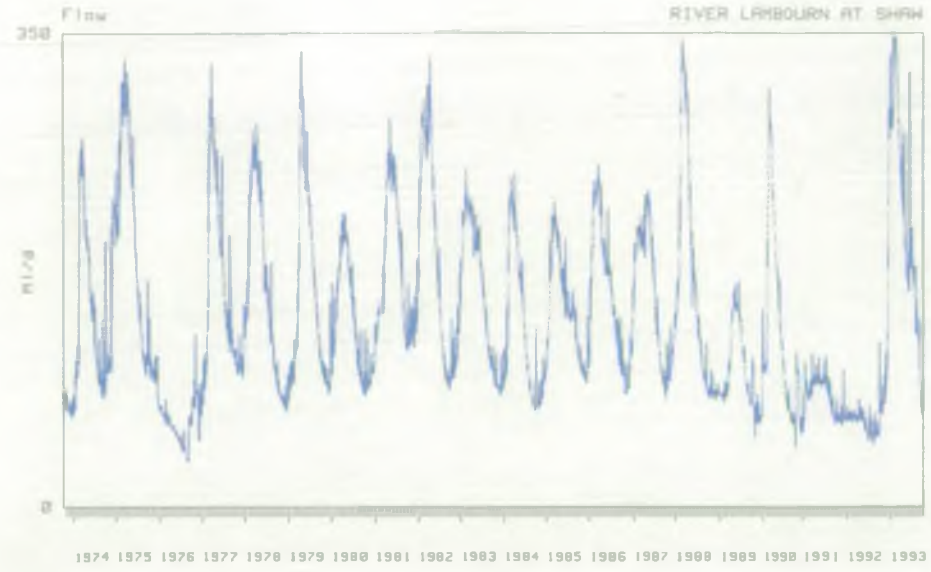
KEY

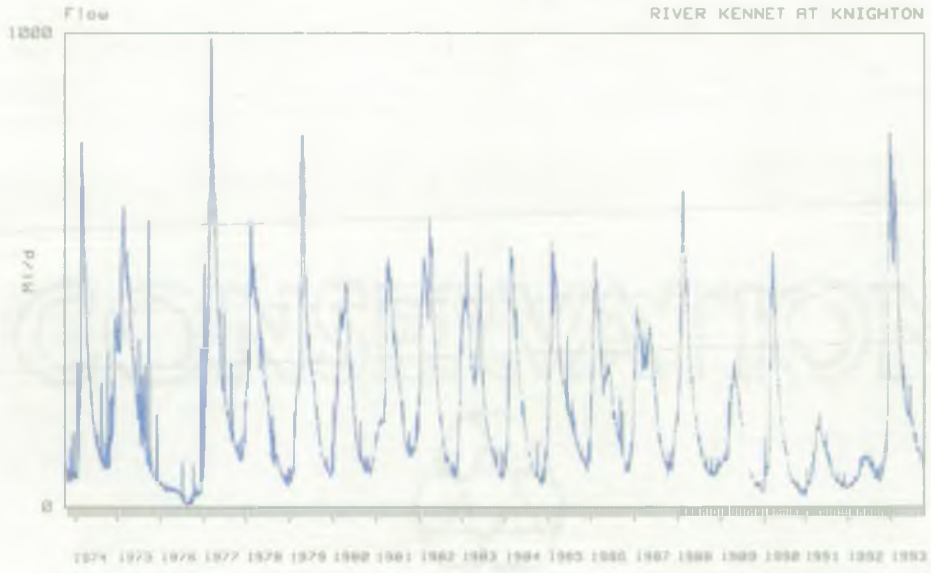
SCALE

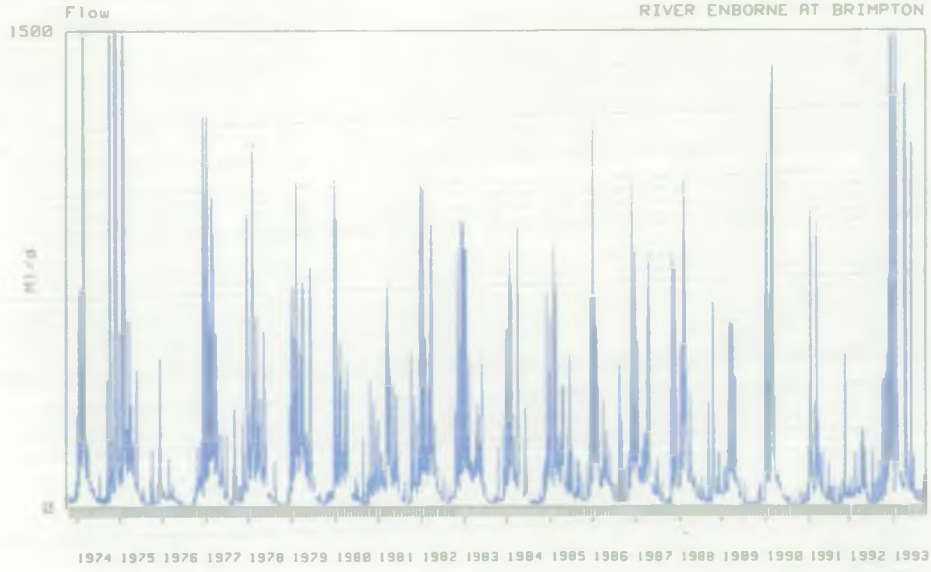
0 — 10 km

Catchment Boundary	Urban Area	Rainfall Station (43)	Flow Gauge (10)
Main River	Average Annual Rainfall (mm)		
Kennet and Avon Canal	up to 700	800 to 900	
M4 Motorway	700 to 800	over 900	

1. R. Kennet at Marlborough
2. R. Og at Marlborough
3. Aldbourne at Ramsbury
4. R. Kennet at Knighton
5. R. Dun at Hungerford
6. Winterbourne Stream at Bagnor
7. R. Lambourne at Shaw
8. R. Kennet at Newbury
9. R. Enbourne at Brimpton
10. R. Kennet at Theale


Flow
RIVER LAMBOURN AT SHAW
350
Ml/d
0
1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993


Flow
RIVER KENNET AT KNIGHTON
1000
Ml/d
0


Flow
RIVER ENBORNE AT BRIMPTON
1500
Ml/d
0
1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993

SECTION 3 - RESOURCES, USES AND ACTIVITIES

The purpose of this section is to review the physical resources of the catchment, the uses we make of the water environment and the activities likely to affect it. In most cases the description involves a brief summary of the available information and a synoptic map. Support documents (see Appendix II) may be available to those wishing to know more.

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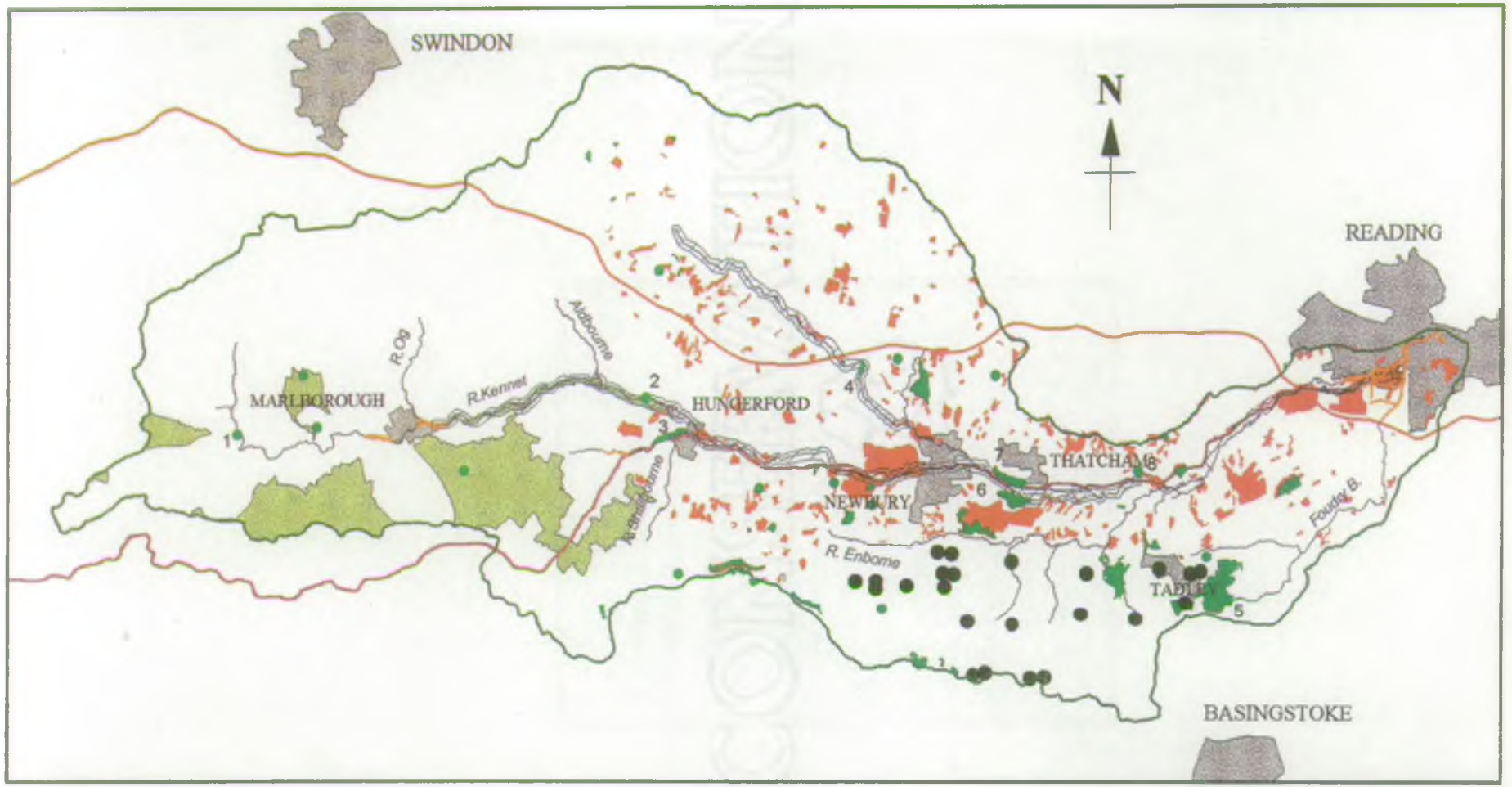
Thames Region

River Kennet
Catchment

ECOLOGY



KEY

SCALE

0 — 10 km

Catchment Boundary		Urban Area		Proposed Riverine SSSI	
Main River		Wildlife Heritage Sites (Berkshire)		River Corridor Designations	
Kennet and Avon Canal		Area of High Ecological Value (Wiltshire)		Sites of Special Scientific Interest	
M4 Motorway		Countryside Heritage Sites (Hampshire)			

Selected sites of Ecological Interest

1 - Silbury Hill
2 - Chilton Foliat Meadows
3 - Freemans Marsh
4 - Boxford Water Meadows
5 - Pamber Forest and Silchester Common
6 - Bowdown and Chamberhouse Woods
7 - Thatcham Reed Beds
8 - Woolhampton Reed Beds

3.1 ECOLOGY

Watercourses and stillwaters within the catchment support rich floral and faunal communities in terms of both total number and species. Surveys of aquatic fauna frequently show high numbers of invertebrate families (eg mayflies, shrimps, snails, midges) for most watercourses in the catchment, including the Kennet and Avon Canal. A number of nationally rare and protected species have been found in the Kennet and Lambourn. The invertebrates are a major component of the food web and a diverse invertebrate community is vital for a healthy fish population. Natural game and coarse fish populations within the catchment form the basis of important, high quality fisheries. A number of sites in the River Kennet and redundant gravel workings provide important breeding and shelter habitats for rare bird species.

This importance is reflected in part by the presence of 55 Sites of Special Scientific Interest (SSSI) as designated by English Nature. There are also over 300 Wildlife Heritage Sites (WHS) as designated by Berkshire County Council, considerable Areas of High Ecological Value as designated by Wiltshire County Council and a number of Countryside Heritage Sites as designated by Hampshire County Council. These sites are shown on the accompanying map and include riverine habitats, reed beds, gravel pits, marshes and commons.

BW completed an ecological survey of the Kennet and Avon Canal in 1988. The need to maintain and enhance the ecology of the canal is recognised in BW's Strategy for the canal.

Habitat mapping by the Hampshire Wildlife Trust has identified and described ancient woodland and a number of herb-rich grasslands typically occupying wet areas of the valley.

English Nature has plans to designate part of the Rivers Kennet and Lambourn as SSSI (from Mildenhall, Wiltshire to Woolhampton, Berkshire). They are also considering the SSSI potential of floodplain habitats between Hungerford and Newbury. Future management of the SSSI needs to take account of current uses and practices. Further liaison is, therefore, necessary between the interested parties.

The NRA recognise the value of existing sites, especially semi-natural habitats, around the catchment and the importance of their protection, maintenance and enhancement in the future. The future of Thatcham Reed Beds for instance is the subject of discussions between the NRA, English Nature, Newbury District Council and the Royal Society for the Protection of Birds.

There is an increasing emphasis being placed on managing the links or corridors between designated sites of ecological value. The River Kennet and its associated floodplain (which includes water meadows, marsh, carr, reed swamp and woodlands) constitutes a corridor whose value is being increasingly recognised by statutory and non-statutory organisations and groups. Many tributaries of the River Kennet eg Holy Brook are also being identified as important river corridors by Local Authorities eg Reading Borough and Kennet District Councils.

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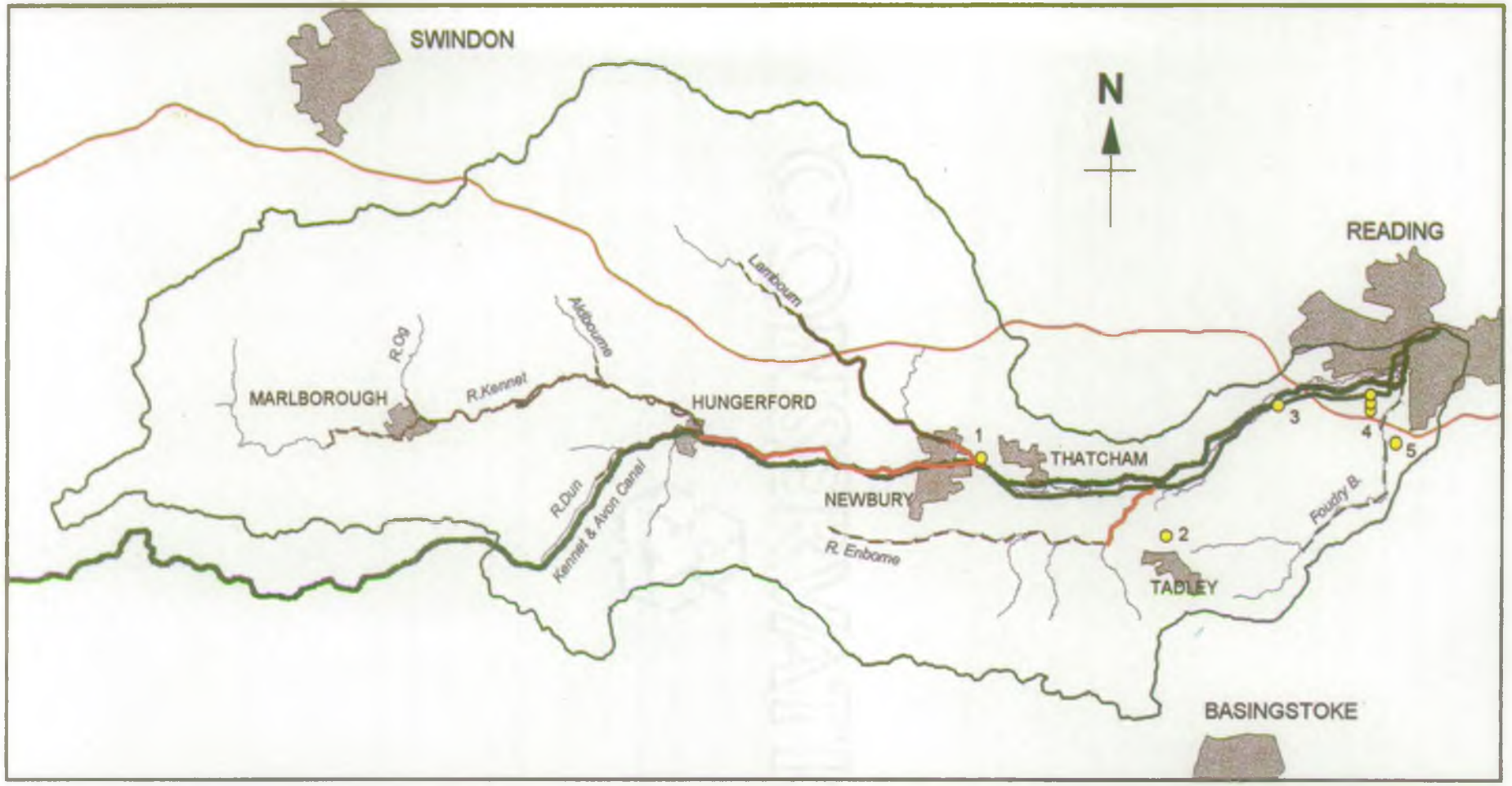
FISHERIES



KEY

SCALE

0 10 km

Catchment Boundary	Urban Area	Fishery Type		Fishery Quality	Stillwater Fisheries
Main River		Game		Good	1. Wylies 2. Aldermaston 3. Theale 4. Englefield, Farnham, Tarmac, Cottage Lane 5. Burghfield
M4 Motorway		Mixed		Moderate	
		Coarse		Poor	

3.2 FISHERIES

The catchment has been recognised as providing some of the best game and coarse fishing in the UK, largely due to the pristine nature of the habitat and good water quality.

Upstream of Ramsbury, the River Kennet supports stable wild brown trout and grayling populations. Estate put-and-take trout fisheries (brown and rainbow) predominate in the river's middle reaches. Between Newbury and Reading the river sustains good coarse fish populations, although effective breeding appears to be reduced in places. The lower reaches of the catchment offer very good barbel fishing and attract anglers from throughout the UK.

The River Lambourn provides an excellent habitat supporting a healthy, self sustaining population of native brown trout and grayling. Salmon fry and parr have been introduced to both the Kennet and Lambourn as part of the Thames Salmon Rehabilitation Scheme

The Kennet and Avon Canal is one of the premier canal fisheries in the country. The canal is used extensively with an estimated 170 000 angling visits each year.

The River Enborne sustains a stable population of coarse fish and also provides an excellent gravel spawning habitat that is likely to be utilised by fish moving upstream from the River Kennet.

The Holy Brook sustains a stable coarse fish population, and also provides a key spawning habitat for coarse fish, particularly barbel and chub. The Foudry Brook contains only a poor to moderate coarse fish population.

Stillwaters provide high quality coarse and game fisheries in the lower parts of the catchment. These stillwaters are often the result of mineral extraction and may be used for a number of other purposes. As the gravel pits mature, coarse fishing tends to improve and some of the older pits are a focus for carp, tench and pike anglers.

Fish populations are dependant upon the quality of both the habitat and the water. Flow regimes are also of great importance and concern has been voiced that changes in these factors may have had a significant impact on the quality of these fisheries. Brown trout and coarse fish are exploited by commercial and recreational fisheries, generating financial benefits to the local communities, and also serve as excellent indicators of the river's well-being.

The NRA actively promote the re-establishment of native brown trout populations in the Upper and Middle Kennet catchment through a number of habitat restoration projects.

National Rivers Authority
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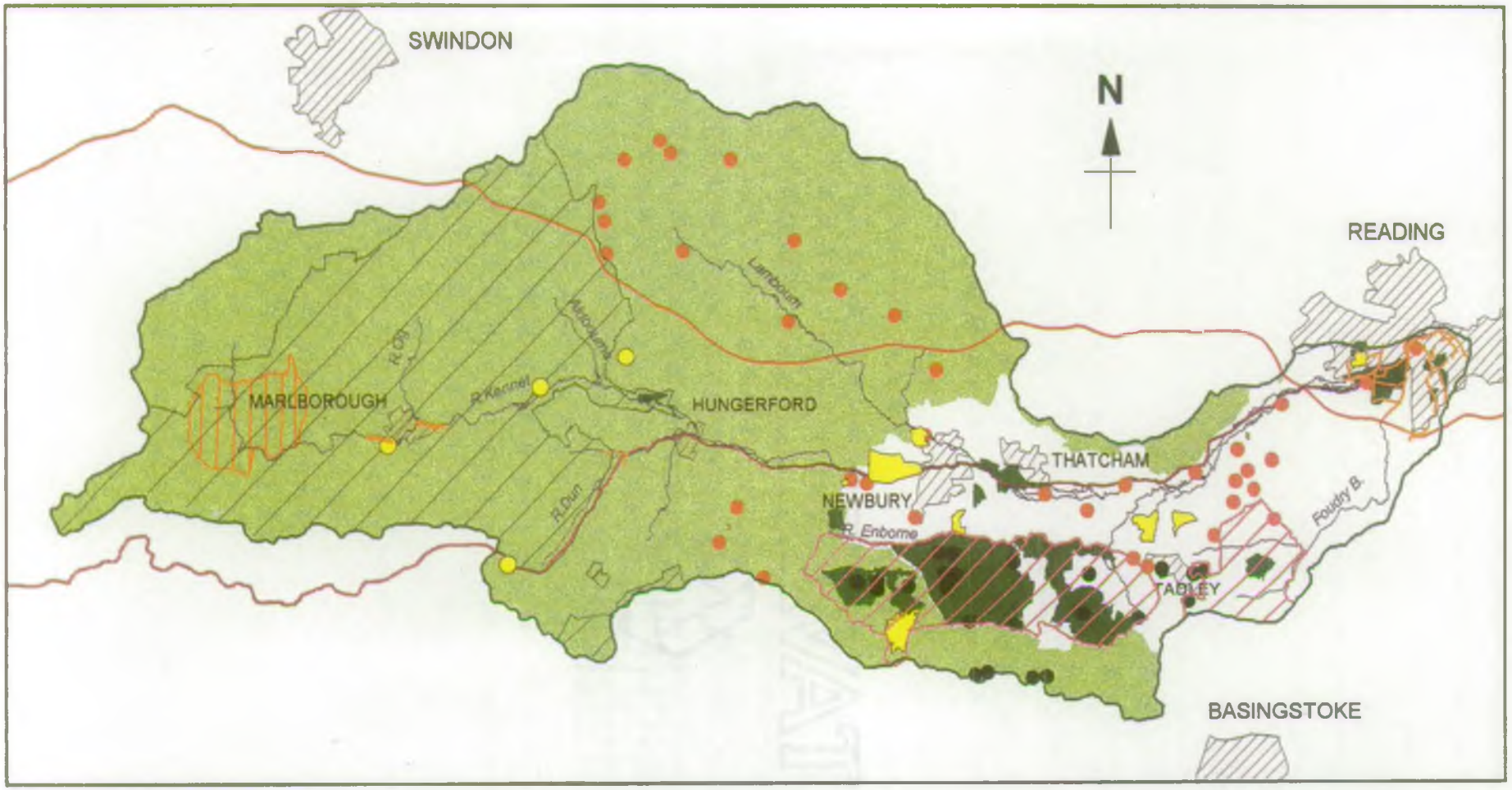
River Kennet
Catchment

LANDSCAPE AND HERITAGE



KEY

SCALE

0 — 10 km

Catchment Boundary	Urban Area	Area of Outstanding Natural Beauty	Scheduled Ancient Monument (Berkshire Only)	Countryside Heritage Area (Hampshire)
Main River		Areas of Particular, Special or Other Landscape Importance	Countryside Heritage Site (Hampshire)	
Kennet and Avon Canal		Historic Parks and Gardens	Green / River Corridors	
M4 Motorway		Areas of High Archaeological Potential (Wiltshire)	World Heritage Site	

3.3 LANDSCAPE AND HERITAGE

The North Wessex Downs AONB covers a significant proportion of the catchment. The overriding consideration, supported by all the relevant authorities, is to conserve and enhance the environment in order to retain its special landscape quality. The scenery is characterised by large fields, undulating landforms and an open aspect. In contrast the river valleys appear well wooded and have a more intimate feel due to smaller field boundaries

At the County level several areas, including the Kennet valley east of the M4 towards Reading, have been designated by local planning authorities in order to protect their landscape characteristics.

