

73

GA-South West LEAP

THE LOWER BRISTOL AVON CATCHMENT MANAGEMENT PLAN ACTION PLAN

89



ENVIRONMENT AGENCY

NATIONAL LIBRARY &
INFORMATION SERVICE

ANGLIAN REGION

Kingfisher House, Goldhay Way,
Orton Goldhay,
Peterborough PE2 5ZR



NRA

*National Rivers Authority
South Western Region
March 1996*

Telephone the emergency hotline to report all environmental incidents, such as pollution, poaching and flooding, or any signs of damage or danger to our rivers, lakes and coastal waters. Your prompt action will help the NRA to protect water, wildlife, people and property.

NRA Emergency Hotline

0800 80 70 60



Further copies of this Action Plan can be obtained from

Alan Turner