East of Newbury the valley becomes broader but the intimate character of the riverscape is maintained through hedges and woodland close to the river and on the floodplain.

In addition, the role of the water environment in the area's landscape is recognised by several Local Authorities. Wiltshire County and Kennet District Councils, for example, have developed policies to protect and enhance the special character of water meadows upstream and downstream of Marlborough. Also it should be noted that archaeological sites are particularly vulnerable to dewatering ie through the lowering of the water table.

The Avebury complex, including Silbury Hill (c. 2600 BC), which straddles the River Kennet, is regarded as one of the most important Neolithic sites in Western Europe and was designated as a World Heritage Site in 1987. Running through this site is the older prehistoric (c. 3000 BC) Ridgeway which is now maintained as a national trail. These sites exemplify the high archaeological value of the western and northern parts of the catchment where there are many nationally important Scheduled Ancient Monuments. River valleys such as those of the Kennet, Lambourn and Dun are likely to contain many features of interest within their alluvial or drift deposits. Many of the towns and villages alongside the River Kennet and Kennet and Avon Canal have important Roman, Saxon, Medieval or Georgian origins. Countryside Heritage Areas and Sites have been designated by Hampshire County Council to recognise areas of general heritage and landscape value.

Latterly, the industrial heritage of the Kennet and Avon Canal is noteworthy in terms of the canal itself and its related structures. BW have recently undertaken an assessment of the canal's landscape and heritage value. The man-made landscape between Thatcham and Reading also has historical importance.

The particular value and sensitivity of the river/waterway landscapes within the catchment has only been partially evaluated through general surveys of the landscape. The recent work by BW and growing interest in the role of river corridors as environmental attributes linking urban areas (eg Reading Borough Council, Newbury and Kennet District Councils), highlights the need to properly evaluate the river's importance to these areas. Newbury District Council have initiated an appraisal of landscapes, including riverine, within their area. The monitoring of landscape change would aid overall management.

Berkshire County Council, Reading Borough Council and Newbury District Council are currently considering the establishment of a Groundwork Trust for the Kennet valley.

3.4 AMENITY AND RECREATION

The Kennet Catchment has a regionally significant role in providing opportunities for water recreation. The key water related features are 50 km of the Kennet and Avon Canal and 500 Ha of wet gravel pits in the Lower Kennet valley.

At present the Kennet and Avon Canal within the Kennet catchment supports over 220 private boats, 8 hire boats and 5 day-trip boats. Visiting boats from the River Thames constitute only a small proportion of the overall canal traffic although a considerable number of boats pass through the canal to and from other waterways. The canal also offers a linear walkway, attracting over 10 million visits per annum, which links in with long distance footpaths such as the Ridgeway, the Wayfarer's Way and the Thames Path at Reading and the recently implemented Lambourn Valley Way. The canal also supports canoeing clubs at Newbury and Reading and is used annually for the Devizes to Westminster canoe race and the Hungerford to Newbury raft race.

The Lower Kennet wet gravel pits (eg Theale, Welman's Farm, Knight's Farm, Searles Farm, Pingewood) some of which are still being excavated, are managed for conservation purposes and are of importance in regional as well as local terms for recreational pursuits such as sailing, water-skiing, angling and board-sailing.

Public open space adjacent or close to waterway is of particular amenity value in urban areas and provides informal access to the water environment for a wide range of people. Within Reading and Newbury this is well recognised in local plans but even in smaller settlements (eg Kingsclere and Winterbourne) the water environment is much valued for its amenity potential.

The NRA is keen to continue to promote recreational activities which sit amicably alongside conservation and ecological interests.

Leisure development (eg marinas at Highclose Farm Hungerford, Colthrop and Reading) are seen as one element in BW's plans to attract private sector investment to the canal.

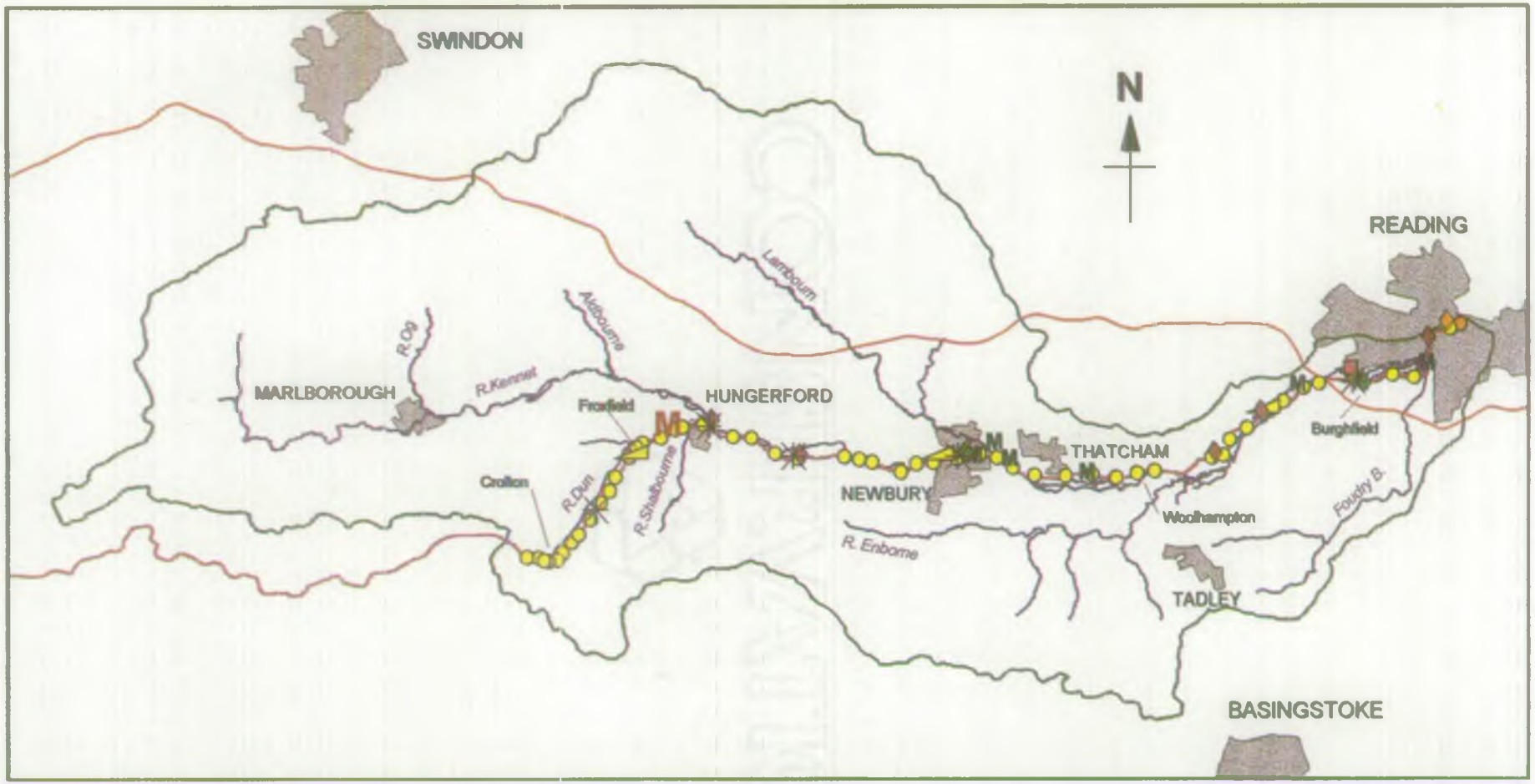
Thatcham Moors covers 280 ha to the south-west of Thatcham and since 1979 has been the subject of plans to increase its formal recreation potential without detriment to the ecological value of the area.

Public access to the upper River Kennet is more limited. Opportunities exist here and in the lower Kennet valley to secure improvements for informal access. This can be achieved through both Countryside Management initiatives and the appropriate restoration of minerals sites. Access is a sensitive issue which requires any specific proposals to be fully debated by interested parties.

National Rivers Authority
Thames Region

River Kennet
Catchment

NAVIGATION



KEY

SCALE

0 — 10 km

Catchment Boundary		Urban Area		Boatyard		Boatyard and Holiday Boat Hire			
Main River	M	Proposed Marina Sites		Slipway		Public Boat Trips			
Kennet and Avon Canal		Lock (BW Operated)		Long - term mooring		Holiday and Public Boat Hire			
M4 Motorway		Lock (NRA Operated)	M	Approved Marina Site					

3.5 NAVIGATION

The Kennet and Avon Canal forms a waterway link between the River Thames and port of Bristol. Construction of the canal was completed in 1810 (although the section east of Newbury was opened in 1723). Competition from the railways quickly made canal transport unprofitable and it fell into decline. In 1951 the Kennet and Avon Canal Association (now Trust) was formed with the aim of restoring the whole length of the waterway as a viable navigation. This aim was achieved when, in 1990, Her Majesty the Queen declared the canal open.

Over 50 km of the canal and 53 locks fall within the boundaries of the catchment. BW has jurisdiction over the canal and is responsible for its maintenance and management. In order to sustain the navigation, BW are investigating means by which it can guarantee the canal's financial and operational independence. A consultation document entitled 'A Plan for the Environment, Tourism and Leisure' was published in November 1991 outlining development options and the environmental constraints associated with the canal. There is concern that the forecast increase in boat traffic on the canal may have a detrimental influence on habitats and therefore also on fisheries and wildlife. BW have identified the need to monitor the situation (including those fisheries under their control) and this information will be supplemented with NRA fisheries monitoring.

The canal is designated a cruiseway between Blakes Lock and Tyle Mill Lock and between Bulls Lock and Hampstead Lock. The other lengths are deemed 'remainder' waterway.

The River Kennet forms a link between the canal and the River Thames, and navigation on this short length of the river (approximately 1.5 km) is managed by the NRA who also operate and maintain Blakes Lock.

The existing water supply problem is expected to continue in the future and will restrict the maintenance and increased use of the waterway. Investment is planned for additional engineering works to support the basic canal infrastructure and water supply. Local Authorities in the Kennet catchment also contribute to the running costs of the canal.

A major appeal has been launched for a back pumping scheme to supply water to the point above Devizes. The water abstraction, however, will be from the River Avon catchment. Other works are envisaged in the near future but these are unlikely to have a significant effect on the Kennet catchment.

3.6 FLOOD DEFENCE

The map shown highlights areas that are known to have flooded in the past (ie the extent of the floodplain) and the limits of designated 'main' river.

Flood events vary in frequency and intensity and are ranked according to their statistical return period eg 1 in 50 years. This does not imply that similar events will be separated by 50 years but that in such a period one event of that severity can be expected. Different types of land use (housing, arable land etc) require different levels of protection which are identified, justified and prioritised objectively. The basis of assessment includes the economic benefit/cost ratio, and any discrete flood alleviation project has to be technically feasible, environmentally acceptable and economically justifiable. In addition, extensive maintenance is required to achieve these standards of service and the importance of this maintenance cannot be stressed too highly. The NRA maintained approximately 200 km of the catchment during 1992/93.

Major urban flooding in the Kennet catchment occurred in 1947. More recently flooding has occurred at Newbury and points downstream in 1971 and 1979. The floods of November 1992 affected many areas in the upper part of the catchment and the more recent storms in January 1994 affected not only the Lower Kennet at Reading but also some fields and agricultural land around Newbury and upstream of Marlborough, notably at Avebury and Manton.

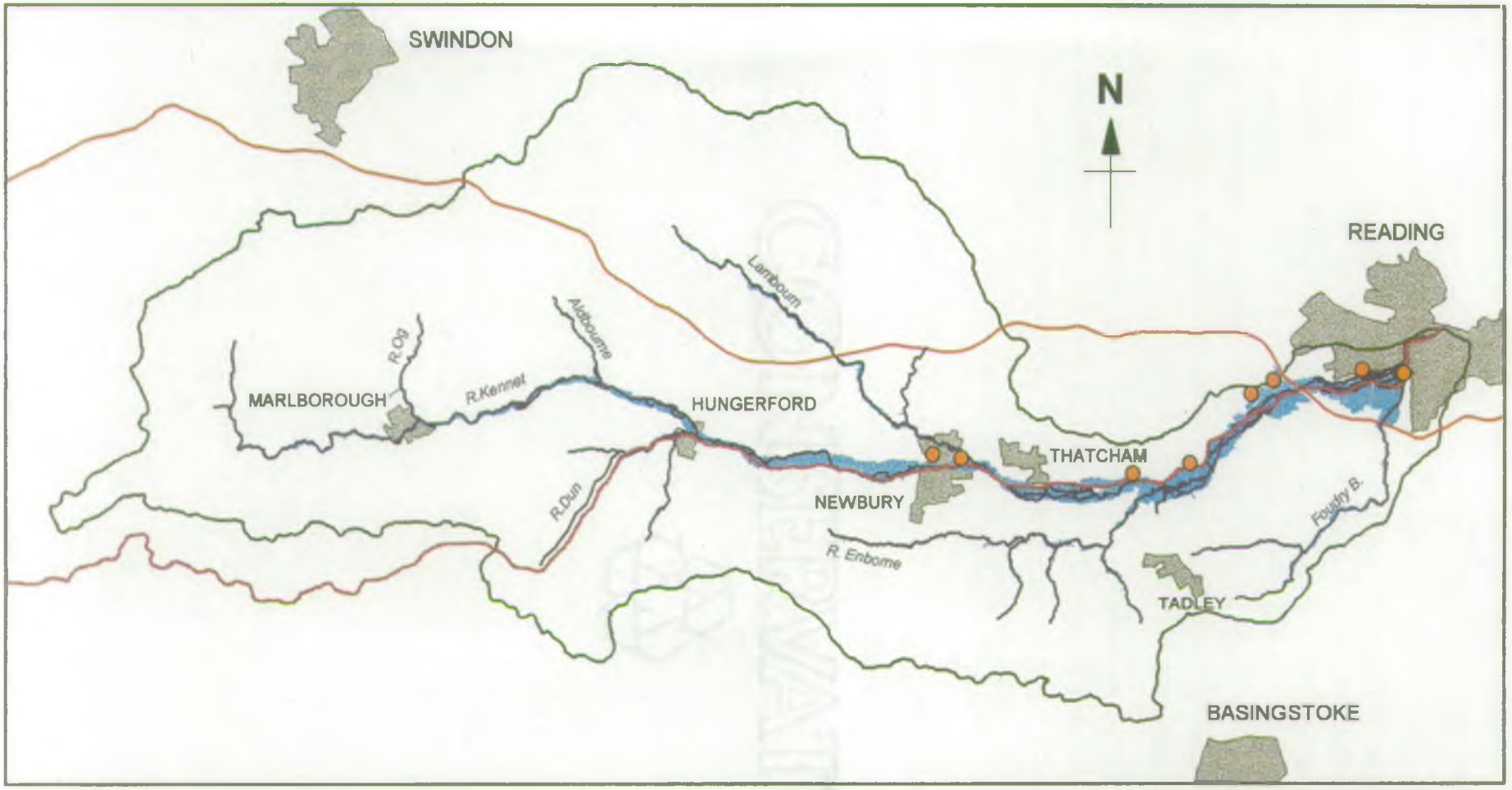
Current hydraulic modelling studies will give a better understanding of the flood risk in Newbury and Thatcham.

The NRA is working closely with District and Borough councils to implement floodplain policies which will ensure that future developments do not compromise existing flood defence standards of protection and, where possible, contribute to their improvement. Where appropriate the NRA will also encourage 'Drainage Management Plans' to ensure the sound management of surface water runoff.

National Rivers Authority
Thames Region

River Kennet
Catchment

FLOOD DEFENCE



KEY

SCALE

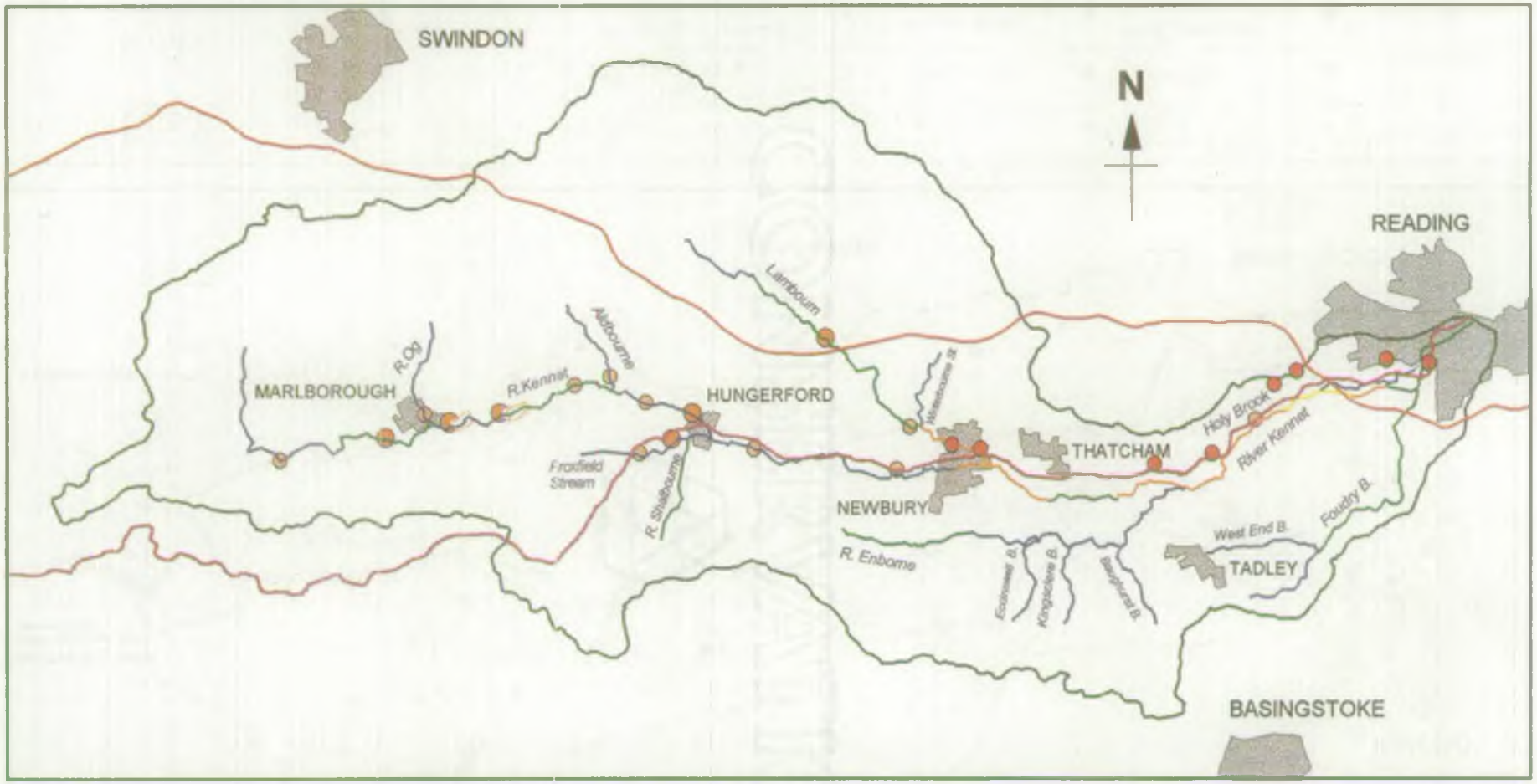
0 10 km

	Catchment Boundary		Urban Area						
	Main River		Areas known to have flooded						
	Kennet and Avon Canal		Urban areas at risk						
	M4 Motorway								

National Rivers Authority
Thames Region

River Kennet
Catchment

FLOOD DEFENCE - TARGET LEVELS OF SERVICE



KEY

SCALE

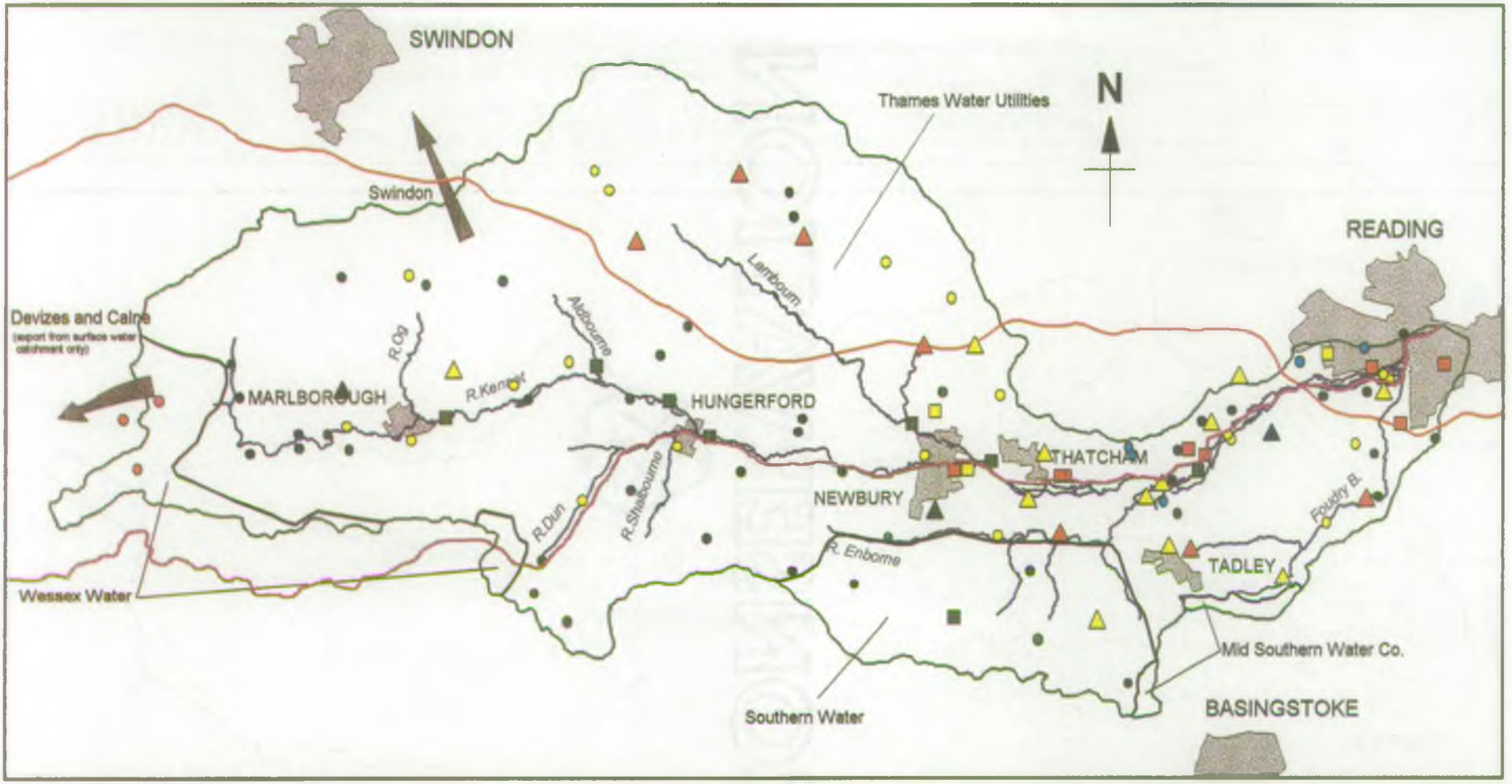
0 10 km

Catchment Boundary	Urban Area	LAND USE BANDS AND TARGET STANDARDS OF SERVICE FOR FLOODPLAIN AREAS					
Main River	River Habitat Enhancement Schemes Undertaken	A = (1 in 50 Years on average)		E = (3 times a year on average)			
Kennet and Avon Canal	Possible River Habitat Enhancement Schemes	C = (1 in 10 Years on average)		Urban areas at Flood Risk			
M4 Motorway		D = (1 in 2 Years on average)					

National Rivers Authority
Thames Region

River Kennet
Catchment

WATER RESOURCES AND ABSTRACTION



KEY

SCALE

0 — 10 km

Catchment Boundary	Urban Area	Public Water Supply Abstractions		Private Water Supply		Mineral Washing	
Main River	Direction of Public Water Supply exported from the catchment	Thames Water		Industrial		River Flow Augmentation	
Kennet and Avon Canal		Wessex Water		Fish Farms and Cress Beds		Water Transfer	
M4 Motorway	Water Company Boundary	Southern Water		Spray Irrigation (Recreation)		Spray Irrigation (Agriculture)	

3.7 WATER RESOURCES AND ABSTRACTION

Water is abstracted from aquifers (eg the Chalk) and from surface waters. There are also a few small abstractions from gravels and Tertiary deposits (eg the Bagshot Beds). Excluding fish farm licences, which do not constitute a net loss to the river system, over 70% of water abstracted in 1991 was used for public water supplies and 17% for industrial processes (primarily Colthrop Board Mills and Courage Breweries). The largest abstraction for public water supply was by Thames Water Utilities Ltd (TWUL) direct from the River Kennet at Fobney (Water Treatment Works), Reading.

Approximately 30% of abstractions for public water supply from the Chalk were made use of outside the catchment (eg Swindon). Much of the remaining water that was abstracted was returned to the catchment as either sewage or industrial effluents.

The current total number of abstraction licences is 316 with the majority (over 170) being small abstractions for agricultural purposes.

Owned and operated by the NRA (in conjunction with TWUL), the **West Berkshire Groundwater Scheme** is a significant water resources asset in the catchment. It consists of 33 abstraction boreholes grouped into 7 well fields with 89 km of pipeline to carry water to perennial streams. A refurbishment and maintenance programme to redress a number of years of neglect is nearly complete. The scheme, which produces a net yield of 70-90 Ml/d depending on timing of use, was originally designed to support water supply abstractions from the lower River Thames during drought periods (say 1 in every 7 - 10 years). However, the future use of the scheme is under review. Strategic, local and environmentally beneficial uses have all been suggested (see 5.3 Water Resources - Action Plan).

It is unlikely that any further major abstractions will be licensed in the upper catchment (west of Hungerford where the river is most vulnerable) for public supply. Such abstractions may be possible in the lower catchment where the chalk aquifer is confined. Minor abstractions that do not have a significant impact upon the overall water resources will be allowed. Some of these abstractions, depending on purpose and location, are likely to have flow constraints imposed upon them to protect low river flows ie water may only be taken when the river is capable of meeting its own environmental needs.

Grav.. extraction is planned to continue in the Kennet valley and hence there will be an on-going demand for gravel washing water. However, there is very little net loss with this use. Agricultural demand may rise in the future but industrial demand is unlikely to rise significantly.

Continued water supply problems for the Kennet and Avon Canal may lead to pressure for extra demands on adjacent ground and surface water sources. The latter are not subject to licensing control for canal use. Groundwater abstractions would be controlled with licences which would not allow abstraction when river flows are low and would therefore be of little benefit to the canal.

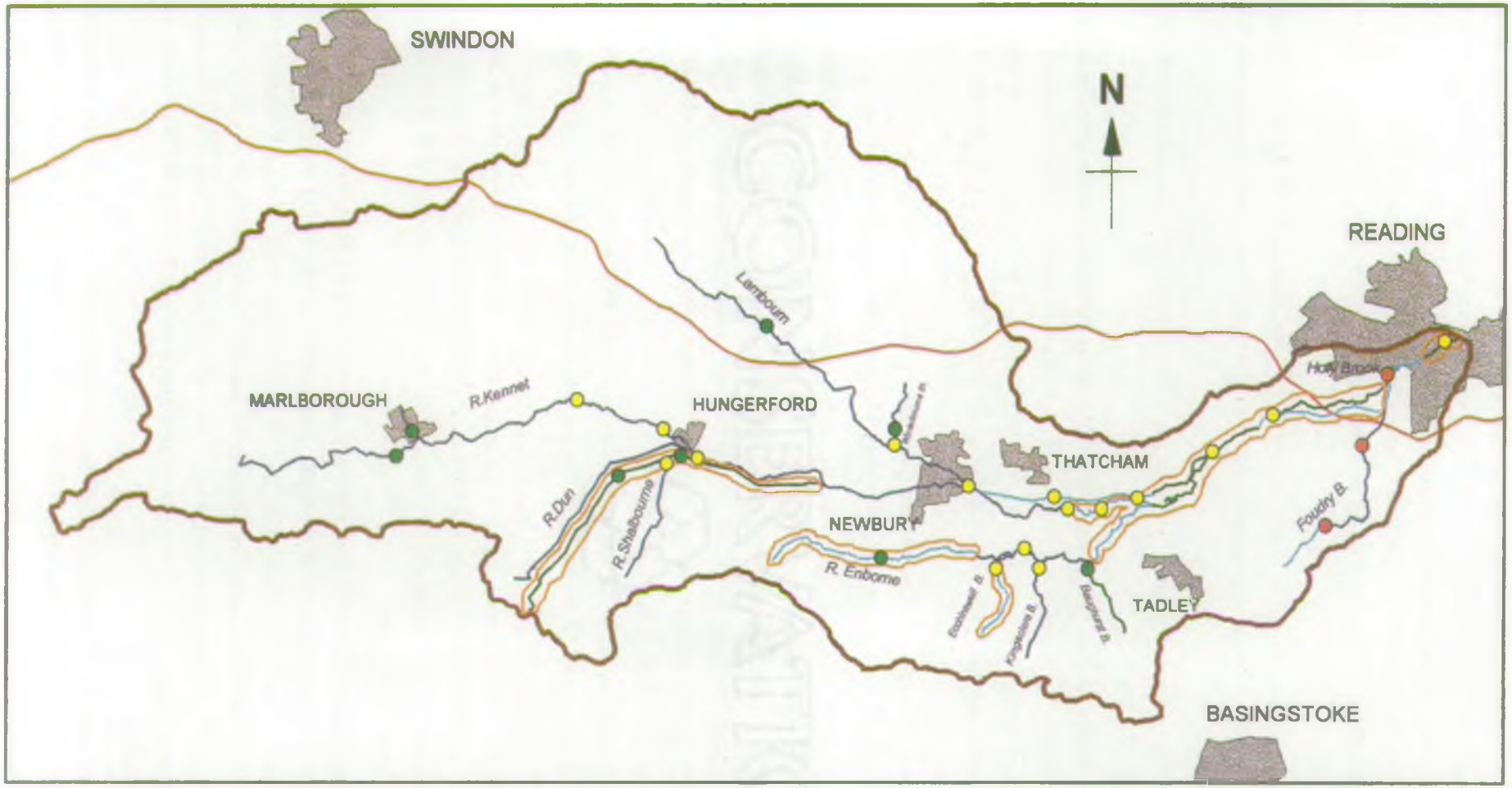
In carrying out water resources activities, the NRA has to meet its general duties for environmental conservation and have particular regard to the statutory obligations of the water undertakers. Proper use of water resources includes meeting not only the legitimate demands of abstractors but also the important demands of aquatic life within the river system itself. Both NRA National and Thames Regional strategies for water resources will be produced in 1994. These reports will look at how demand management measures (eg increased leakage control, recycling, metering) can be used to defer the need for new major resource schemes, as well as the opportunities that exist for new schemes to meet forecast increases in consumption.

The NRA have also prepared a paper on current and future water resources in the Upper Thames and Kennet area (which includes sources at Axford and Ogbourne) as part of the Action Plan for the 'Upper Kennet River levels/flows study' (June 1993). This concluded that public water supply demands in the Kennet can be met to the year 2011 by existing licensed sources. Further development may cause local problems which may be overcome by infrastructure improvements.

National Rivers Authority
Thames Region

River Kennet Catchment

WATER QUALITY (CHEMICAL AND NUTRIENTS)



KEY

SCALE

0 10 km

Catchment Boundary		RIVER QUALITY CLASS ACHIEVEMENT				Nutrient Levels (Phosphate in mg/l : Mean Value 1989 - 1992)		
M4 Motorway		Class 1A		Reaches Failing To Meet RQO Standard		< 0.1		
Urban Area		Class 1B				0.1 - 1.0		
		Class 2A				> 1.0		

3.7 WATER RESOURCES AND ABSTRACTION (Continued)

Work has been carried out on a computational groundwater model for the catchment to study the effects on groundwater levels and river flows of various groundwater abstraction regimes. Further work on the model will be carried out at a later date.

The map shown highlights the location and ownership of the public water supply abstractions. Several sources in the west of the catchment, eg Axford, Ogbourne St.George, are used to provide water outside the surface water catchment eg to Swindon and Devizes (see 3.10 Development). Concern has been expressed that the water is effectively lost to the Kennet catchment with the effluent being returned to the River Thames and not the Kennet.

Targets or standards for water resource management have not yet been set for the catchment. To do this fully the NRA shall need to set a scientifically based 'minimum acceptable flow' (MAF). National research work is currently under way to provide a method for doing this (see 5.3 Water Resources - Action Plan). In the meantime, the NRA has produced an abstraction licensing policy statement which will use MAFs determined on an interim (largely statistical) basis.

3.8 WATER QUALITY AND EFFLUENT DISPOSAL

Introduction

The watercourses of the Kennet catchment are generally considered to be of good water quality when compared with those of other catchments in the region.

The NRA monitors river chemistry and biology. This monitoring provides data to classify rivers on a scale good to bad, to assess compliance with EC Directives and to specify nutrient status. The biology indicates the overall health of the river.

Groundwaters are also monitored. The NRA has published a document entitled "Policy and Practice for the Protection of Groundwater" (1991) which addresses monitoring requirements.

Details of water quality classifications, applications for consent and issued consents, sample information and details of prosecutions are held on the Public Register which is available for inspection at the NRA's Reading office (Tel: 0734 - 535000).

Water Quality Objectives and Classification

Existing

The first approach uses the 1978 National Water Council (NWC) system. This led to non-statutory 'River Quality Objectives' (RQOs) based on water quality data. All the watercourses classified were given a short-term objective and a long-term objective where improvement was desirable, but not immediately practicable. The Kennet and its tributaries are of a high water quality and therefore most of the short and long-term objectives are the same. An exception is the Baughurst Brook. However, this watercourse is now consistently achieving its long term RQO.

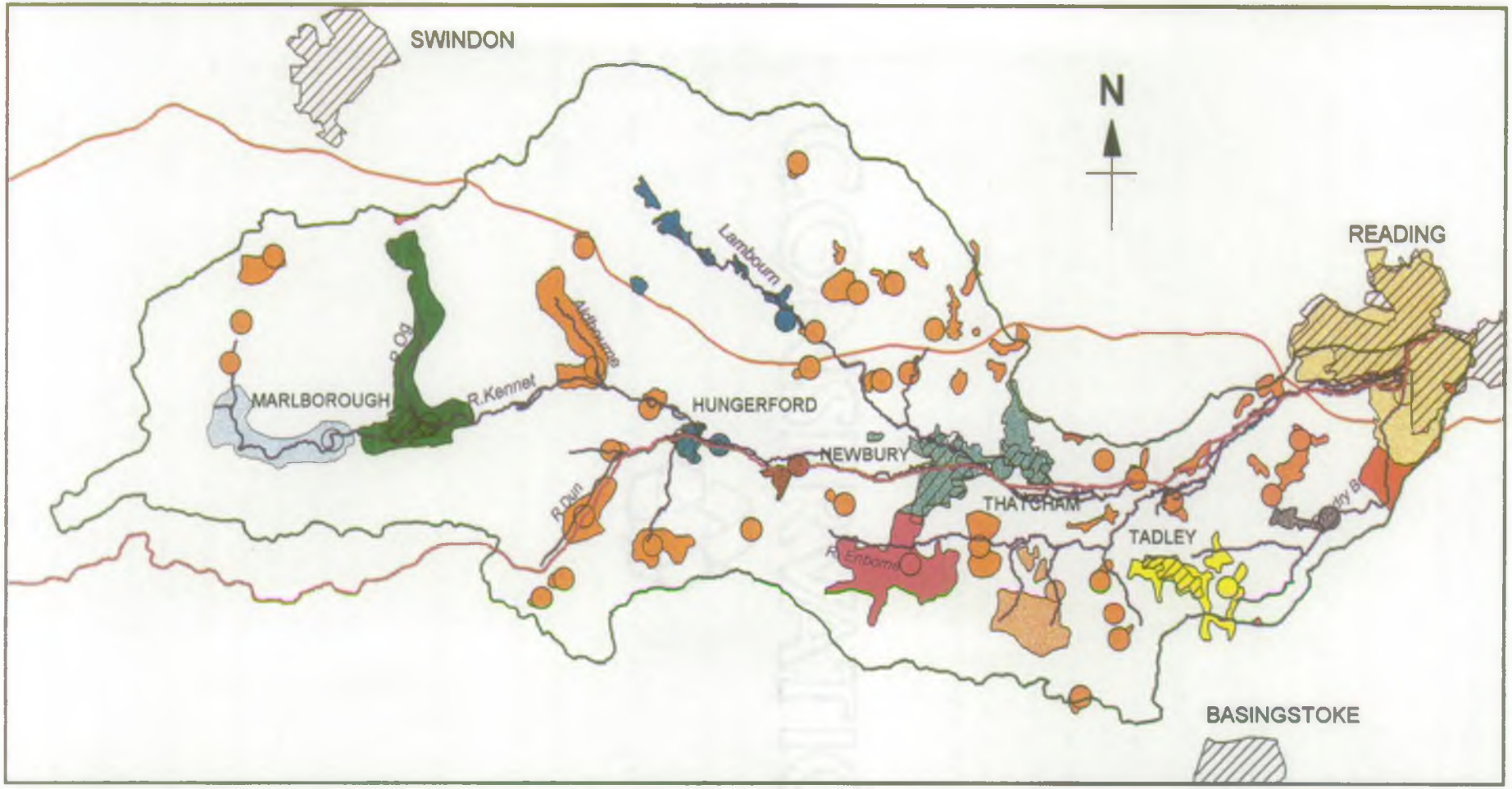
The map shown and Appendix III give the current chemical status and objectives of the catchment's watercourses. A number of reaches failed to achieve their objectives during the 'drought years' of 1990-92. This was mainly due to flow related DO and BOD failures.

The RQO scheme will be shortly superseded by the General Quality Assessment (GQA) scheme. This is currently under development by the NRA. The new system will include chemical, ecological, nutrient and aesthetic criteria and will provide an overall 'snapshot' of river water quality.

National Rivers Authority
Thames Region

River Kennet
Catchment

EFFLUENT DISPOSAL



KEY

SCALE

0 10 km

Catchment Boundary	Urban Area	Fyfield	Washwater	Reading Manor Farm
Main River	Sewage Treatment Works & Sewered Areas	Elcot Lane, Marlborough	Newbury	Kintbury
Kennet and Avon Canal	Effluent Exported from Catchment	Hungerford	Kingsclere	Stratfield Mortimer
M4 Motorway	Minor Works	East Shefford	Silchester	

Future

The second approach relates specifically to uses for which rivers should be suitable. A new water quality classification system, known as 'Statutory Water Quality Objectives' (SWQO) has been proposed by the DoE and draft regulations were published in November 1993. Although similar to the existing system, it aims to relate to the current and future uses of watercourses and will also include groundwaters and waterbodies (eg lakes).

The first part of the SWQO scheme relates to the Fisheries Ecosystem (FE) classification. The FE classification is designed to maintain and where justified, set targets for river quality improvements for aquatic ecosystems in specified reaches. It uses many of the same determinands as the existing NWC classification so as to facilitate translation from existing RQOs and river quality surveys. Nevertheless, it will potentially use different, more consistent assessment and monitoring procedures and will include a wider range of standards.

The government has indicated that SWQOs may be tested and set on a catchment basis. The NRA Thames Region has proposed the Kennet catchment as one of the scheme's pilot catchments. Water quality objectives will be subject to detailed public consultation and confirmation by DoE before being made statutory.

Effluent Disposal

In order that RQOs are met, discharges of effluent to the water environment need to be controlled. This is achieved by issuing consents and imposing consent conditions which limit the quality and volume of the effluent. The Kennet catchment has approximately 170 consented discharges, 24 of which are to the ground. The primary sources of effluent are TWUL sewage treatment works (STW) such as Newbury STW and Reading STW.

The good water quality in the catchment supports several fish farms including those at Padworth and Hungerford. These discharge effluent to the Rivers Kennet and Dun respectively. Cooling and process effluent from Colthrop Board Mills and effluent from mineral abstractions at Woolhampton and Pingewood are also discharged to the Kennet.

The NRA has a statutory duty to monitor discharges and assess them against their consents. Consent compliance over the last three years has improved from 62% in 1989 to 74% in 1993. However, non-compliance is being identified and targeted for action by the NRA.

There is public concern (notably from the Winterbourne Stream Action Group) over the location and operation of Chieveley STW. In particular, the impact of future developments in the area and potential loading on the works is causing concern.

Increases in population in the catchment will mean that the volume of effluent will increase. The NRA will ensure that discharge consents are set and discharges monitored so that water quality objectives are achieved.

EC Directives

Two European Community (EC) water quality Directives apply directly to the catchment (see accompanying map) :

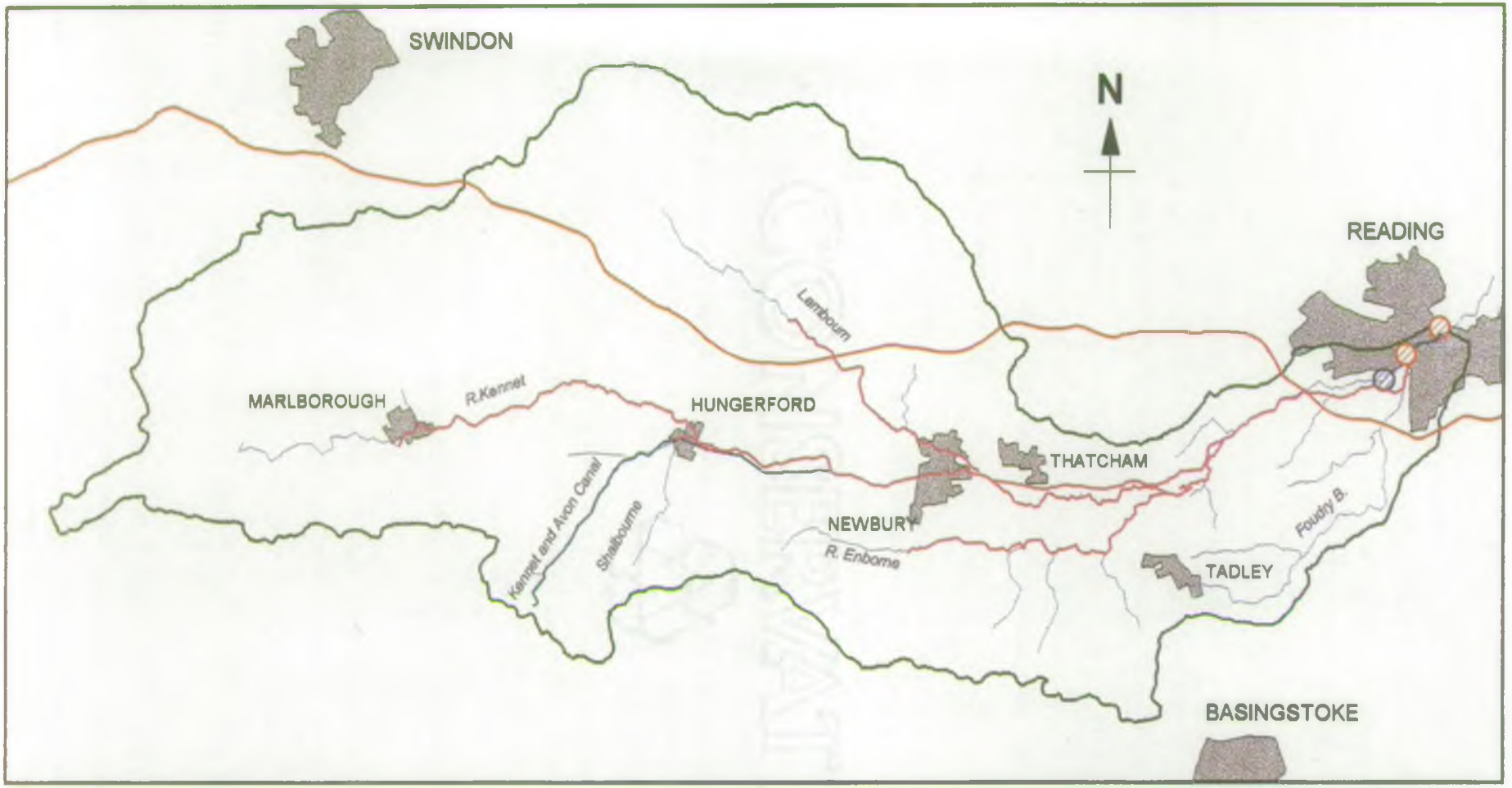
(i) The 'Fisheries Directive' (78/659/EC), designates reaches with water quality suitable for supporting cyprinid or salmonid fish populations. The necessary water quality was met in 1993;

(ii) The 'Dangerous Substances Directive' (76/464/EC) is concerned with the discharge of substances considered to be harmful to the aquatic environment. None of the standards have been exceeded during 1993 for the two sites monitored on the Kennet.

National Rivers Authority
Thames Region

River Kennet
Catchment

WATER QUALITY - EC DIRECTIVES



KEY

SCALE

0 — 10 km

Catchment Boundary	EC Fisheries Directive Reach Designations		EC Dangerous Substances Directive		EC Surface Water for Drinking Directive			
Main River	—	Salmonid	⊘	Monitoring Sites	⊘	Monitoring Site		
M4 Motorway	—	Cyprinid						
Urban Area								

3.8 WATER QUALITY AND EFFLUENT DISPOSAL (Continued)

Biological Status

The biological status of the Kennet catchment is monitored at least annually using benthic macroinvertebrates. These are the small animals which inhabit the bottom sediments of watercourses, are unable to move far and therefore respond to water conditions throughout the year. By monitoring this response, pollutants present at very low levels, or those occurring infrequently can be detected (which may be missed in chemical sampling). Sampling and analysis enables the compilation of a list of the macroinvertebrates found at each site. These are related to water quality using the Biological Monitoring Working Party (BMWP) scoring system. Devised in 1980, the BMWP system is internationally recognised as a simple means of assessing water quality. A high BMWP score indicates high water quality where a site has a diverse fauna with many pollution-sensitive animals present.

The BMWP scores for the Kennet (some approaching 200) were amongst the highest for the whole of the Thames Region in 1993. A more pollution tolerant fauna are present in several of the minor tributaries and consequently the BMWP scores for these watercourses are lower. In some cases STW's discharges (eg into Silchester Brook and Clayhill Brook) appear to be the cause of the decline in quality of the fauna. A poor physical river habitat will also suppress the BMWP scores.

Total and faecal coliforms are bacteriological indicators of the extent of contamination by human and animal sewage derived materials. These may arise from point sources such as STWs or diffuse sources such as agricultural land. The health implications of these data are the responsibility of the Local Authorities' Environmental Health Officers.

Groundwaters

The quality of groundwaters is receiving increasing attention. However, the development of a national classification scheme for groundwater quality similar to the proposed SWQO scheme for surface waters will be a significant undertaking - not only in developing the scheme itself but also in establishing a national network of sampling points. The NRA's document 'Policy and Practice for the Protection of Groundwater' establishes a comprehensive framework for protecting groundwater which will gradually be given geographical perspective through the phased publication of groundwater vulnerability maps and source protection zones for major public water supply sources. The establishment of 'nitrate sensitive areas' around appropriate drinking water abstraction points is already progressing and a pilot area has been established around the public water supply abstraction point at Ogbourne St. George. Here nitrate levels have risen above the relevant standards necessitating blending with other water sources.

Monitoring of raw water abstractions from aquifers by TWUL and Southern Water Services indicates that there are generally no significant groundwater quality problems at present. The NRA groundwater monitoring network is currently being established and utilised.

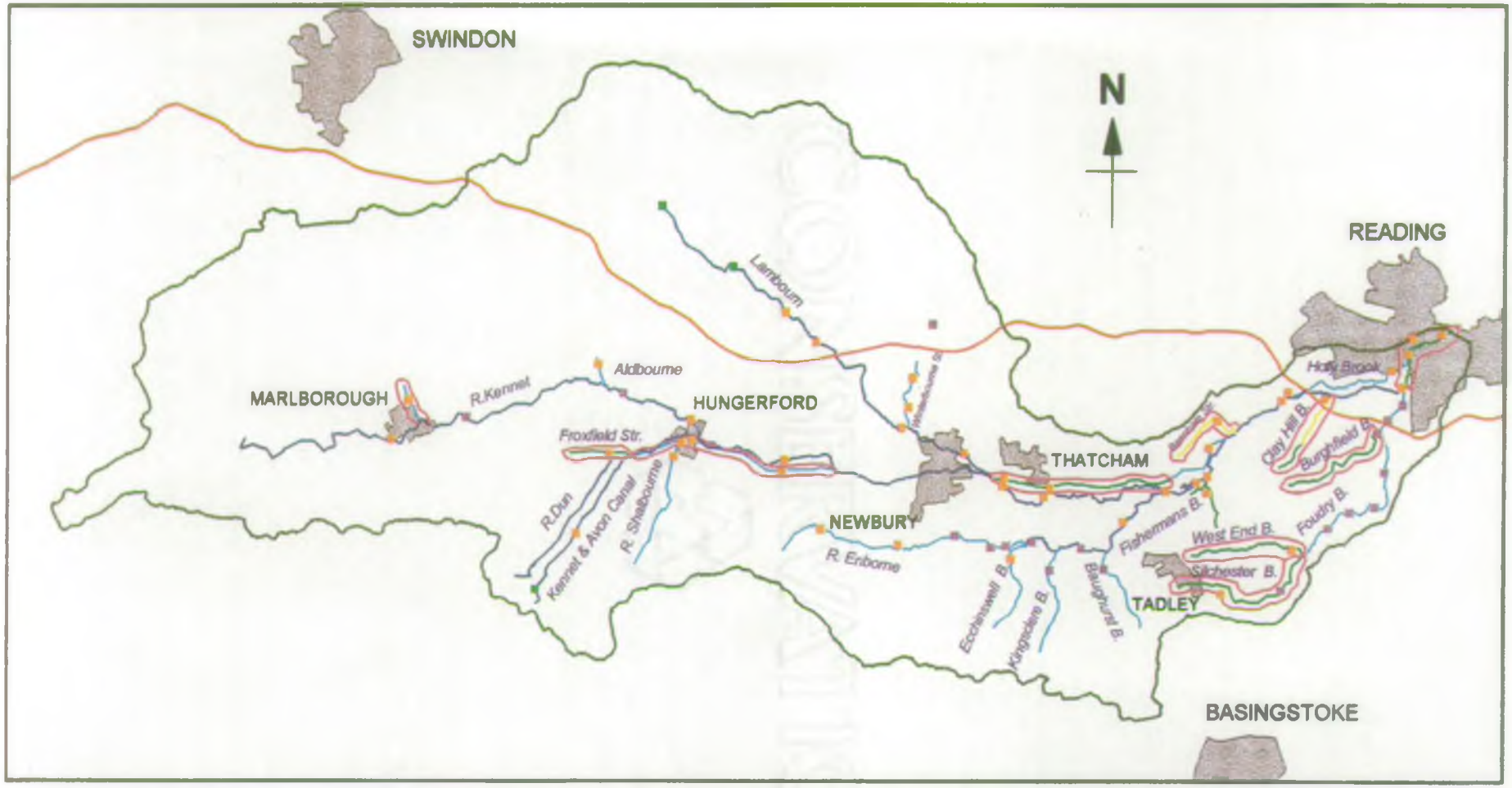
Nutrient Status

Nutrients are essential for successful biological growth. However, in excess, nitrogen and phosphorus may upset the ecosystem and cause accelerated plant growth (including algae), if other conditions are 'favourable'. The majority of nutrients enter watercourses either as point sources in the form of effluents from STWs or as diffuse sources such as inputs from farming activities. The NRA actively promotes the use of buffer zones on new developments to remove nutrients from runoff and protect flora, fauna and the overall nutrient balance. The unimproved pasture land ie unrotational set-aside beside the river acts as a buffer for farm runoff and enhances the conservation value of the river corridor. However, the quality and productivity of the land in question must be taken into account before a decision to set aside land is made. The greatest nutrient concentrations are found in the

National Rivers Authority
Thames Region

River Kennet
Catchment

WATER QUALITY (BIOLOGICAL AND BACTERIOLOGICAL)



KEY

SCALE

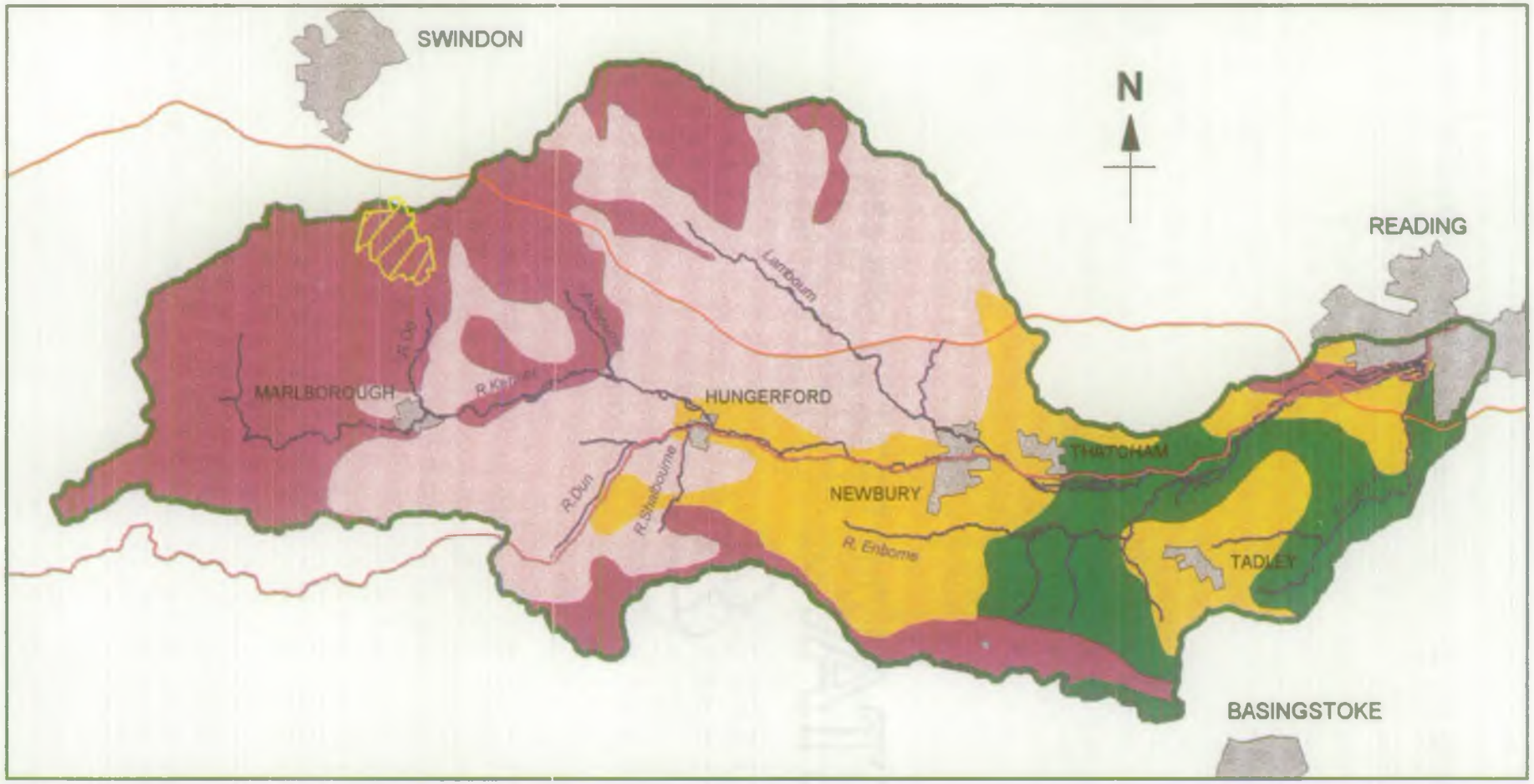
0 10 km

	Biological Monitoring Working Party Scores for 1993 (Latest Sample Taken)		Bacteriological Quality (Mean Values E Coli /100ml in 1993) Based on EC Bathing Water Directive For Comparison Only	
Catchment Boundary	151+	16 - 50	< 100	
M4 Motorway	101 - 150	0 - 15	100 - 2000	
Urban Area	51 - 100	Reaches not Meeting Predicted Scores	>2000	

National Rivers Authority
Thames Region

River Kennet
Catchment

WATER QUALITY (GROUNDWATER)



KEY

SCALE

0 — 10 km

- Catchment Boundary
- Main River
- Kennet and Avon Canal
- M4 Motorway
- Urban Area
- Ogbourne St. George Nitrate Sensitive Area

Groundwater Vulnerability Classification

- Major Aquifer (High Vulnerabiliy Soil)
- Major Aquifer (Intermediate Vulnerabiliy Soil)
- Minor Aquifer
- Non - Aquifer

Note : Map is indicative only

Foudry and Silchester Brooks and River Kennet downstream of the Foudry Brook, all of which receive STW effluent. Although nutrients are not deemed to be a particular problem within the Kennet catchment, algal blooms have occurred causing nuisance to river users, for example to fisheries owners in the middle reaches of the River Kennet. The Fobney water treatment works intake was adversely affected in May 1990 as a result of an algal bloom for a period of ten days. Algal blooms or excessive plant growth can cause DO problems (high DO during the day, low DO during the night). In extreme circumstances fish kills may result.

Pollution Incidents

The annual number of recorded pollution incidents is continuing to grow. This is thought to reflect greater awareness and reporting of incidents rather than a real increase in events. Pollution incidents generally cluster in the urban areas, notably Reading and Thatcham, and in and around the valley of the River Enborne.

About half of the recorded pollution incidents in the catchment occur in ditches and drainage channels. The River Kennet itself suffers most from pollution incidents notably those caused by oil.

Details of all the incidents recorded in 1993 are given in the table below.

Pollution Type	**Kennet**	**Lambourn**	**Enborne**	**Foudry Bk**	**K & A Canal**	**Total**
Oil	64	0	1	3	6	74
Chemical	8	0	0	0	0	8
Sewage	19	2	2	2	0	25
Natural	7	0	1	0	0	8
Agricultural	5	0	1	0	0	6
General	23	0	0	1	2	26
Urban runoff	1	0	0	0	0	1
Not known	7	0	0	0	1	8
TOTAL	**134**	**2**	**5**	**6**	**9**	**156**

The NRA also has the power to prosecute polluters of the water environment. Since 1989 successful legal action has been taken on eight occasions against polluters in the Kennet catchment. The largest fine imposed was for £15,000.

The NRA undertakes a 'pollution prevention' visit programme (see 5.2 Water Quality - Action Plan). MAFF/ADAS are also actively involved in reducing potential sources of agricultural pollution.

3.9 LOCAL AUTHORITIES

The following table summarises the distribution of the catchment area amongst County Councils and Local Authorities falling within the catchment boundary. The distribution of the catchment's population of 211,000 is shown in brackets.

County Councils		**District Councils**	
Berkshire	45% (80%)	Newbury DC	42% (46%)
		Reading BC	2% (30%)
		Wokingham DC	1% (4%)
Wiltshire	39% (8%)	Kennet DC	34% (7%)
		Thamesdown DC	3% (1%)
		North Wilts DC	2% (*)
Hampshire	13% (12%)	Basingstoke and Deane BC	13% (12%)
Oxfordshire	3% (*)	Vale of White Horse DC	3% (*)
TOTAL	**100%**	**TOTAL**	**100%**

*Note: * indicates less than 0.5%*

Most of the County Councils and District Councils have recently revised, or are currently revising, their statutory development plans. These documents, when considered in conjunction with Regional Planning Guidance, provide the best means of establishing possible future land use trends which have an impact on, or interact with, the natural water environment.

The boundaries indicated on the map are as existing and do not take into account any changes which may be proposed by the Local Government Commission for England.

The following development plans have been reviewed:

Structure Plans

Berkshire (Structure Plan 1991-2006, Examination in Public (1993)

Mid-Hampshire and North-East Hampshire (1st/2nd Alteration, 1989)

Oxfordshire (Draft, January 1992)

North-East and Western Wiltshire (2nd Alteration, 1991)

District Plans

Basingstoke and Deane (Deposit, 1992)

Kennet (Draft, 1993)

Newbury (Deposit, 1990)

North Wilts (Approved, 1990)

Reading (Deposit, 1992)

Thamesdown (Draft, 1991)

Vale of White Horse: Rural Areas (Draft, 1990)

Several organisations have also developed strategies directly related to the water environment. These include:

1) Waterways Plan (Reading Borough Council, 1992);

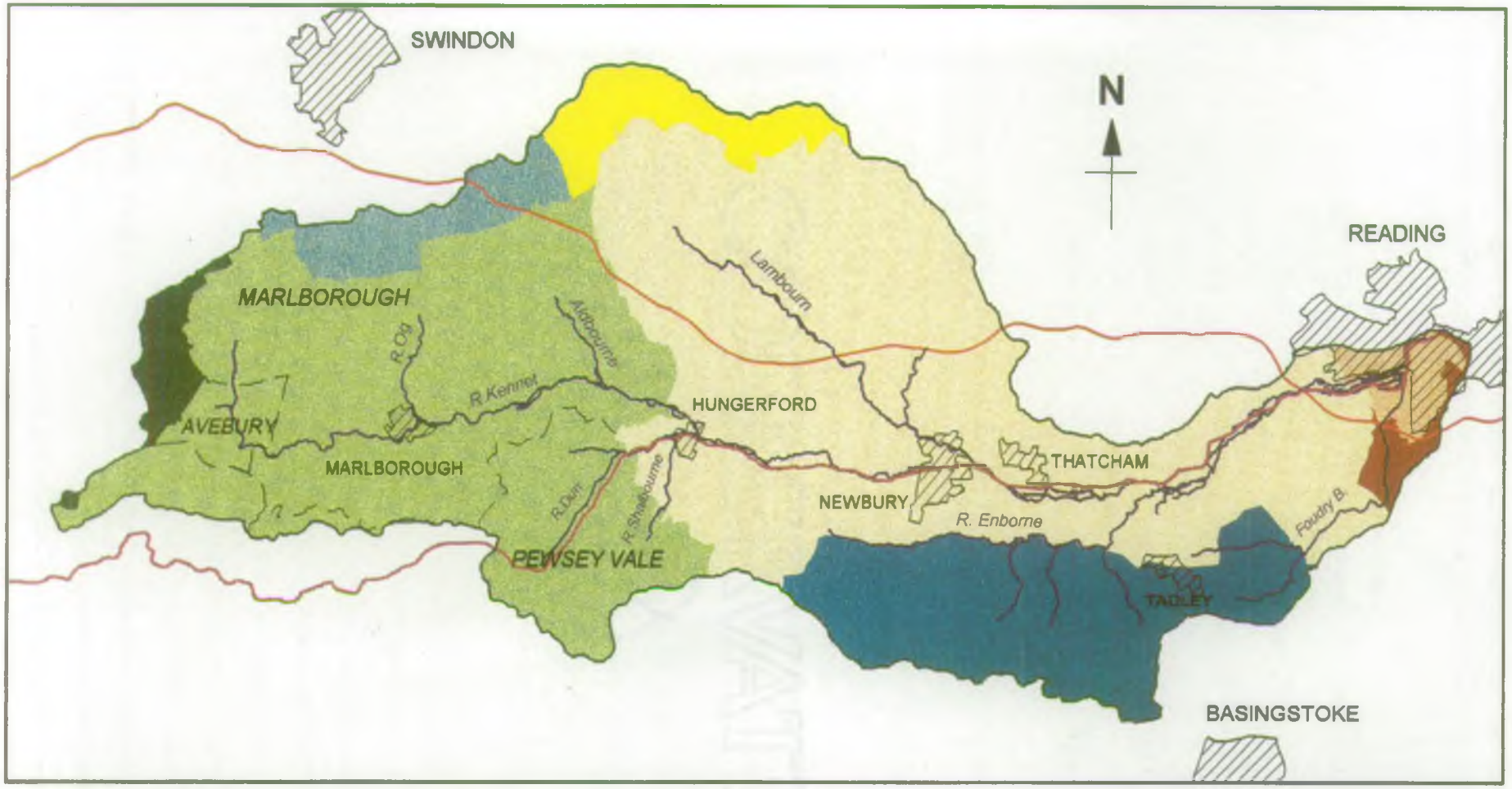
2) Plan for the Environment, Tourism and Leisure - Kennet and Avon Canal (British Waterways, 1991);

3) Land Management in the Urban Fringe. A defence strategy for the Lower Kennet Valley (Friends of the Lower Kennet, 1991).

National Rivers Authority
Thames Region

River Kennet
Catchment

LOCAL AUTHORITIES



KEY

SCALE

0 10 km

Catchment Boundary	Urban Area	BERKSHIRE	HAMPSHIRE / WILTSHIRE
Main River	Area Plan Boundaries for Kennet District Council	Newbury	Basingstoke and Deane / Kennet
Kennet and Avon Canal		Reading	OXFORDSHIRE / North Wilts
M4 Motorway		Wokingham	Vale of White Horse / Thamesdown

National Rivers Authority
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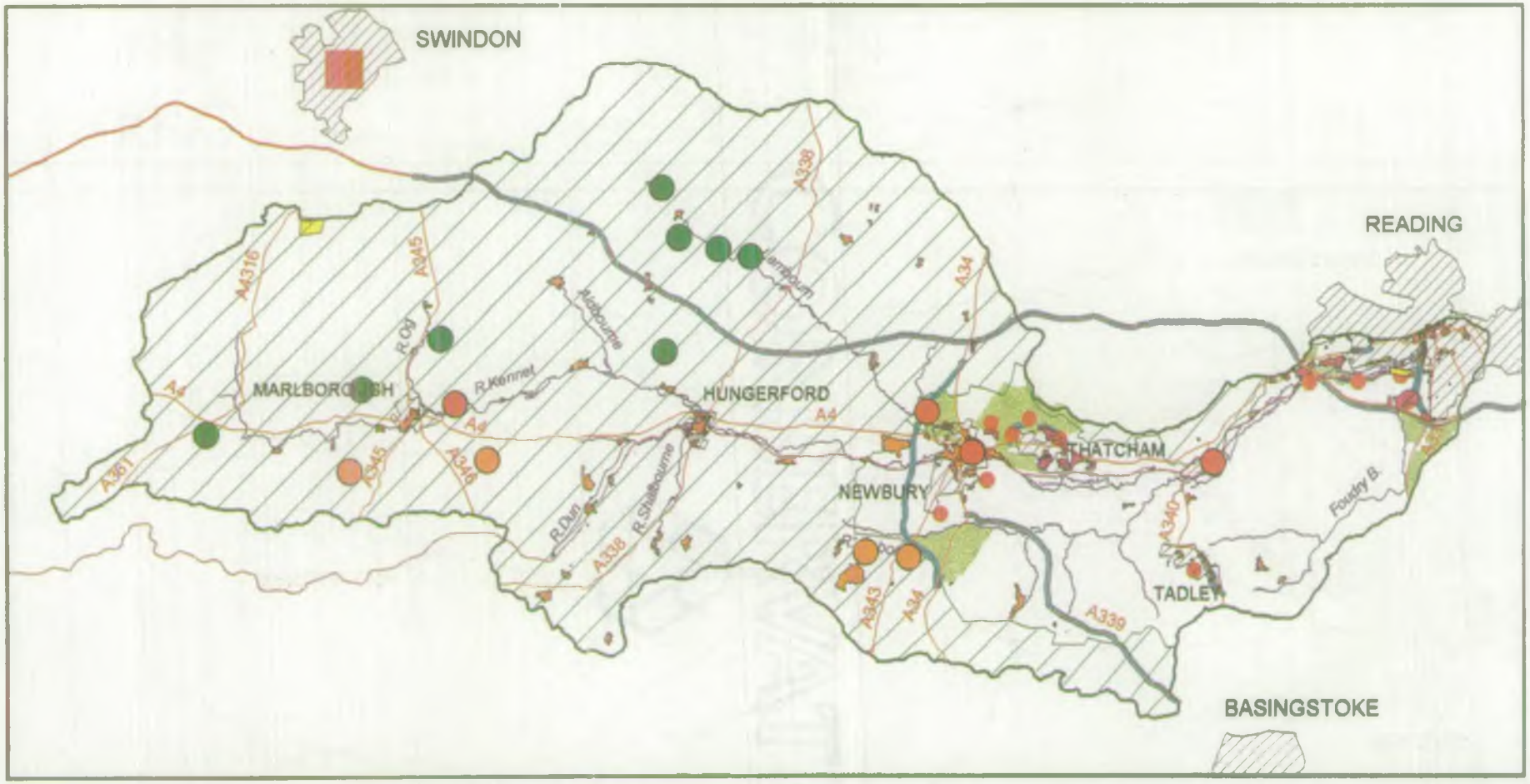
River Kennet
Catchment

DEVELOPMENT



KEY

SCALE

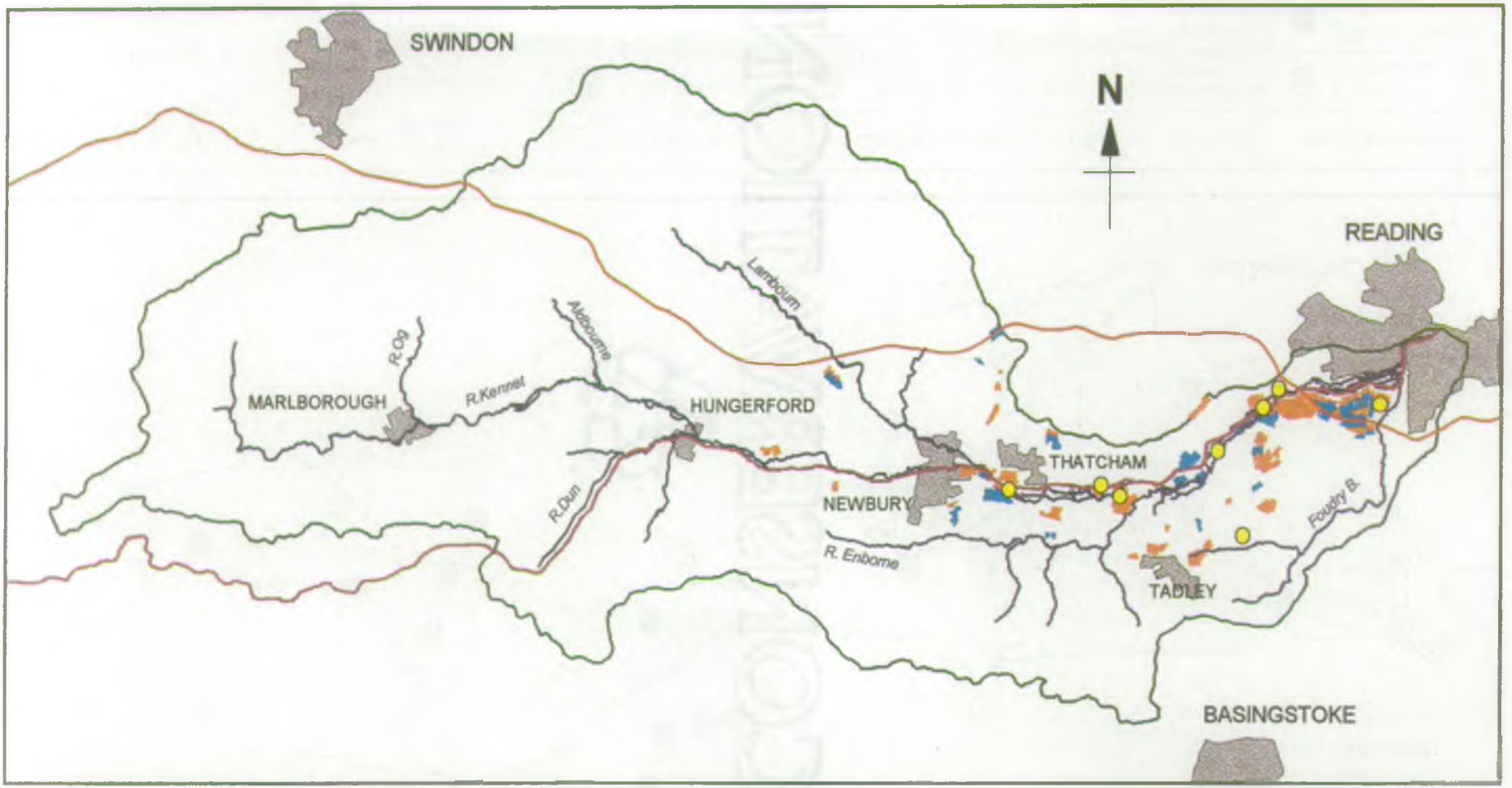
0 — 10 km

Catchment Boundary		Urban Area		Development Proposals		Development Constraints		Rural Development	
Main River		Regional Growth Area		Residential / Commercial		Strategic Gap/Rural Buffer Setting of Settlement		Forestry Commission Sites	
Kennet and Avon Canal		Existing Highways		Recreational		Urban Conservation Area		Horse Racing Centres	
M4 Motorway		Highway Proposals / Improvements		Possible Pressure Points		Area of Outstanding Natural Beauty		Fish Farms	

National Rivers Authority
Thames Region

River Kennet
Catchment

MINERAL EXTRACTION AND SOLID WASTE DISPOSAL



KEY

SCALE

0 — 10 km

	Catchment Boundary		Urban Area		Mineral Extraction				
	Main River				Past				
	Kennet and Avon Canal				Current or with Planning Permission				
	M4 Motorway				Proposed				

3.10 DEVELOPMENT

Agriculture is the largest land use in the Kennet catchment. The Kennet valley generally comprises of relatively poor quality farmland used as pasture with higher quality farmland over the gravel and brickearth deposits. On the Downs, however, arable farming dominates and barley, wheat and oilseed rape are grown. Elsewhere in the Lambourn area, the horse racing industry is well established and in the western reaches of the catchment, the good water quality facilitates fish farming on a commercial scale. Several Forestry Commission woodland areas occur, notably the ancient Savernake Forest which is an extensive swathe of woodland in the locality.

There is potential for enhancing the water environment by creating buffer zones adjacent to watercourses. Recent changes in agricultural policy to 'set-aside' approximately 15% of arable land provide such an opportunity.

The management of rural areas including environmentally-sensitive tourism projects will need closer liaison with MAFF and the Countryside Commission.

Within the catchment there is considerable pressure for further growth. The DoE's Consultation Draft Regional Planning Guidance for the South West (1993) indicates that Swindon will continue to be a major regional growth point although development is unlikely to occur at the rates which have characterised recent years. Such growth together with associated highways will have considerable impact on all aspects of the water environment.

An important aspect of future land use planning policy and control activity will be the way in which it embraces the government's intention to work towards ensuring that development and growth are sustainable. Within the River Kennet catchment, the NRA are keen to continue working with County and District Councils to ensure that land use planning decisions reflect this approach. Of particular interest are the catchment-wide concerns about water resources and the more localised conservation needs of the Kennet valley.

3.11 MINERAL EXTRACTION AND SOLID WASTE DISPOSAL

Little mineral extraction takes place in the valley to the west of Newbury. This is partly because of geological constraints but is primarily due to the area being within the North Wessex Downs AONB – where mineral working is contrary to the aims of conserving landscape quality and the environment.

Current workings in the valley are located between Newbury and the western edge of Reading. A significant amount of working has also taken place here in the past and as a result reserves between Newbury and Thatcham have been largely exhausted.

The majority of waste disposal sites are located around populated areas particularly to the south of Reading and the east of Newbury (eg Beenham). Many of these are former gravel extraction sites which are being filled back to ground level and then restored.

The Draft Replacement Minerals Local Plan (1993) for Berkshire identifies seven preferred sites for further extraction up to the year 2011. Generally, new areas should not be dug until extraction has finished at nearby sites which already have planning permission. In addition, no increases in overall levels of extraction will be allowed if they will harm the character or amenity of the valley.

Use should be made of existing processing plant where possible. No increases will be allowed in absolute numbers of plant and every opportunity will be taken to secure the removal of plant which are no longer appropriate.

3.11 MINERAL EXTRACTION AND SOLID WASTE DISPOSAL (Continued)

Berkshire's draft Minerals Strategy seeks to respect the environmental capacity of the valley to absorb the impact of mineral working. Emphasis is also laid on the need to ensure the satisfactory restoration of mineral sites. It is proposed that restoration should be mainly to dry land and any water features should be small in scale or in the form of flood meadows, carr woodland or reed-beds. This strategy reflects the existing landscape character of the area which is small in scale. The cumulative impact of restoration proposals on groundwater flows and water quality will need to be carefully considered.

Mineral extraction in the River Kennet valley is likely to continue for many years to come. Berkshire County Council are intending to convene a working party of interest groups including local councils and mineral operators to guide the operation of their proposed strategy.

The document 'Waste Disposal - A New Strategy for Berkshire' (1992) indicates that the disposal of putrescible (ie potentially polluting) waste via landfill should be phased out by the year 2007.

The Hampshire Minerals Plan identifies, over the next 20 years, one potential gravel extraction and waste disposal infilling site in the east of the catchment at Mortimer West End.

No sites are identified within the catchment in the Wiltshire or Oxfordshire Minerals Plans.

3.12 IDENTIFICATION OF CATCHMENT VALUES

This section has reviewed the resources of the catchment, the uses we make of the water environment and the activities that might affect it. The key points raised by this review are as follows:

- the ecology and fisheries of the catchment are of regional and national importance;
- the landscape of much of the catchment is of national importance;
- the western half of the catchment is nationally significant in archaeological terms;
- the Kennet and Avon Canal is an important recreational, heritage, landscape and ecological asset whose future depends on securing greater financial support and more water resources;
- the water areas of the Lower Kennet valley are of county-wide importance as recreational assets;
- water abstraction and effluent disposal are significant and important uses within the catchment and need to be carefully managed so as to protect or improve the environment;
- agricultural land use management grants offer opportunities if appropriately used for protecting and enhancing the water environment;
- urban land use change, including mineral extraction, will be focused on the Kennet valley downstream of Newbury;
- opportunities exist for the integrated management of the water environment in the Upper and Lower Kennet;
- flood defence standards of service are maintained primarily by maintenance activities which are also of benefit to fisheries and ecology.

These key points provide a basis for identifying the issues facing the water environment.

SECTION 4 - REVIEW OF THE CONSULTATION PROCESS

4.0 REVIEW OF THE CONSULTATION PROCESS

Introduction

One of the objectives of Catchment Management Planning is to involve all interested parties in the planning for the future well being of the catchment. The NRA is therefore committed to the concept of public consultation on all its CMPs.

Informal consultation on the River Kennet CMP took place with a wide range of organisations and Local Authorities over a period of 4 months during which the Consultation Report (CR) was produced. Once published, the CR marked the start of formal public consultation. It was launched in April 1993 through press releases and radio interviews as well as through wide distribution to consultees for review and comment.

Subsequently, during the summer of 1993, public meetings were held at Marlborough, Newbury and Reading to discuss not only the range, adequacy and priorities in terms of issues identified for the catchment but also to obtain views on the identified catchment values. Display boards and posters were set up at these meetings and also at council offices and local libraries located throughout the catchment.

Review

Regional NRA staff, the NRA Thames Regional Advisory Board and the three NRA TR Statutory Committees were initially consulted before the CR was released for external consultation. Subsequently, the NRA TR was reorganised and this caused some delay in proceeding with the Final CMP. The reorganisation facilitated the establishment of operational areas (see Appendix I) which now take responsibility over traditionally region-based activities including Catchment Management Planning and the production of CMPs. However, a 'regional' link is maintained through an Advisory Group consisting of representatives from the Committees and regional headquarters. This group provides strategic and more detailed local advice on the CMP.

A total of 500 CRs were produced with about 350 distributed to Local Authorities, external organisations and key individuals. This resulted in 56 written responses to the NRA. These responses provided useful feedback and although not all comments were positive, most were constructive. These comments have all been considered and where appropriate incorporated into the Final report.

3000 summary leaflets were produced and these were distributed through either mailing or by handing out at libraries and public meetings. The former was found to be more effective.

The public meetings attracted an average audience of 35, mainly from local interest groups eg angling associations, Action for the River Kennet, Cleaner Kennet Campaign etc. However, attendance by individual members of the public was poor. The meetings provided an opportunity for local people to express views on the catchment issues and enabled the NRA to understand their relative importance. There were no new issues identified but surprisingly, the issue of flood defence was not considered particularly important at these meetings. However, the NRA takes the potential risk of flooding, for example at Newbury and Thatcham, seriously and has put forward an Action Plan to address the issue (see 5.5 Flood Defence - Action Plan).

The public consultation exercise was deemed worthwhile. The range and extent of catchment resources, uses and activities identified in the CR were confirmed and edited - enhancing the Authority's database. The issues facing the Kennet catchment were also thoroughly debated and agreed. Overall, consultation led to the Kennet catchment and its issues being given a much higher profile and this should assist any necessary actions.

The results of public consultation were presented to an invited audience at a Forum in Newbury on 27th July 1993. Following this Forum, Action Plans were drafted by the Authority and key organisations and participants consulted on its contents. The Action Plans were then incorporated into this Final Report.

SECTION 5 - KEY ISSUES AND ACTION PLANS

5.1 ACTION PLANS - INTRODUCTION

Action Plans act as a mechanism for setting and implementing cross-functional objectives for the catchment as a whole. Through the preparation of the Consultation Report, the NRA was able to identify a number of issues which required consideration by all those interested in the future of the catchment's natural water environment. These issues were generally agreed and confirmed through the consultation process, and are shown in the table below. The relevant issue codes in this Action Plan are also provided for cross referencing.

ISSUE (as identified in Consultation Report)	**ACTION PLAN ISSUE CODES**
Upper Kennet River Levels/flows	WQ3, WR1, FC1, FC9, CO1-CO2.
Newbury and Thatcham	WQ11, FD1, FD3, FD5.
West Berkshire Groundwater Scheme	WR2.
Kennet and Avon Canal	WR7, FC8, FD2, FD3, FD4.
Fisheries and Conservation Management	FC1-10.
Water Quality Protection	WQ1-12, WR3, FC6.
Changes in Catchment Status	WR1, WR3, WR6, FC1, FC4, FC7, FD2.
Communications	CO1-CO2

A number of these issues overlap and so the Action Plans have been devised to avoid repetition. However, the multifaceted nature of catchment management must be stressed and is illustrated in the range of participants identified in the Action Plans themselves. Very few issues can be successfully tackled by a single organisation, group or individual. This extends to the activity of the NRA itself which depends upon an integrated approach for its achievements and success. The Plans begin with a statement of the NRA's broad aims and strategies to provide a policy framework for the activities described.

A number of the concerns raised will be dealt with through the routine work of the NRA. Therefore, a summary of this activity is also included. Most of the routine activities stated are undertaken by the NRA and are generally deemed to be of 'high' priority.

Many of the issues described involve conflicts between competing uses, between different activities, or, between the conservation of natural resources and activities/uses harmful to them. The actions described in this Report do not necessarily resolve all these conflicts; they attempt instead to achieve a balance for the overall betterment of the water environment.

It must be noted that the order in which the issues/actions are stated in this document in no way indicates a priority or importance. The order of the document is completely arbitrary. Furthermore, the timing of improvements is dependent on prioritisation of projects throughout the Region and the outcome of cost-benefit analysis.

It should also be realised that the actions stated are aspirations that the NRA and key participants are working towards. All the participating organisations have limited resources and powers. If resources are not available due to budget shortcomings or more urgent priorities then the actions indicated cannot be executed within the allotted timescale.

It is intended that the CMP is directly related to the NRA Corporate planning process. The River Kennet CMP will be one of the first to be produced in the NRA Thames Region. However, the River Kennet catchment's needs will not take priority over the needs of other catchments within the West Area because of this. Therefore, to avoid the River Kennet CMP becoming a 'resource sink' at the expense of following CMPS, the overall priorities of the West Area will need to be reviewed as each CMP is produced.

5.1 ACTION PLAN - INTRODUCTION (Continued)

The following will provide notes to accompany the Action Plans.

KEY TO NRA DEPARTMENTS

1. Environmental Services - Pollution Control (West)
2. Scientific Department
3. Environmental Services - Groundwater Quality (West)
4. Environmental Services - Water Resources (West)
5. Technical Department - Water Resources
6. Technical Department - Hydrological and Hydrometric Services
7. Fisheries and Conservation (West)
8. Flood Defence (West)
9. Catchment Planning (West)
10. Navigation and Recreation (West)
11. Project and Engineering Services

NOTES

- Resource implications: The costs/time shown are those incurred by the NRA; are indicative and subject to detailed project justification.
- Resource implications: 'Y' and 'N' indicate 'yes' and 'no' respectively.
- Priority of 'lead' organisation indicated.
- Please refer to Appendices I and IV (Key Participants and Glossary respectively) for the definition of acronyms.
- Should new issues become apparent during the life-span of this Plan, further actions will be added at succeeding reviews.

5.2 WATER QUALITY PROTECTION - ACTION PLAN

The National Rivers Authority (NRA) **aim** to:

- **achieve a continuing overall improvement in the quality of rivers through the control of pollution;**
- **ensure that dischargers pay the costs of the consequences of their discharges;**
- **protect and improve the water environment by the effective management of water resources and by substantial reductions in pollution.**

(all the above from NRA Water Quality Strategy, 1993)

The NRA's **strategies** are to:

- maintain waters that are already of high quality;
- improve waters that are of a poorer quality;
- prosecute polluters as appropriate and recover costs of restoration from them;
- ensure all waters are of an appropriate quality for their agreed uses;
- devise charging regimes that allocate the costs of maintaining and improving water quality fairly and provide incentive to reduce pollution.

(all the above from NRA Water Quality Strategy, 1993)

The NRA **policies** pertinent to the above aims and strategies are:

- **Guidance Notes for local planning authorities**

  - NRA looks to Local Planning Authorities not to permit (the allocation of land for) developments likely to place the quality of watercourses or groundwater at risk and generally to encourage initiatives which lead to improvements.

  - The NRA would look to the council to discourage...small package sewage treatment plants within sewered areas. The use of septic tanks will only be considered if the ground conditions are satisfactory..for adequate subsoil drainage and poses no risk to groundwater quality.

- **NRA Policy and Practice for the Protection of Groundwater (1991):** to identify groundwater sources and aquifers vulnerable to pollution, to identify risks to groundwater quality and protect the quality of groundwater by preventing pollution.

- Need to develop a policy for the identification of water protection zones under the Water Resources Act 1991 S93

- **The control of pollution (Silage, Slurry and Agricultural Fuel oil) Regulations 1991:**

  The NRA can serve statutory notice for improvements. The NRA also sanction the production of farm waste management plans ie slurry storage and the size of facilities.

- Compliance with the requirements of all EC directives (which set conditions and standards for water quality).

5.2 WATER QUALITY PROTECTION - ACTION PLAN

WATER QUALITY PROTECTION: ISSUE-RELATED ACTIONS

ISSUES	ACTIONS	PRIORITY	LEAD RESPONSIBILITY	KEY PARTICIPANTS	YEARS	NRA RESOURCE IMPLICATIONS STAFF TIME	COSTS (£)
WQ1. **Establishment of groundwater sampling network**	Completion of groundwater sampling network by the location of survey points and continuation of sampling programme at identified sites in the catchment	Medium	NRA[1,2,3]		1993/4..1998/9	Y	Y
WQ2. **Perceived lack of accessibility to the public register** *The register is available to the public from 0930 to 1600 hrs.*	a) Continue the development of the computer systems to eventually improve the accessibility ie physical access and ease of understanding and interpretation b) Make the NRA public register better publicised eg circulation of NRA leaflet to interested parties. *(See also 5.6 Communications Action Plan)*	Medium	NRA[2]		1994/5..1998/9	Y	Y
WQ3. **Upper Kennet River Levels Study - water quality action:** Upper Kennet failure to meet dissolved oxygen RQO; *(perception that this was due to low flow)*	a) Baseline data collection; installation of dissolved oxygen meters	Medium/High	NRA[2]	NRA[1]	1993/4 (completed)	Y	Y

WATER QUALITY PROTECTION: ISSUE-RELATED ACTIONS

ISSUES	ACTIONS	PRIORITY	LEAD RESPONSIBILITY	KEY PARTICIPANTS	YEARS	NRA RESOURCE IMPLICATIONS STAFF TIME	COSTS (£)
	b) Assessment of correlation between dissolved oxygen and (low) flows *(Internal report produced and concluded that although flow was a factor the DO concentrations were more closely related to algae and macrophytes. Groundwater by its very nature is already depleted in DO and this will also effect overall levels.)*	Medium/High	NRA[2]		1993/4 (draft completed)	Y	N
WQ4. **Need for comprehensive database on the use and storage of chemicals**	a) Assess the feasibility of combining the hazardous chemical lists of HMIP, COSHH, HSE, County Councils, CIMAH, BASIS and the fire brigade into a single database	High	NRA[1,2]	BCC, RBC, NDC, KDC (Fire Brigade), HMIP, HSE, Police	1994/5..1998/9	Y	N
	b) Collation of site specific hazardous chemicals information; improve knowledge of where the chemicals are located in the catchment	Medium	NRA[1,2]	BCC, RBC, NDC, KDC (Fire Brigade), HMIP, HSE	1994/5..1998/9	Y	Y
WQ5. **Groundwater Quality** A number of strategic water quality investigations have been identified and are relevant to the activities in the Kennet catchment:							
a) Effects of highway soakaways on groundwater quality	Investigation into impact of representative highway soakaways on groundwater quality	Medium	NRA[2]	NRA[3]	1993/4..1998/9	Y	Y
b) Landfill site impact upon groundwater quality	Assess potential for effect of landfill sites on groundwater quality in Kennet catchment	Medium	NRA[2]	NRA[3]	1993/4..1998/9	Y	Y

5.2 WATER QUALITY PROTECTION - ACTION PLAN (continued)

WATER QUALITY PROTECTION: ISSUE-RELATED ACTIONS

ISSUES	ACTIONS	PRIORITY	LEAD RESPONSIBILITY	KEY PARTICIPANTS	YEARS	NRA RESOURCE IMPLICATIONS STAFF TIME	COSTS (£)
c) Groundwater quality in relation to specific land use	Assess potential for effects of specific land uses on groundwater quality	Medium	NRA[2]	NRA[1]	1993/4..1998/9	Y	Y
WQ6. **Ingress of groundwater to sewers** reduces their capacity to carry sewage and is the direct cause of flooding in some areas eg buildings being flooded in the Lambourn area especially during high groundwater conditions.	a) The District councils as agents of Thames Water Utilities to work on sealing the faulty sewers.	High	RBC, KDC, NDC,TWUL	NRA[1]	1993/4..1998/9	Y	N
	b) Undertake liaison to identify critical problem areas and repair programme West Kennet and Aldbourne areas are also being worked on currently. Where sewer surcharging results in water quality problems the issue shall be addressed by the NRA.	Medium	TWUL, NRA[1,2,3]	RBC, KDC, NDC	1993/4..1998/9	Y	Y
WQ7. **Undertake pollution prevention campaigns** to identify and educate potential polluters in order to minimise future pollution risks, increase the NRA's efficiency and save unnecessary or excessive "clean up" costs.	Continue programme of pollution prevention campaigns ie Thatcham Industrial areas (done), South Reading and Lower Kennet industrial areas, Foudry Brook farming and industrial areas (under way), Enborne and tributaries farming areas (under way).	High	NRA[1]	RBC, BCC, NDC, KDC, TWUL, Riparian Owners, BW, RBC, BCC, BDBC, Industry, Farmers, MAFF/ADAS	1993/4..1998/9	Y	N

5.2 WATER QUALITY PROTECTION - ACTION PLAN (continued)

WATER QUALITY PROTECTION: ISSUE-RELATED ACTIONS

ISSUES	ACTIONS	PRIORITY	LEAD RESPONSIBILITY	KEY PARTICIPANTS	YEARS	NRA RESOURCE IMPLICATIONS STAFF TIME	COSTS (£)
WQ8. **At Hungerford, turbid water is entering the River Dun from the canal lock overflows directly, or from the Shalbourne, causing an adverse (aesthetic) impact.** *Ecological effects may also need to be considered.* *(see also 5.4 Fisheries and Conservation action plan)*	a) Investigate the extent of the problem by inspection, sampling and analysis, etc at the Shalbourne/canal confluence and downstream of lock.	High	NRA [1,2,7]	BW, Riparian Owners	1993/4..1994/5	Y (1 man month)	Y
	b) Produce report and make recommendations, considering effect on Fisheries and Conservation etc	Medium	NRA [1,2,7]	BW, Riparian Owners	1993/4..1994/5	Y	Y
WQ9. **Litter** on the Kennet and Avon Canal especially on bank	Improve public awareness and education	High	NDC, RBC, KDC, BW, Riparian Owners	NRA [2,10] CKC	1993/4..1998/9	Y	N
WQ10. Aesthetic impact of **litter at Foudry Brook** due to its location adjacent to a civic amenity site.	a) Educate the public not to use the Foudry brook or the surrounding area as a waste dump.	Medium	BCC, RBC	NRA [2,10]	1993/4..1998/9	Y	N
	b) Continue to review the situation and consider possible new locations for the site. *BCC have tried to alleviate the problem with a new road-side bund*	Medium	BCC, RBC	NRA [2,10]	1993/4..1998/9	Y	N
WQ11. **Sewage related debris in the River Kennet downstream of Newbury STW.** Thought to be related to Storm tank/overflow activities at the works.	a) Storm overflow consent application by TWUL and processed by NRA to ensure appropriate effluent standards.	Medium	TWUL, NRA[4]	NRA [1]	1993/4..1998/9	Y	N

WATER QUALITY PROTECTION: ISSUE-RELATED ACTIONS

ISSUES	ACTIONS	PRIORITY	LEAD RESPONSIBILITY	KEY PARTICIPANTS	YEARS	NRA RESOURCE IMPLICATIONS STAFF TIME	COSTS (£)
	b) Improvements to the works to meet consent may need inclusion in the AMP2 list or succeeding AMPs. *[Actions not yet agreed]*	Medium	TWUL	NRA [1,2]	1994/5..1998/9	Y	N
WQ12. Frequent **incidence of foam at Reading** outfall on Foudry Brook. Aesthetic impact.	a) Liaison as appropriate to explore ways to alleviate problem	Low	NRA [1,2]	TWUL	1993/4..1995/6	Y	N
	b) Improved outfall structure design *(The expense of possible actions makes progress unlikely at this stage)*	Low	TWUL		1994/5..1998/9	Y	N

5.2 WATER QUALITY PROTECTION – ACTION PLAN (continued)

WATER QUALITY PROTECTION - ROUTINE WORKS

ACTIVITY	PURPOSE	NRA & KEY PARTICIPANTS	NRA RESOURCE IMPLICATIONS STAFF TIME	COST (£)
1. **Discharge consenting and charging for discharges.** Review of discharge consents. The NRA is considering review of consents at Fyfield, Burghfield, Marlborough, Kintbury and Kingsclere STW.	Regulation Provide funding of NRA pollution control activities Enforcement of the 'polluter pays' principle	NRA [1,2,3] TWUL	Y	Y
2. **Water Quality Monitoring:** Automatic stations, monthly sampling programme (surface and groundwater quality; at least 40 river sampling points are monitored monthly. This excludes groundwater and effluent sampling). Sampling suites over a whole range of substances including pesticides/ list II substances. Biological surveys: Invertebrate fauna (sites surveyed at least annually); Bacteriological sampling (rolling sampling programme); Algal sampling (site specific sampling) and aquatic plant (macrophyte) sampling (rolling sampling programme).	Chemical and biological status indicates the basic health of the water. Collection of data as a basis for NRA activities, assessment of compliance, summary statistics for publishing at least every 5 years. Annual summaries are also compiled. This information allows NRA to establish the effectiveness of pollution control measures and determine the ability of receiving waters to accept discharges. Monitoring will also identify problems and instigate remedial action.	NRA[1,2,3] HMIP, HSE, BCC, RBC, NDC, KDC,BDBC.	Y	Y
3. **Water Quality Planning work:** Modelling to assess conditions on discharge consents. Calculating compliance with RQOs and determination of river class. Future activity implications of GQAs introduction by the NRA (SWQOs by DoE).	In order to carry out statutory duties and allow realistic decisions. Assessing current class of rivers and identifying areas of water quality improvement.	NRA[1,2] DoE RBC, BCC, NDC, KDC, BDBC, Industry	Y	Y
4. **Provision of Public Register on Water Quality**	To fulfil duty under Water Resources Act 1991	NRA[1]	Y	Y

WATER QUALITY PROTECTION - ROUTINE WORKS

ACTIVITY	PURPOSE	NRA & KEY PARTICIPANTS	NRA RESOURCE IMPLICATIONS STAFF TIME	COST (£)
5. **Enforcement of pollution control legislation:** – collection of evidence – follow-up legal action and prosecution	To fulfil statutory duties and exercise statutory powers.	NRA[6,Legal]	Y	Y
6. Ensuring compliance and designation of experimental **Nitrate Sensitive areas** (eg Ogbourne St.George). The NRA monitor them.	To protect controlled waters ie public water supply boreholes from diffuse pollution by (agricultural) nitrate.	MAFF DoE, NRA [1,3,4,9] farmers, TWUL	Y	Y
7. **Groundwater quality assessment and protection**	Enforcement of NRA's policy and practice for the protection of groundwater	NRA[1,2,3,9]	Y	N
8 **Pollution Prevention visits** *(see 5.2 Water Quality Protection: Issue related Actions)* MAFF currently funds ADAS to carry out farm visits and to offer advice on reducing pollution risk.	Protection of controlled waters from pollution	NRA[1] MAFF, ADAS, Industry, farmers, Riparian Owners	Y 2 permanent members of staff for West t Area plus Pollution Officers	Y
9. **24 hour service in dealing with reported incidents of pollution:** to prevent entry to watercourses, rapid clean up and warning *NRA Standards of Service: NRA to respond to reported incidents within: 2hrs of notification 0900-1700hrs Mon-Fri* *4hrs of notification 1700-0900hrs Mon-Fri and at weekends*	To minimise the impact of pollution on the environment	NRA[17] BCC, RBC, NDC, (Fire Brigade), TWUL, Industry,farmers, Riparian Owners	Y	Y

5.3 WATER RESOURCES - ACTION PLAN

The NRA's principal **aim** in relation to water resources is to:

* **manage water resources available to the Kennet Catchment to achieve the right balance between the needs of the environment and those of the abstractors.**

(from NRA Water Resources Strategy 1993)

To achieve this aim, the NRA's **strategies** are to:

* plan for the sustainable development of water resources, developing criteria to assess reasonable needs of abstractors and of the environment
* collect, validate, store and provide hydrometric data and environmental data in order to assess water resources
* apply a nationally consistent approach to abstraction licensing including licence determination, charging, policing and enforcement
* work in a multi-functional way and with external bodies to protect the quality of our water resources
* take account of other uses within the catchment as identified through catchment management plans
* ensure that the availability of water resources is taken into account in town and country planning

(all the above from NRA Water Resources Strategy 1993)

* promote water efficiency measures - including leakage control, selected domestic metering and wise use of water in industry and in the home.

The NRA **policies** pertinent to the above aim and strategies are:

* **NRA Policy and Practice for the protection of groundwater** - practices or processes ie abstraction or land use which might cause a deterioration in the quality of groundwater will be prohibited
* **NRA Guidance notes for local planning authorities** - new development will be resisted where the NRA considers that adequate water resources do not already exist or where the provision is considered likely to pose a risk to existing abstractions, water quality, fisheries, amenity or conservation. (However, note that it is a statutory duty of water undertakers to make supply available to new developments. Therefore, a balanced approach to development is necessary).
* **NRA Thames Region Licensing policy** - granting of abstraction licences, enforcement and implementation of charging scheme.

5.3 WATER RESOURCES - ACTION PLAN

WATER RESOURCES: ISSUE-RELATED ACTIONS

ISSUES	ACTIONS	PRIORITY	LEAD RESPONSIBILITY	KEY PARTICIPANTS	YEARS	NRA RESOURCE IMPLICATIONS STAFF TIME	COSTS (£)
WR1. **Upper Kennet River Levels** Public concern instigated a NRA study and the production of an action plan (The actions are cross-functional and reference will be made to them in the other Action Plans as appropriate)	a) Assess PHABSIM as a means to set prescribed flow (for Axford licence) to protect environmental needs	High	NRA[1]	Birmingham University, NRA[4,7,8], TWUL, ARK	1993/4..1994/5	Y	N (14k)
	b) Determination of Axford Licence variation and establishment of flow constraint on River Kennet *(see footmnote 1)*	High	NRA[1]	NRA[2], TWUL	1994/5	Y (3 man months)	N
WR2. **West Berkshire Groundwater Scheme** Need to assess potential use and resource value of the scheme within a local, regional and environmental context	a) Negotiations with TWUL to affirm the strategic use of the scheme	High/ Medium	NRA[4,5]	NRA[7,8], TWUL	1994/5	Y (6 man months)	N
	b) Develop a strategy and operating agreement for future use	Medium	NRA[4,5]	NRA[7,8], TWUL	1994/5..1995/6	Y	N
WR3. Structure Plan proposals indicate **increases in demands on water resources** in the targeted development areas ie Newbury and Reading	a) Assess need and potential to develop new groundwater resources in the Middle and Lower Kennet.	Medium	NRA[4,5], TWUL	NRA[1,10], BCC, NDC, RBC	1993/4..1996/7	Y	Y

5.3 WATER RESOURCES - ACTION PLAN (continued)

WATER RESOURCES: ISSUE-RELATED ACTIONS

ISSUES	ACTIONS	PRIORITY	LEAD RESPONSIBILITY	KEY PARTICIPANTS	YEARS	NRA RESOURCE IMPLICATIONS STAFF TIME	COSTS (£)
	b) Use of NRA in-house groundwater model to assess effects of abstraction and the potential for further development in the confined aquifer ie for developments between Reading and Newbury.	High	NRA[1]	NRA[4], TWUL	1993/4..1994/5	Y	N
	c) Investigation by TWUL of emergency support for Reading water supply; from chalk aquifer at Fobney, Thames-side groundwater or river Test pumping and other work is ongoing.	High	TWUL	NRA[4,5]	1995/6..1996/7	Y	N
WR4. **Ensure new abstractions are not detrimental to environmental needs**	Produce abstraction policy for Kennet catchment	High	NRA[4,5]	TWUL	1993/4..1994/5	Y	N
WR5. **The adequacy of the hydrometric network**	a) Assess need for improvements to the measurements on Foudry Brook, Shalbourne and Kingsclere Brook *(After an internal review, no support was found for flow monitoring on the Foudry Brook.)*	High	NRA[8]	NRA[1,11]	1993/4 (complete)	Y	N
	b) Appraisal/feasibility study of gauging stations on the River Shalbourne and Kingsclere Brook. Construction will follow as appropriate	Medium/Low	NRA[8]	NRA[1,11]	1994/5..1997/8	Y	Y (£100k per gauging station)
WR6. **Effects of mineral extraction** and infilling on groundwater flow patterns. Also has water resources and quality implications.	Investigation of groundwater flow patterns in the valley downstream of Newbury using in-house expertise	Medium	NRA[4,5]	NRA[5,9]	1994/5..1998/9		Y (30K initial model development)

5.3 WATER RESOURCES - ACTION PLAN (continued)

WATER RESOURCES: ISSUE-RELATED ACTIONS

ISSUES	ACTIONS	PRIORITY	LEAD RESPONSIBILITY	KEY PARTICIPANTS	YEARS	NRA RESOURCE IMPLICATIONS STAFF TIME	COSTS (£)
WR7. **Kennet and Avon Canal**	Evaluate water supply needs (for navigation), resources availability, distribution and limits of operation Investigate ways of optimising water usage Continue liaison with relevant parties	High	BW	NRA[2,4,5,7,8,10] BCC, RBC, NDC K&ACT, Riparian Owners, EN	1993/4..1998/9	Y	N

Please Note:

1 If TWUL wish to renew the licence, the NRA must assess the licence application and establish a constraint on this licence in terms of river flow. If the licence quantity is reduced from present then TWUL would have to provide replacement resources (at additional cost).

WATER RESOURCES - ROUTINE WORKS

ACTIVITY	PURPOSE	NRA & KEY PARTICIPANTS	NRA RESOURCE IMPLICATIONS STAFF TIME	COST (£)
1. Data Collection: a) Measurement of rainfall, groundwater levels, river flow and level both manually and by telemetry. b) This data is collected and processed. The means of measurement such as gauging stations also need to be constructed and maintained.	Monitoring is necessary to provide the information for the NRA to carry out its duties effectively such as planning and licensing, as well as assisting operational duties eg flood warning. The details collected form a long term archive.	NRA[1,11]	Y	N (Y for gauging station appraisal and construction)
2. Abstraction Licensing Where it is judged that a licence proposal would have significant environmental impacts, the licence applicant will be required to carry out an environmental appraisal and submit an environmental report.	To fulfil statutory duties under Water Resources Act 1991 and process in accordance with NRA TR licensing policy.	NRA[2,4,5], applicant	Y	N
3. Abstraction licence enforcement	To ensure adherence to licence conditions. 316 licensees in the Kennet catchment will all be visited at least once over a 5 year period (125 visits were undertaken in 1993/4)	NRA[4]	Y (1.3 enforcement staff employed in whole of NRA TR West area)	N
4. Water Resources Planning	Need to assess current and future demands on water resources and planning of new water resource developments. NRA Thames Region Water Resources Strategy document *(see appendix II)* is currently being prepared.	NRA[5], Water supply companies, BCC,NDC,RBC	Y	Y
5. Computer Modelling	Increase understanding of the operational, hydrological and hydrogeological relationships within catchments. This greater understanding allows a more scientifically based assessment of the environmental consequences of various options.	NRA[5,6]	Y	N
6. Development Planning: Water Resources staff comment on all planning applications and statutory plans. Water conservation is promoted. One example is the application of 'source control' to runoff from new and redevelopments through the use of soakaways, swales etc.	To achieve sustainable use of water resources within the catchment	NRA[3,4,5,9]	Y	N

5.3 WATER RESOURCES - ACTION PLAN (continued)

WATER RESOURCES - ROUTINE WORKS

ACTIVITY	PURPOSE	NRA & KEY PARTICIPANTS	NRA RESOURCE IMPLICATIONS STAFF TIME	COST (£)
7. **Improve West Berkshire Groundwater Scheme borehole sites:** Removal of unsightly disused radio masts; Commission grass cutting regimes; General site tidying.	To enhance the visual amenity of NRA sites	NRA[58]	Y	N
8. **Provision of data and advice** to: a) Water Companies	To fulfil statutory duties under the Water Resources Act 1991	NRA[55&6]	Y	N
b) The Public	To fulfil requirements under Environmental Information Regulations 1992 To further education and understanding of the water environment	NRA[55&6]	Y	N
c) Within the NRA	To allow other functions to operate efficiently	NRA[55&6]	Y	Y

5.4 FISHERIES AND CONSERVATION MANAGEMENT - ACTION PLAN

The National Rivers Authority (NRA) **aim** to:

- **maintain, improve and develop fisheries;**
- **conserve and enhance wildlife, landscape and archaeological features associated with inland and coastal waters of England and Wales.**

(all the above from NRA Fisheries and NRA Conservation Strategies 1993)

The NRA's **strategies** are to:

- protect and conserve salmon, trout, freshwater fish and eels;
- monitor the fisheries status of rivers and inland waters;
- formulate policies to maintain, improve and develop fisheries and restore and rehabilitate damaged fisheries;
- regulate fisheries through the enforcement of a consistent series of licences, orders, byelaws and consents;
- provide an efficient and effective fisheries service which is responsive to the needs of customers;
- assess and monitor the conservation interest of inland waters and associated lands;
- ensure the NRA's regulatory, operational and advisory activities take full account of the need to sustain and further conservation;
- promote conservation to enhance the quality of the aquatic and related environment for the benefit of wildlife and people.

(all the above from NRA Fisheries and NRA Conservation Strategies 1993)

The NRA **policies** pertinent to the above aims and strategies are:

- liaise with and provide relevant advice and expertise on fisheries and conservation management techniques and issues to external organisations as necessary;
- **Guidance notes for local planning authorities** - the NRA will promote and support initiatives which seek to conserve, restore or enhance the natural elements of river corridors and other waterside areas, or which encourage appropriate water-based and waterside recreation;
- The NRA will seek to improve river corridors and other waterside areas by:

(a) promoting sympathetic land management through our regulatory and advisory work;

(b) resisting development which would have an adverse impact on nature conservation, fisheries, landscape, public access or water related recreation.

5.4 FISHERIES AND CONSERVATION MANAGEMENT - ACTION PLAN

FISHERIES AND CONSERVATION MANAGEMENT: ISSUE-RELATED ACTIONS

ISSUES	ACTIONS	PRIORITY	LEAD RESPONSIBILITY	KEY PARTICIPANTS	YEARS	NRA RESOURCE IMPLICATIONS STAFF TIME	COSTS (£)
FC1. **The need for the collection of (baseline) data** in order to assist the NRA to carry out its duties and to provide information to outside organisations and general public regarding the watercourses	a) River corridor surveys of: i) Upper Kennet ii) Middle Kennet iii) Lower Kennet and Kennet tributaries	High	NRA*	BW, RBC, KDC, NDC, BCC	1993 1994/5 1995/6	Y	Y
	b) Fisheries survey of the Kennet system incorporating use of new technology (eg hydroacoustics) where appropriate	High	NRA*		1993/4..1994/5	Y	Y
	c) Strategic Landscape Assessment of the River Kennet	High	NRA*	NDC, RBC, BCC, WCC, KDC	1994/5	Y	Y (£22k)
	To identify landscape issues related to the catchment planning process, develop policies for dealing with them and identify enhancement opportunities. The aim is also to share landscape assessment data with NDC and potentially define collaborative projects.						

5.4 FISHERIES AND CONSERVATION MANAGEMENT - ACTION PLAN (continued)

FISHERIES AND CONSERVATION MANAGEMENT: ISSUE-RELATED ACTIONS

ISSUES	ACTIONS	PRIORITY	LEAD RESPONSIBILITY	KEY PARTICIPANTS	YEARS	NRA RESOURCE IMPLICATIONS STAFF TIME	COSTS (£)
	d) Geomorphological survey of the River Kennet Through consultation, identify the most appropriate mitigation and enhancement measures for selected reaches.	Medium/High	NRA*	NRA[1,4,8,9] Riparian Owners	1994/5 Upper Kennet Draft Report completed Oct. 1993 (Remainder to be completed soon.)	Y	Y (£5k)
	e) Produce database of Riparian Owners on Kennet system. Phase 1 being the collection of data; Phase 2 inputting this data onto GIS (SPANS)	Medium	NRA*	Riparian Owners	Phase 1 1993/4 Phase 2 1994/5	Y	N
	f) Integration of (natural resource) survey data ie data collected by the NRA combined with data from external sources.	Medium	NRA*	EN, BW	1994/5	Y	N
FC2. The River Kennet is a unique habitat with excellent fisheries and a very high diversity of both aquatic and marginal plants and aquatic invertebrates. Therefore, **there is a need to maintain the existing high ecological value of the catchment.**	Actions include the support of designation of part of the Rivers Kennet and Lambourn as a SSSI. Ensure all internal operations are in sympathy with the high nature conservation value of the catchment and advise and promote the sensitive management of this valuable resource.	High	EN, NRA*	NRA*, KVFA, S&TA, BW, Riparian Owners, Wildlife Trusts, FWAG	1994/5	Y	N
FC3. **Thatcham Reed Beds SSSI:** Concern that the site is experiencing a reduction in ecological interest due to a lack of optimum hydrological regime and management.	Instigate an investigation into the problem and recommend actions ie habitat management programme, repair and refurbishment of control structures etc	High	EN	NRA*, NDC, RSPB	1994/5 .1995/6	Y	Y

5.4 FISHERIES AND CONSERVATION MANAGEMENT - ACTION PLAN (continued)

FISHERIES AND CONSERVATION MANAGEMENT: ISSUE-RELATED ACTIONS

ISSUES	ACTIONS	PRIORITY	LEAD RESPONSIBILITY	KEY PARTICIPANTS	YEARS	NRA RESOURCE IMPLICATIONS STAFF TIME	COSTS (£)
FC4. **The stillwaters of the lower Kennet valley ie gravel pits represent a valuable recreational and ecological resource.** These waterbodies are threatened by development pressures.	Produce a database of stillwaters to include mapping, ownership and uses. Phase 1 has been completed and has found 96 lakes or pits adjacent to the River Kennet, half of which are actively fished. Other uses need to be assessed similarly.	Medium	NRA*	BCC, Riparian Owners	1993/4..1994/5	Y	N
FC5. **The recovery of an otter population in the Kennet catchment**	Look to promote and initiate an otter habitat project for the Kennet catchment. Aim to assess its suitability for otters by investigating habitat, prey populations and the levels of toxic pollutants ie through fish tissue analysis. Natural recolonisation will be encouraged. Appointment of project officer to recommend specific habitat enhancement through liaison with landowners.	High	NRA*	WWT, BCC, KDC, BBONT, KVFA, EN, Riparian Owners	1994/5..1995/6 (to commence March 1994)	Y	Y £25K pa (£50K in total)
FC6. **Sustain and where possible improve the resident brown trout population of the Kennet catchment**	Optimise recruitment to resident brown trout population by; a) Identifying and assessing sites to increase spawning habitats and locate egg incubation boxes. Phase 1 to cover upper and middle reaches of River Kennet. Such activities commenced at Axford and the Wilderness fishery during 1993.	Medium	NRA*	Riparian Owners, KVFA	1993/4..1997/8	Y	Y
	b) Developing a fish introduction and control policy. This will identify opportunities to reduce the need to stock farmed trout and will clarify areas where controlled culling may take place.	Medium/High	NRA*	Riparian Owners, KVFA, S&TA	1993/4..1997/8	Y	N

FISHERIES AND CONSERVATION MANAGEMENT: ISSUE-RELATED ACTIONS

ISSUES	ACTIONS	PRIORITY	LEAD RESPONSIBILITY	KEY PARTICIPANTS	YEARS	NRA RESOURCE IMPLICATIONS STAFF TIME	COSTS (£)
	c) Develop standards of best practice for weed cutting *(see FC9b and 5.5 Flood Defence - action plan)*	Medium/High	NRA*#	NRA*‡ Riparian Owners	1993/4..1994/5	Y	N
FC7. Past changes and present development pressures on water and land use have caused the **degradation of key habitats** with resultant adverse impacts on a variety of flora and fauna.	Support and promote environmentally sympathetic schemes such as the Countryside Stewardship Scheme in order to restore ecologically rich habitats along the river corridor. In particular, promote the restoration of water meadows which will have significant ecological benefits. Water quality will also affect the success of such projects *(see 5.2 Water Quality Action Plan)*.	Medium	NRA*	NRA‡, RBC, KDC, NDC, BCC,BDBC, Riparian Owners, BW, EN	1993/4..1997/8	Y	N
FC8. **Kennet and Avon Canal:**							
(a) Environmental impact of increased boat traffic on physical habitat	i) Through BW, the impact of all proposals for expansion of boat traffic and moorings to be evaluated against best environmental practice, ensuring no detriment	Medium	BW	NRA*#,NDC, K&ACT	1993/4..1998/9	Y	N
	ii) Take appropriate opportunities for enhancement when doing maintenance works eg soft bank revetment, off channel refuges for invertebrates and fry, planting etc.	Medium	BW	NRA*	1993/4..1998/9	Y	N
(b) Deterioration of water quality due to increased boat traffic ie increased turbidity and impact on flora	Identify sites, assess damage and investigate solutions.	Medium	NRA*	NRA‡, BW	1993/4..1998/9	Y	N

5.4 FISHERIES AND CONSERVATION MANAGEMENT - ACTION PLAN (continued)

FISHERIES AND CONSERVATION MANAGEMENT: ISSUE-RELATED ACTIONS

ISSUES	ACTIONS	PRIORITY	LEAD RESPONSIBILITY	KEY PARTICIPANTS	YEARS	NRA RESOURCE IMPLICATIONS STAFF TIME	COSTS (£)
(c) At Hungerford turbid water is entering the River Dun from the canal lock overflows directly or from the Shalbourne (causing an adverse aesthetic and possibly ecological impact). *(see also 5.2 Water Quality Protection - Action Plan)*	Identify cause of the problems and investigate solutions Through liaison with BW and riparian owners, the NRA has proposed a scheme to alleviate the problem which will also improve the existing habitat. This involves a silt settlement area in the form of a reed bed and settling pool.	High	NRA[7]	NRA[1,3,4], BW,BBONT Riparian Owners	1993/4	Y	Y (£5-10k) Possibility of sharing capital and maintenance cost with other organisations
FC9. **Upper Kennet River Levels Study - aquatic plant study** Perception of change in aquatic plant growth in the Upper Kennet and concern over aquatic plant management activity. *(see also 5.5 Flood Defence - Action Plan)*	a) Detailed aquatic plant survey of the Upper Kennet (completed): coverage and species noted. Riparian Owners interviewed. (Also a general aquatic plant (weed) survey of the whole catchment has been completed.)	Medium	NRA[1,2,7,8]	NRA[4] EN,Riparian Owners	Final report completed Spring 1994	Y	Y (£10K)
	b) Formulation of aquatic plant management strategy through liaison and following NRA Good Practice Guidelines for weed cutting.	Medium	NRA[1,7,8]	EN, Riparian Owners	1994/5..1997/8	Y	Y (£5K)
FC10. **Thames Salmon Rehabilitation Scheme:** to re-establish a substantially self-sustaining run of salmon	a) Programmed stocking of juvenile salmon into the Rivers Kennet and Lambourn	High	NRA[7]	TST, Riparian Owners	1994/5..1997/8	Y	Y
	b) Construction of fish passes to facilitate migration. Proposals at present (dependent on agreement and funding): Blakes (94-95) Fobney (95-96) Southcote-Sulhampstead (96-97).	High	NRA[7,8]	NRA[11] TST, Riparian Owners, KVFA	1994/5..1997/8	Y	Y

FISHERIES AND CONSERVATION MANAGEMENT - ROUTINE WORKS

ACTIVITY	PURPOSE	NRA & KEY PARTICIPANTS	NRA RESOURCE IMPLICATIONS STAFF TIME	COST (£)
1. **Emergency fish rescues** will be carried out to NRA National Standards of Service ie (i) Attend 90% of reported fish mortalities within: *2hrs of notification 0900hrs-1700hrs Mon-Fri* *4hrs of notification 1700hrs-0900hrs Mon-Fri and at Weekends* (ii) Initiate 90% of emergency fish rescues or take other ameliorative measures within: *2hrs of problem assessment 0900hrs-1700hrs Mon-Fri* *4hrs of problem assessment 1700hrs-0900hrs Mon-Fri and at Weekends*	To prevent or limit losses of fish	NRA[7] RBC, NDC, KDC, BCC, WCC	Y	Y
2. **Regulation of fisheries through the enforcement of licences, byelaws and consents**	To maintain, improve and develop fisheries.	NRA[7] R&DAA, UTFC	Y	N
3. **Habitat enhancement projects** as identified by Fisheries, Conservation and Flood Defence staff. Some proposals are given below:	To identify and execute enhancements to improve the diversity of habitats within the river corridor	NRA[2,7,8] Riparian Owners, EN, BCC,RBC,NDC, WCC,KDC,BDBC	Y	Y
a) Extension of Welford site on River Lambourn during 1994/5. Works include channel narrowing, revetment, gravels, groynes, etc.	Habitat improvement primarily for brown trout. This will also benefit other species, eg grayling.	NRA[1,2,7] Riparian Owner	Y	Y (£5k)
b) Potential scheme on the Kennet upstream of Newbury during 1994/5. Currently designing channel narrowing, groynes and the creation of marginal vegetation.	Habitat improvement for both coarse and game fish	NRA[1,2,7] Riparian Owner	Y	Y
c) River Dun at North Standen. Proposed works include gravel importation, improved substrate, channel narrowing, etc.	To enhance brown trout, macroinvertebrates and macrophytes.	NRA[1,2,7] Riparian Owner	Y	Y (£10-15k)

FISHERIES AND CONSERVATION MANAGEMENT - ROUTINE WORKS

	ACTIVITY	PURPOSE	NRA & KEY PARTICIPANTS	NRA RESOURCE IMPLICATIONS STAFF TIME	COST (£)
4.	Provision of specialist advice internally and externally (some examples given below):	To ensure any activities are carried out in an environmentally sensitive way.	NRA[1,11], EN, CPRE, Riparian Owners	Y	N
(i)	Liaison with NRA Flood Defence, input to the design and execution of routine river maintenance works eg trimming, weed cutting and dredging. Also input to the design of Flood Defence and other capital schemes.	To ensure internal operational activities are undertaken in a way which minimises adverse environmental impacts and maximises opportunities to improve the diversity and landscape value of the riverine environment.	NRA[7,8]	Y	Y
(ii)	Liaison with fisheries consultative committees to assist in the formulation of the policy decisions	To maintain, develop and improve the fisheries of the Kennet Catchment.	NRA[1] UTFC, S&TA	Y	N
(iii)	Advisory visits to angling clubs and fishery owners. These cover a wide range of issues including general fisheries management, fish health, stocking and the design of new fisheries.	To maintain, develop and improve the fisheries of the Kennet Catchment.	NRA[7] Riparian and Fishery Owners, Angling Clubs, R&DAA, KVFA	Y	N
(iv)	Liaison with/advice to landowners and farmers on sympathetic riparian land management and information on availability of environmental schemes such as Countryside Stewardship and the provision of riverside buffer strips.	Promotion of NRA fisheries and conservation policies and enforcement of statutory duties. Promotion of non-intensive agricultural schemes in the floodplain such as the reinstatement of watermeadows, reversion of arable land to pasture etc and advise as to where funding may be available for such schemes	NRA[7] Riparian Owners	Y	N
(v)	Liaison on planning applications and forward plans.	Resist development pressures which would adversely impact upon nature conservation, fisheries, landscape and recreation. Also advise and agree with planning authorities to protect the water environment and to maximise opportunities for enhancement as an integral part of development.	NRA[7,9] EN, RBC, NDC, BCC, KDC,WCC,BDBC	Y	N
(vi)	Develop a strategy to deal with planning applications adjacent to the Kennet and Avon canal to replace the current ad hoc approach. *(See 5.8 Catchment Management Planning)*	To protect and enhance the balance between economic development and heritage/ecology	NRA[9] BW	Y	N

5.5 FLOOD DEFENCE - ACTION PLAN

The NRA **aim** to:

- **provide effective defence for people and property against flooding from rivers;**
- **provide adequate arrangements for flood forecasting and warning.**

(all the above from NRA Flood Defence Strategy, 1993)

The NRA's flood defence **strategies** are to:

- develop and implement..a systematic approach for assessing capital and maintenance requirements and develop medium and long-term plans for those defences owned and maintained by the NRA;
- encourage development of information technology and extension of facilities which will further improve the procedures for warning of, and responding to, emergencies;
- review best practices for all operational methods;
- heighten general awareness of the need to control development in floodplains;
- carry out surveys of all the main and ordinary rivers under S105 (Water Resources Act 1991) to provide information on land at risk of flooding;
- identify opportunities for the enhancement of environmental, recreational and amenity facilities when undertaking flood defence works.

(all the above from NRA Flood Defence Strategy, 1993)

The NRA **policies** pertinent to the above aims and strategies are:

- **NRA Standards of Service (SoS) approach:**

The requirement for flood defence and land drainage varies with different land use. Actual levels of service are compared to target levels of service. For areas not achieving the target SoS, the possibility of remedial works is considered.

- **From NRA Guidance notes for local planning authorities:**

Within the identified floodplain or in areas at unacceptable risk from flooding, the NRA will resist new development, intensification of existing development or land raising unless flood protection and mitigation measures...compensate for the impact of development;

Resist development which would result in adverse impact on the environment due to surface water run-off;

Developers will be expected to cover the costs of assessing surface water drainage impacts and of any appropriate enhancement and mitigation works, including their long-term monitoring and management;

Development should not normally be permitted which would adversely affect the integrity and continuity of...fluvial (river) defences. Access...for maintenance and emergency purposes will be protected and where appropriate improved.

5.5 FLOOD DEFENCE - ACTION PLAN

FLOOD DEFENCE: ISSUE-RELATED ACTIONS

ISSUES	ACTIONS	PRIORITY	LEAD RESPONSIBILITY	KEY PARTICIPANTS	YEARS	NRA RESOURCE IMPLICATIONS STAFF TIME	COSTS (£)
FD1. **Increased potential risk of flooding in Newbury and Thatcham from the Rivers Kennet and Lambourn through increase in development, and pressure for further development.**	a) Identify areas where new development should be resisted on flood defence grounds.	High/Medium	NRA[8,9]	KDC, NDC, RBC, BCC, WCC	1994/5..1998/9	Y	Y
	b) Development control in the floodplain by Local Authorities.	High	KDC, NDC, RBC, BCC, WCC	NRA[8,9]	1994/5..1998/9	Y	N
	c) Continue mathematical modelling of the floodplain of the Rivers Kennet and Lambourn in the Newbury and Thatcham area to ascertain if standards of service are being achieved.	High	NRA[6,8]		1994/5..1997/8	Y	Y
	d) Encourage Local Authorities to produce and adopt drainage management plans and NRA land use policies.	Medium	NRA[8,9]	KDC, NDC, RBC, BCC, WCC	1994/5..1998/9	Y	N
	e) Continue monitoring of water levels, flow and gate operation to assist with calibration of hydraulic model	High	NRA[6,9]	BW	1994/5 ..1997/8	Y	Y

5.5 FLOOD DEFENCE - ACTION PLAN (continued)

FLOOD DEFENCE: ISSUE-RELATED ACTIONS

ISSUES	ACTIONS	PRIORITY	LEAD RESPONSIBILITY	KEY PARTICIPANTS	YEARS	NRA RESOURCE IMPLICATIONS STAFF TIME	COSTS (£)
FD2. **Need for more flood defence information to improve flood warning and forecasting on the Kennet and Lambourn.**	a) Survey and map the whole system detailing control structures by type, size and reaches controlled.	High	NRA*	BW, Riparian Owners	1994/5	Y	Y (£10k)
	b) Produce capital proposals and briefs for remote river level and flow monitoring based on the survey work detailed above.	Medium	NRA*	BW, RBC,KDC,ND, WCC,BCC	1994/5	Y	Y (£20K)
	c) Review condition of all control structures and prioritise work on them to produce a rolling programme of refurbishment.	Medium	NRA*	BW	1994/5	Y	Y (£1k)
	d) Bring all control structures to fully operational condition especially those already identified in the TWA 'Jameson' report (1986)	Medium/High	NRA*	Riparian Owners	1995/6. 1997/8	Y	Y (£100k+)
	e) Carry out Section 105 surveys to facilitate floodplain mapping	High	NRA*	NRA*? BW, RBC,KDC,NDC WCC,BCC	1994/5..1997/8	Y	Y
FD3. **Management of complex control structures in the Newbury area in order to reduce potential risk of flooding.**	Continue mathematical modelling (actioned under 1. above) to investigate Standards of Service and need for flood defence capital works.	High	NRA*	NRA*, BW	1994/5 .1995/6	Y	Y (£20k+)

5.5 FLOOD DEFENCE - ACTION PLAN (continued)

FLOOD DEFENCE: ISSUE-RELATED ACTIONS

ISSUES	ACTIONS	PRIORITY	LEAD RESPONSIBILITY	KEY PARTICIPANTS	YEARS	NRA RESOURCE IMPLICATIONS STAFF TIME	NRA RESOURCE IMPLICATIONS COSTS (£)
FD4. **Maintenance and dredging could conflict with conservation interests**	Continue (and improve as necessary) sympathetic and sensitive canal and river maintenance for navigation and flood defence purposes. Enhance existing consultation procedures before and during such works. Procedures currently work well and should be continued.	Medium	BW/NRA*	NRA[2*], EN	1994/5..1998/9	Y	Y (£1-5k)
FD5. **A34 Newbury Bypass** poses a threat of increased flood risk and possible adverse ecological impact.	a) Continue to oppose present form of A34 Newbury Bypass as proposed b) Investigate the possibility of incorporating mitigation proposals into a strategic flood alleviation scheme	High	NRA*	NDC, DTp, NRA*[7,8,9]	1994/5	Y	Y (£5k)

5.5 FLOOD DEFENCE – ACTION PLAN (continued)

FLOOD DEFENCE – ROUTINE WORK

	ACTIVITY	PURPOSE	NRA & KEY PARTICIPANTS	NRA RESOURCE IMPLICATIONS STAFF TIME	COST (£)
1.	**Identify responsibilities for ongoing operation and maintenance of control structures**	To improve operational practices	NRA[8] BW, Riparian Owners	Y	Y (£5-10k)
2.	**River dredging and bank trimming**	Maintenance dredging must be carried out for general flood alleviation incorporating good environmental practice to protect and enhance riverine habitats.	NRA[1,2,7,8] EN, Riparian Owners	Y	Y (£350k pa)
3.	**Aquatic plant (weed) management**, ie provision and installation of removable weed screens	Collection and removal of weeds (after cutting) from strategic sites eg at Wilderness will facilitate NRA Fisheries operations.	NRA[2,7,8] Riparian Owners	Y	Y (£50 - £100 pa)
4.	**River control** In the Kennet Catchment, river levels are maintained by Riparian Owners. The NRA has powers to supervise this activity.	Water levels are maintained for navigation purposes, to control water levels for flood alleviation and riparian uses.	NRA[8] Riparian Owners	Y	Y
5.	**Flood forecasting and warning**	To respond effectively to emergencies.	NRA[6,8]	Y	Y

5.6 COMMUNICATIONS - ACTION PLAN

The NRA's principal communications **aim** is:

> * **to improve public understanding of the water environment and the NRA's work.**
>
> (from NRA Strategies series, 1993)

The recently completed Upper Kennet Public Perception study (part of the Upper Kennet river levels action plan) has indicated that there is insufficient awareness of the NRA and its duties. There is, therefore, a need to raise awareness by encouraging good communications between the NRA and other interested parties eg local authorities, BW, TWUL, environmental organisations, the media and the public.

Improved communications will also facilitate the effective implementation of the Kennet CMP. For example, the Kennet CMP can be promoted through close liaison with Local Planning Authorities to ensure an appropriate policy framework in Development Plans. The NRA's proposals for raising awareness are given in the Action Plan, below.

The **shared aims** of all the organisations participating in the Action Plans are to:

* initiate and promote a general awareness of the objectives and contents of the River Kennet CMP;
* facilitate the successful implementation of the Action Plans through information exchange, joint working groups and effective liaison between participating organisations.

The **strategies** to meet these aims are to:

* establish a satisfactory system for enhanced communications on catchment issues;
* ensure good lines of communications are developed and maintained between the NRA and key participants in the Action Plans;
* make meetings more time efficient and effective;
* identify a mechanism to oversee the implementation of Action Plans eg regular working groups.
* achieve integration across 'artificial' geographical boundaries and disciplines.

Two recent initiatives, the NRA Emergency Hotline and the Cleaner Kennet Campaign (CKC) 'RiverWatch', have focused on encouraging a rapid response from the public to prevent pollution and protect the water environment.

The NRA has recently launched a 24 hour free emergency telephone hotline **0800 80 70 60.** Every week, the NRA follows up hundreds of reports of suspected pollution - many of them identified by vigilant members of the public. The public are requested to help the NRA to protect the water environment by reporting pollution, poaching, flooding and illegal water abstraction.

To further its aim 'to improve the water quality of the River Kennet and its valley', CKC have launched 'RiverWatch' - which also encourages the public to report pollution, dumping or abuse of the river to the NRA and themselves on **0734 390200.**

5.6 COMMUNICATIONS - ACTION PLAN

COMMUNICATIONS: ISSUE-RELATED ACTIONS

ISSUES	ACTIONS	PRIORITY	LEAD RESPONSIBILITY	KEY PARTICIPANTS	YEARS	NRA RESOURCE IMPLICATIONS STAFF TIME	COSTS (£)
CO1. **The effective coordination and means of debating** local concerns and issues related to the water environment.	a) Make positive use of existing groups and fora to: - help the NRA achieve its coordinating role; - report incidents promptly; - promote monitor, audit, and review actions.	High	NRA [illegible]	BW, Riparian Owners, KVFA, S&TA, NDC, CKC, RBC, BCC, WCC, KDC, CLA, TWUL, EN, ARK,CPRE	1994/5..1998/9	Y	N
	b) Raise awareness and communicate the importance of implementing the Action Plans by key participants.	High	NRA [illegible]	BW, Riparian Owners, KVFA, S&TA, NDC, CKC, RBC, BCC, WCC, KDC, CLA, TWUL,EN, ARK, CPRE	1993/4..1998/9	Y	N
	c) Form working groups of key participants to monitor and review the implementation of Action Plans	High	NRA'	NRA' [illegible] Riparian Owners, BCC, KDC, RBC, NDC, BW, TWUL.	1994/5..1998/9	Y	N
CO2. Continue to **improve communication and flow of information** between NRA, external organisations and the public.	a) Commission and distribute a six monthly newsletter to key participants of the Action Plan.	High	NRA"	NRA' [illegible] Riparian Owners, BCC, KDC, RBC, NDC, BW, TWUL.	1994/5..1998/9	Y	Y

5.6 COMMUNICATIONS - ACTION PLAN (continued)

COMMUNICATIONS: ISSUE-RELATED ACTIONS

ISSUES	ACTIONS	PRIORITY	LEAD RESPONSIBILITY	KEY PARTICIPANTS	YEARS	NRA RESOURCE IMPLICATIONS STAFF TIME	COSTS (£)
	b) Through a forum, disseminate progress on Action Plans annually to an invited audience.	High	NRA[1]	NRA[all business] Riparian Owners, BCC, KDC, RBC, NDC, BW, TWUL.	1994/5..1998/9	Y	Y
	c) Investigate ways of improving awareness of NRA and its duties through effective communication to external interested parties ie 'the public'.	Medium/High	NRA[all business]	Riparian Owners, BCC, KDC, RBC, NDC, BW, TWUL, ARK and others	1993/4..1998/9	Y	Y

5.7 NAVIGATION AND RECREATION - ROUTINE WORKS

The NRA **aim** to:

* **improve and maintain inland waters and their facilities for use by the public where the NRA is the navigation Authority.**
* **to develop the amenity and recreational potential of inland waters and associated lands.**

(all the above from NRA Navigation and NRA Recreation Strategies, 1993)

The NRA's **Strategies** are to;

* contribute to the development of an overall navigation strategy for England and Wales;
* regulate NRA navigation through the enforcement of a consistent series of licences, orders, byelaws and statutes;
* maintain and improve the NRA navigation fairway, facilities and standards;
* recover from users the costs of providing specific navigation facilities and a reasonable proportion of the costs of maintaining the navigation.
* maintain develop and improve recreational use of NRA's sites;
* take account of recreation in proposals relating to any NRA function;
* promote the use of water and associated land for recreational purposes.

(all the above from NRA Navigation and NRA Recreation Strategies, 1993)

Stretching across a substantial area of southern England, the Kennet valley is rich in open waters. There are rivers, streams, canal, lakes and numerous wet gravel pits which all attract people in their leisure time. NRA's navigation staff ensure that people on the River Thames and the lowest reach of the River Kennet enjoy their recreation safely without spoiling the enjoyment of other river users. Guidance of craft through a lock, overseeing river-based events and conducting launch safety inspections are just some of the elements involved in managing river navigation. The NRA's on-going work aims to develop this amenity and recreational potential. The Authority is always on the look out for ways of improving amenity and recreation facilities in the region and is keen to adopt a partnership approach to finance a service or facility for the benefit of the local community.

No work of special significance is currently being done in the Kennet catchment. However, recently completed works include:

- Support for the completion of the Kennet and Avon Canal in partnership with BW, K&ACT and industry.
- Participation in Bruce Charitable Trust;
- Participation in Reading Waterways Festival.

The NRA **policy** pertinent to the above aim and strategies is:

* From **NRA Guidance notes for local planning authorities:**

  The NRA should normally support proposals for the development of the recreational, leisure and tourist potential of river navigations where this is consistent with the capacity of the river and does not jeopardise other recreational activities, local amenity or conservation value.

5.7 NAVIGATION AND RECREATION – ROUTINE WORKS

ACTIVITY	PURPOSE	NRA & KEY PARTICIPANTS	NRA RESOURCE IMPLICATIONS STAFF TIME	COST (£)
1. Carry out a **(facilitating) study** of the refurbishment of Blakes Lock	To achieve effective and efficient development of the navigation fairway (channel).	NRA[10],BW	Y	Y
2. **Refurbishment of Blakes lock** *(See also FC10b)*	To strengthen clay base and improve the navigation facilities and standards	NRA[10], BW	Y	Y (£50k)
3. **Maintain the moorings facility at Blakes lock**	To provide navigation facilities for river users	NRA[10], BW	Y	Y
4. Carry out a study for the environmental improvements at Blakes Lock Island.	To contribute to the wider total Reading environment	NRA[7,8,10], RBC	Y	Y (£5k)
5. Liaise with Local Authorities and landowners in **identifying recreation projects as part of development proposals in a development plan, or as part of a flood alleviation scheme**	- To manage the river corridor to the benefit and enjoyment of the visitor. - To enhance the amenity value of the water environment	NRA[10], BCC,RBC, KDC,NDC,BDBC Riparian Owners,BW	Y	N
6. Continue to provide land **facilities at Blakes Island for recreational youth groups.**	- To promote the recreational use of waterside land and to harness its potential.	NRA[10], BCC,RBC,NDC, KDC,CKC.	Y	Y
7. Promote and support the need and provision of **public access** with particular reference to agreed specific reaches of the Upper Kennet through the Local and Structure Plan process. The Countryside Stewardship Scheme may also provide access opportunities to complement existing rights of way.	- To fulfil statutory duties under Section 18 of the Water Resources Act 1991. - To ensure that good use is made by the public of waterside leisure and activity.	NRA[10], CoCo, Riparian Owners, KDC,WCC,RBC, NDC,BCC.	Y	Y
8. Promote the availability of **opportunities to work with the NRA in developing and implementing recreational facilities.**	- To enhance the amenity value of the water environment. - To provide leisure benefits to the local community.	NRA[10], BCC,RBC,NDC, KDC,BDBC,BW.	Y	Y
9. Continue to support BW in progressing appropriate policies of their PETAL document (1991), 'Position Statement' (1993) and in **keeping the Canal open as a recreational resource.**	To encourage and increase the profile of the canal as an amenity and provide a secure future for the canals and watercourses of the Kennet catchment.	NRA[10], BW,NDC, BCC,RBC, KDC.	Y	N

5.8 CATCHMENT MANAGEMENT PLANNING - ROUTINE WORK

The NRA's routine activities in catchment planning cover the broad spectrum of Town and Country Planning, forward planning, planning liaison and development control. The overall **aims** are to:

- ensure that all development proposals adequately take account of effects on the water environment;
- ensure that opportunities to enhance the value of the water environment are recognised and realised;
- persuade Local Authorities to shift the balance of policy in favour of sustainability;
- ensure that Local Authorities give adequate prominence to the River Kennet Catchment Management Plan in their development plans.

The NRA is developing closer liaison, understanding and cooperation with Local Authorities' planning officers to ensure that NRA interests are satisfactorily accommodated in proposals for land use changes as well as in the regulation of existing land use. Both of these can be used as means of controlling potential problems at source. The NRA seeks to advise, negotiate and recommend to Local Planning Authorities planning conditions and agreements in planning permissions.

Forestalling causes rather than treating symptoms, is a cornerstone of effectiveness in the longer term. Catchment Management Planning provides a value for money process intended to help the Authority to improve its efficiency and effectiveness as well as ensuring that we focus maximum resources on improving the water environment.

The Kennet Catchment Management Plan provides a means of achieving the integrated management of the river catchment, by setting priorities for the NRA and others to tackle environmental problems, and to provide a framework for conserving and enhancing the water environment.

The CMP also seeks to focus the attention of outside organisations on water-related issues in the Kennet Catchment area. In particular, the CMP provides a vehicle by which the NRA's concerns can be integrated into the Local Authority's Development Plan System.

5.8 CATCHMENT MANAGEMENT PLANNING – ROUTINE WORKS

	ACTIVITY	PURPOSE	NRA & KEY PARTICIPANTS	NRA RESOURCE IMPLICATIONS STAFF TIME	COST (£)
1.	Respond effectively to individual **planning applications and development proposals** in the Kennet Catchment	To ensure that NRA's aims to protect and improve the water environment are achieved. To improve liaison and communications with Local Planning authorities, consultants and developers.	NRA[all functions], BCC, WCC, NDC, RBC, KDC, BDBC	Y	N
2.	**Promotion of Guidance Notes for Local Planning Authorities for incorporation into statutory plans**	To ensure adequate environmental safeguards are written into plans to facilitate development control.	NRA[1], BCC, WCC, NDC, RBC, KDC, BDBC	Y	N
3.	**Land Drainage Consents**	To ensure that the water environment is protected via formal consent procedures under the Water Resources Act 1991, Land Drainage Act 1991 and Land Drainage Byelaws.	NRA[all functions]	Y	Y
4.	**Promotion of the River Corridor**	Seek protection and enhancement of the overall river corridor through advice, negotiation and statutory control where possible in the planning and development control process	NRA[all functions], BCC, WCC, NDC, RBC, KDC, BDBC	Y	Y
5.	Liaise with BW to ensure environmental assessments for **proposed marinas** cover all issues related to NRA functions	To ensure that NRA concerns relating to the River Kennet are taken into account in BW plans in order to achieve mutually acceptable BPEO.	NRA[1], BW	Y	Y
6.	Comment on **proposals for mineral extraction** in the catchment including river valleys, floodplains, SSSIs and water meadows	To ensure that mineral planning procedure adequately takes account of the need to protect the water environment	NRA[1], BCC, WCC	Y	N
7.	Liaise with Local Authorities to encourage wetland habitat and landscape enhancement as part of **after use plans.**	To promote improvements in the water environment in minerals plans.	NRA[1], BCC, WCC, BDBC	Y	N
8.	**Issue comprehensive guidance to promoters of road schemes** and to their consultants eg A34 bypass, M4 widening, A33 Reading Relief Road.	To ensure procedures for dealing with major road schemes include protection and/or mitigation for the effects on the water environment	NRA[1], BCC, WCC, NDC, RBC, DTp	Y	N
9.	**Special area specific planning studies**	To promote and undertake special area specific studies where further information is desirable for catchment planning purposes	NRA[all functions], BCC, WCC, NDC, RBC, KDC, BDBC, BW	Y	Y

5.8 CATCHMENT MANAGEMENT PLANNING – ROUTINE WORKS (continued)

ACTIVITY	PURPOSE	NRA & KEY PARTICIPANTS	NRA RESOURCE IMPLICATIONS STAFF TIME	COST (£)
10. **Monitor formulation of Structure and Local Plans and reference to the River Kennet CMP**	To ensure that appropriate NRA catchment policies are adopted and that NRA interests are integrated into the Local Authority development plan system	NRA*, BCC, WCC, NDC, RBC, KDC	Y	Y

SECTION 6 - FUTURE REVIEW AND MONITORING

6.1 FUTURE REVIEW AND MONITORING

In collaboration with the jointly responsible identified organisations, the NRA will aim to pursue and implement the actions outlined in this Final Plan. An annual review will be undertaken to monitor progress. The results of this review will form a report produced by the NRA and distributed to interested parties. The first Kennet CMP annual review is expected in March 1995. However, regular monitoring of the implementation of the Action Plans will be undertaken by Catchment Planning staff in close liaison with internal and external participants.

The review document will comprise the following information:

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

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

APPENDICES

APPENDIX I - KEY PARTICIPANTS

Her Majesty's Inspectorate of Pollution (HMIP)
Berkshire County Council (BCC)
Wiltshire County Council (WCC)
Hampshire County Council (HCC)
Oxfordshire County Council (OCC)
Reading Borough Council (RBC)
Newbury District Council (NDC)
Wokingham District Council (WDC)
Kennet District Council (KDC)
Thamesdown District Council (TDC)
North Wilts. District Council (NWDC)
Basingstoke & Deane Borough Council (BDBC)
Thames Water Utilities Limited (TWUL)
British Waterways (BW) (The Kennet and Avon Canal is run by the Kennet and Avon Waterways - a management unit of British Waterways Southern Region.)
Kennet and Avon Canal Trust (K&ACT)
Countryside Commission (CoCo)
English Nature (EN)
Reading & District Anglers Assoc.(R&DAA)
Upper Thames Fisheries Consultative (UTFC)
Council for the Protection of Rural England (CPRE)
Salmon & Trout Association (S&TA)
Kennet Valley Fisheries Association (KVFA)
Wiltshire Wildlife Trust (WWT)
Berks.,Bucks. and Oxon. Nature Trust (BBONT)
Thames Salmon Trust (TST)
Countryside Landowners Association (CLA)
Royal Society for the protection of Birds (RSPB)

Several local action groups have been formed with a particular focus on the water environment as follows:

(1) Action for the River Kennet (ARK)

Concerned with the River Kennet and its tributaries in the area upstream of Chilton Foliat.

(2) Cleaner Kennet Campaign (CKC)

Concerned with the valley of the River Kennet downstream of Newbury.

(3) Friends of the Lower Kennet (FOLK)

Concerned with the valley of the River Kennet between Theale and Reading.

(4) Winterbourne Stream Action Group

Concerned with the valley of the Winterbourne Stream.

Groups (1), (3) and (4) are led and run by members of the local community whereas the Cleaner Kennet Campaign has the direct support of Reading Borough Council and Newbury District Council.

NRA Key Contacts

The NRA Thames Region has recently undergone a reorganisation into three operational areas and a regional office (see addresses below). The Kennet Catchment is one of seven catchments under the jurisdiction of the WEST area. The programme is to complete all CMPs in NRA Thames Region by 1998.

Regional Office
NRA Thames Region
Kings Meadow
Kings Meadow Road
Reading
Berks RG1 8DQ
Tel: (0734) 535000
Fax: (0734) 500388

West Area Office
NRA Thames Region (West Area)
Isis House
Howbery Park
Wallingford
Oxon OX10 8BD

The following officers, for example can be contacted at Wallingford (through the Regional switchboard number):

Catchment Manager	NRA Catchment Planning (West)
Senior Planning Liaison Officer	NRA Catchment Planning (West)
Senior Pollution Officer	NRA Environmental Services (West)
Water Resources Officer	NRA Environmental Services (West)
Fisheries Officer	NRA Fisheries & Conservation (West)
Conservation Officer	NRA Fisheries & Conservation (West)
Operations Manager	NRA Flood Defence (West)

APPENDIX II - FURTHER READING

Legislation

Salmon & Freshwater Fisheries Act 1975

Wildlife & Countryside Act 1981

Water Act 1989

Environmental Protection Act 1990

Land Drainage Act 1990

Water Resources Act 1991

NRA Publications

River Kennet Catchment Management Plan: Consultation Report 1993

NRA Corporate Plan 1993/94

Future Water Resources in the Thames Region –
A Strategy for Sustainable Management 1994.

Policy and Practice for the Protection of Groundwater 1992

NRA Functional Strategies 1993:
Water Quality, Water Resources, Flood Defence, Conservation,
Navigation, Recreation, Research and Development (R & D).

NRA Water Quality Series 1992

Other Publications

Changing River Landscapes
Countryside Commission CCP238 1987

Conservation Guidelines for Drainage Authorities
MAFF, DoE & Welsh Office. 1991

Development and Flood Risk. Circular 30/92
MAFF, DoE & Welsh Office. 1992

Rivers and Wildlife Handbook
RSPB 1984

Plan for the environment, tourism and leisure (PETAL)
British Waterways 1991

APPENDIX III – TABLE OF RIVER OBJECTIVES AND NUTRIENT CONCENTRATIONS

RIVER/ WATERWAY	REACH	LENGTH (metres)	OBJECTIVE CURRENT/FUTURE		ACHIEVEMENTS 1993	1992	1991	1990	AVERAGE NUTRIENT CONCENTRATIONS (MEAN VALUES 1989 – 92 IN mg l) NH3-N	TON	ORTHO-P
Kennet	West Kennet to Marlborough STW	13,570	1A	1A	1A	1A	1B	1B	0.08	5.41	0.05
Kennet	Marlborough STW to Hungerford	20,140	1A	1A	1A	1A	1B	1B	0.10	5.19	0.42
Kennet	Hungerford STW to Newbury STW	17,390	1A	1A	1A	1A	1A	1A	0.06	4.00	0.12
Kennet	Newbury STW to Aldershot Stream	5,940	1B	1B	1A	1A	1A	1A	0.07	4.35	0.41
Kennet	Aldershot Stream to Enborne	6,090	1A	1A	1A	1B	1A	1A	0.23	3.94	0.50
Kennet	Enborne to Sulhamstead Stream	8,950	1A	1A	1A	2A	1A	1A	0.07	4.23	0.57
Kennet	Sulhamstead Stream to Foudry Brook	8,300	1A	1A	1A	1B	1A	1A	0.07	3.75	0.37
Kennet	Foudry Brook to Holy Brook	2,820	1B	1B	1A	1B	1A	1B	0.20	6.50	1.36
Kennet	Holy Brook to Thames	1,310	1B	1B	1B	2A	2A	1B	0.19	5.09	0.92
Kennet & Avon Canal	Crofton (Summit)	19,470	1A	1A	1B	2A	1B	1B	0.09	2.85	0.03
Kennet & Avon Canal	Widmead Lock to Woolhampton	6,840	1B	1B	1A	1B	1B	1A	0.07	3.83	0.35
Kennet & Avon Canal	Woolhampton to Ufton	4,450	1A	1A	1B	2A	1A	2A	0.06	3.24	0.29
Og	Bay Bridge to Kennet	2,120	1A	1A	1A	1A	1B	1A	0.05	5.99	0.04
Aldbourne	Whittonditch to Knighton Loop	1,300	1B	1B	1A	*	*	1B	*	*	*
Dun	East Grafton to Kennet	16,190	1A	1A	1A	1A	1A	1B	0.06	3.86	0.05
Shalbourne	Shalbourne to Dun	6,500	1A	1A	1A	1A	1B	1A	0.05	3.59	0.16
Lambourn	Lambourn to Boxford STW	16,120	1A	1A	1A	1A	1A	1A	0.05	5.63	0.04
Lambourn	Boxford STW to Lambourn FFm	5,050	1A	1A	1A	1A	1A	1A	0.05	5.95	0.18
Lambourn	Lambourn FFm	4,530	1A	1A	1A	1A	1B	1A	0.05	4.93	0.14
Winterbourne Stream	Winterbourne to Bagnor Stream	3,900	1A	1A	1A	1A	1A	1A	0.06	6.41	0.05
Enborne	West Woodhay to Bishops Grn STW	13,030	1A	1A	1A	1B	1A	1B	0.27	2.25	0.08
Enborne	Bishops Grn STW to Baughurst	7,880	1A	1A	1A	1A	1A	1A	0.10	3.9	0.62
Enborne	Baughurst Brook to Kennet	6,050	1A	1A	1A	1B	1A	1B	0.07	4.96	0.66
Ecchinswell Brook	Ecchinswell to Enborne	6,620	1A	1A	1A	1B	1A	1B	0.11	3.93	0.28
Kingsclere Brook	Kingsclere to Enborne	7,000	1A	1A	1A	1A	1A	1B	0.08	5.21	1.00
Baughurst Brook	Pound Green to Enborne	5,700	3	2B	1B	2A	1B	2A	0.60	2.66	0.09
Foudry Brook	Devil's H-Way to S Mortimer STW	2,190	1B	1B	1A	1B	1B	1B	0.26	9.37	4.10
Foudry Brook	S. Mortimer STW to Kennet	10,470	1B	1B	1A	1A	1B	1B	0.15	9.68	3.95

Notes: 1) Thames Region have uniquely split Class 2 into 2A and 2B. The national system uses only Class 2.
2) Nutrient parameters are: NH3-N - amount of nitrate in the form of nitrogen, TON - total oxidised nitrogen, ORTHO-P: ortho-phosphate.
3) 1993 data are the latest figures available; July 1992 - June 1993.

APPENDIX III – RIVER QUALITY OBJECTIVE (RQO) STANDARDS

RIVER CLASS	QUALITY CRITERIA	REMARKS	CURRENT POTENTIAL USERS
1A	Class limiting criteria (95 percentile) (i) Dissolved oxygen saturation greater than 80% (ii) Biochemical oxygen demand not greater than 3mg/l. (iii) Ammonia not greater than 0.4mg/l. (iv) Where the water is abstracted for drinking water, it complies with requirements for A2** water. (v) Non-toxic to fish in EIFAC terms (or best estimates if EIFAC figures not available).	(i) Average BOD probably not greater than 1.5mg/l. (ii) Visible evidence of pollution should be absent.	(i) Water of high quality suitable for potable supply abstractions and for all other abstractions. (ii) Game or other high class fisheries. (iii) High amenity value.
1B	(i) DO greater than 60% saturation (ii) BOD not greater than 5mg/l. (iii) Ammonia not greater than 0.9 mg/l (iv) Where water is abstracted for drinking water, it complies with the requirements for A2** water. (v) Non-toxic to fish	(i) Average BOD probably not greater than 2 mg/l. (ii) Average ammonia probably not greater than 0.5 mg/l. (iii) Visible evidence of pollution should be absent. (iv) Waters of high quality which cannot be placed in 1A because of high proportion of high quality effluent present or because of physical factors such as canalization, low gradient or eutrophication. (v) Class 1A and 1B together are essentially class 1 of the River Pollution Survey (RPS)	Water of less high quality than 1A but usable for substantially the same purposes.
2	(i) DO greater than 40% saturation. (ii) BOD not greater than 9 mg/l. (iii) Where water is abstracted for drinking water, it complies with the A3** water requirements. (iv) Non-toxic to fish	(i) Average BOD probably not greater than 5mg/l. (ii) Similar to class 2 of RPS. (iii) Water not showing physical signs of pollution other than humic coloration and a little foaming below weirs	(i) Waters suitable for potable supply after advanced treatment. (ii) Supporting reasonably good coarse fisheries. (iii) Moderate amenity value.
3	(i) DO greater than 10% saturation. (ii) Not likely to be anaerobic. (iii) BOD not greater than 17 mg/l*.	Similar to class 3 of RPS	Waters which are polluted to an extent that fish are absent or sporadically present. May be used for low grade industrial abstraction purposes. Considerable potential for further use if cleaned up.
4	Waters which are inferior to class 3 in terms of DO and likely to be anaerobic at times.	Similar to class 4 of RPS	Waters which are grossly polluted and are likely to cause nuisance.
X	DO greater than 10% saturation.		Insignificant watercourses and ditches not usable, where objective is simply to prevent nuisance developing.

APPENDIX III – RIVER QUALITY OBJECTIVE (RQO) STANDARDS

NOTES

(a) Under extreme weather conditions (eg flood, drought, freeze up), or when dominated by plant growth, or by aquatic plant decay, rivers usually in Classes 1, 2 and 3 may have BODs and dissolved oxygen levels, or ammonia content outside the stated levels for those classes. When this occurs the cause should be stated along with analytical results.

(b) The BOD determinations refer to 5 day carbonaceous BOD (ATU). Ammonia figures are expressed as NH4.

* This may not apply if there is a high degree of re-aeration.

** EEC category A2 and A3 requirements are those specified in the EEC Council Directive of 16 June 1975 concerning the Quality of Surface Water intended for Abstraction of Drinking Water in the Member States.

(c) In most instances the chemical classification given above will be suitable. However the basis of the classification is restricted to a finite number of chemical determinands and there may be a few cases where the presence of a chemical substance other than those used in the classification markedly reduces the quality of the water. In such cases, the quality classification of the water should be downgraded on the basis of the biota actually present, and the reasons stated.

(d) EIFAC (European Inland Fisheries Advisory Commission) limits should be expressed as 95% percentile limits.

APPENDIX III – STANDARDS OF SERVICE FOR FLOOD DEFENCE AND LAND DRAINAGE

RIVER	REACH	REACH LENGTH	FLOOD PLAIN AREA (ha)	LAND USE BAND (1)
ALDBOURNE	MRL to Knighton Loop	5.53	28	E
YATESBURY B'NE	MRL to River Kennet	1.12	0	E
KENNET	Fobney Water Works to River Thames	4.65	126	D
KENNET	M4 to Fobney Water Works	5.10	430	C
KENNET	Ufton Bridge to M4	4.75	383	A
KENNET	A340 to Ufton Bridge	4.55	332	C
KENNET	Kings Bridge to A340	4.50	313	C
KENNET	Chamberhouse Cottage to Kings Bridge	4.65	282	D
KENNET	Northbrook Street to Chamberhouse Cottage	5.90	236	C
KENNET	Railway to Northbrook Street	4.35	220	E
KENNET	Kintbury Station to Railway	5.50	300	E
KENNET	Denford Mill to Kintbury Station	4.00	168	E
KENNET	Knighton Loop to Denford Mill	6.75	238	E
KENNET	Axford Bridge to Knighton Loop	6.80	145	D
KENNET	Railway Marlborough to Axford Bridge	4.95	80	E
KENNET	Lockeridge to Railway Marlborough	7.25	170	D
KENNET	Silbury Hall A4 to Lockeridge	6.30	70	E
KENNET	MRL to Silbury Hill A4	5.55	14	E
FOUDRY BROOK	Foudry Bridge to River Kennet	5.70	69	D
FOUDRY BROOK	West End Brook to Foudry Bridge	5.95	82	D
FOUDRY BROOK	MRL to West End Brook	5.20	25	E
WEST END BROOK	MRL To Foudry Brook	6.35	20	E
ENBOURNE	Able Bridge to Aldermaston o/d Mill	4.75	156	E
ENBORNE	Thornford Bridge to Able Bridge	6.65	75	E
ENBORNE	A34 to Thornford Bridge	5.83	42	E
ENBORNE	MRL to A34	7.52	48	D
BAUGHURST BRK	MRL to River Enbourne	5.85	32	E
KINGSCLERE BRK	MRL to River Enbourne	5.50	21	E
ECCHINSWELL BRK	MRL to River Enbourne	5.20	29	E
LAMBOURN	Bagnor Bridge to River Kennet	4.65	58	C
LAMBOURN	Boxford to Bagnor Bridge	4.55	59	D
LAMBOURN	Elton Lane to Boxford	4.95	68	D
LAMBOURN	East Garston to Elton Lane	5.15	64	D
LAMBOURN	MRL to East Garston	4.05	8	E
WINTERBOURNE STREAM	MRL to Bagnor Mill	4.43	11	E
DUN	Froxfield Stream to River Kennet	5.62	57	E
SHALBOURNE	MRL to River Dun	5.75	21	D
FROXFIELD STM	MRL to River Dun	3.15	26	D
OG	MRL to River Kennet	6.29	45	E
HOLY BROOK	MRL to Holy Brook	0.15	0	E

APPENDIX III – STANDARDS OF SERVICE FOR FLOOD DEFENCE AND LAND DRAINAGE

LAND USE BAND	DESCRIPTION OF TYPICAL LAND USE	TARGET STANDARDS OF SERVICE
A	A reach containing the urban elements of residential and non-residential property distributed over a significant proportion of its length, or densely populated areas over some of its length. Any agricultural influence is likely to be over-ridden by urban interests. Amenity uses such as parks and sports fields may be prominent in view of the floodplain's proximity to areas of population density.	These heavily built-up areas should be protected to a standard such that the risk of flooding in any one year is no greater than 1 in 50. In some areas higher standards may be applied.
B	Reaches containing residential and/or non-residential property either distributed over the full length of the reach or concentrated in parts but characterised by lower densities than Band A.	Buildings should be protected to a standard such that the risk of flooding in any one year is between 1 in 20 and 1 in 50. However, agricultural or amenity land found in these areas should remain susceptible to regular flooding.
C	Limited numbers of isolated rural communities or urban fringe at risk from flooding, including both residential and commercial interests. Intensive agricultural use could also be included.	The chance of flooding of property in any one year would be between 1 in 10 and 1 in 50 years. Agricultural or amenity land, however, could be susceptible to more regular flooding.
D	Isolated, but limited number of residential and commercial properties at risk from flooding. Agricultural use will probably be the main customer interest with arable farming being a feature. In undeveloped pockets of largely urban use, amenity interests may be prominent.	Agriculture and amenity land in this band should be protected to a standard such that the chance of flooding or prolonged bankfull events in any one year, at a time when crops are normally susceptible to damage (ie March to October inclusive), is between 1 in 2 and 1 in 5.
E	There are likely to be very few properties and major roads at risk from flooding in these reaches. Agricultural use will be the main customer interest with either extensive grassland or, where the floodplain extent is small, arable cropping being the most common land uses. Amenity interests are likely to be limited to public footpaths along or across the river.	Agricultural land in this category could be susceptible to yearly waterlogging and/or flooding, possibly occurring on several occasions throughout the year. Protection should be maintained to a standard which reduces the risk of either type of event to between one and three times per year at a time when crops are normally susceptible to damage.

APPENDIX IV - GLOSSARY OF TERMS & ABBREVIATIONS

Units

Length - 10mm = 1 cm (equivalent to 0.394 inches)
100cm = 1m (equivalent to 39.37 inches)
1000m = 1km (equivalent to 0.621 miles)
1 mile = 1.609 km

Area: 10 000 sq.m = 1 ha (equivalent to 2.47 acres)

Flow: 1 000 l/s = 1 cumec (equivalent to 35.31 cusecs)
1 Ml/d = 11.6 l/s (equivalent to 0.224 mgd)
(cumec = cubic metres per second)

Abstraction	Removal of water from surface or groundwater, usually by pumping.
Abstraction Licence	Licence issued by the NRA under S38 of the Water Resources Act 1991 to permit water to be abstracted. The maximum abstraction rates are specified in the licence.
AMP	Asset Management Plan
AOD	Above Ordnance Datum
AONB	Area of Outstanding Natural Beauty as designated by the Countryside Commission
Aquifer	A layer of underground porous rock which contains water and allows water to flow through it.
Baseflow	That part of the flow in a watercourse made up of groundwater and discharges. It sustains the watercourse in dry weather.
BASIS	British Agricultural Safety Inspection Scheme
Biochemical Oxygen Demand (BOD)	A measure of the amount of oxygen consumed in water, usually as a result of organic pollution.
BPEO	Best Practicable Environmental Option
Catchment	Area from which river systems, lakes and reservoirs collect water.
CIMAH	Control of Industrial Major Accident Hazards
Confined Aquifer	Aquifers are confined when they lie beneath 'clayey' strata, are fully saturated and under pressure.
Confluence	The point at which two rivers meet.
Consent	The statutory document issued by NRA under schedule 10 of the Water Resources Act 1991 to indicate any limits and conditions on the discharge of an effluent to a controlled water.

COSHH	Control of Substances Hazardous to Health.
County Structure Plans	Statutory documents produced by County Councils outlining their strategy for development over a 10-15 year timescale.
CMP	Catchment Management Plan - integrated plans for the catchment which cover all the functions of the NRA. These provide the strategy by which the catchments will be managed.
Cyprinids	Coarse fish of the Carp family ie roach, dace, bream.
Dangerous Substances	Substances defined by the European Commission as in need of special control because of their toxicity, bioaccumulation or persistence. The substances are classified as List I or List II according to the Dangerous Substances Directive.
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.
Diffuse pollution	Caused by the areal spread of pollutants or by the cumulative effect of many individual or ill-defined events ie acid rain, pesticides etc.
Directive	A type of legislation issued by the European Community which is binding on the member states.
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.
DoE	Department of the Environment
DTp	Department of Transport
EA	Environmental Assessment
Environmental Appraisal	Process of defining and examining options and of weighing costs and benefits before a decision is taken.
Environmental Capacity	The point at which development passes from being sustainable to unsustainable.
Floodplain	This includes all land adjacent to a watercourse over which water flows or would flow but for flood defences in times of flood.
FWAG	Farming and Wildlife Advisory Group
GIS	Geographical Information System. The TYDAC Spatial Analysis System (SPANS) is favoured by NRA-TR.
Groundwater	Underground water contained in the pores and fissures of aquifers (water bearing strata).
Hydrometric	Measurement of hydrological entities.
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).
Landfill	Site used for waste disposal into/onto land.
Macrophytes	Plants that can be seen by the naked eye.
MAFF	Ministry of Agriculture, Fisheries and Food.

Main River	Some, but not all, watercourses are designated as 'Main River'. 'Main River' status of a watercourse must first be approved by MAFF. The NRA has the power to carry out works to improve drainage or protect land and property against flooding on watercourses designated as 'Main River'.
MRL	Main River Limit
PETAL	Plan for the Environment, Tourism and Leisure (British Waterways 1991)
PHABSIM	Physical Habitat Simulation System - a suite of computer programmes used for the specification of ecologically acceptable flows.
Potable water	Water suitable for human consumption.
Prescribed Flow (Flow Constraint)	A river flow incorporated as a condition in an abstraction licence, such that abstraction must cease once the flow falls below this value.
Recruitment	Reproduction of a species which results in new individuals successfully entering the (fish) population ie fry surviving to juveniles.
Riparian Owner	A person/organisation with property rights on a river bank.
River Corridor	Of particular importance to the NRA, such a corridor is a continuous area of land which has visual, physical or ecological links to a watercourse and is dependent on the quality or level of water within the channel.
River Quality Objective (RQO)	The level of water quality that a river should achieve in order to be suitable for agreed uses.
Run (fish)	To migrate upstream from the sea especially in order to spawn.
Salmonids	Fish classified as belonging to the Salmon family ie salmon, trout, char etc.
Septic Tank	A small tank receiving and treating sewage by bacteria.
Set-aside	Temporary withdrawal of agricultural land from agricultural production.
Silage	A winter feed for cattle. Silage is produced in the summer by bacterial action on freshly cut grass.
Site of Special Scientific Interest (SSSI)	A site given a statutory designation by English Nature because it is particularly important, on account of its conservation value.
Sludge	The accumulation of solids from the sewage treatment process. Sludge can be incinerated or spread on farm land.
Slurry	Animal waste in liquid form.
Source Control	A collective term to describe the management of run-off at or near the point of impact of rainfall and before it reaches the traditional piped drainage and sewer systems of urban areas (see Swale).
Springs	Natural emergence of groundwater at the surface.
STW	Sewage Treatment Works
Swale	An example of Source Control attenuation, these are elongated grass channels used to convey and treat run-off. Others include balancing ponds, permeable pavements and underground water butts.

SWQOs - statutory water quality objectives	Water quality objectives set by the Secretary of State, in relation to controlled waters.
Sustainable	Capable of being maintained at a steady state without exhausting natural resources or causing ecological damage.
Sustainable development	Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.
Topography	Physical features of a geographical area.
Turbidity	Measure of the light scattering properties of the water caused by suspended matter ie, the higher the light scattering - the higher the turbidity.
Watercourse	A stream, river, canal or the channel, bed or route along which they flow.

NOTES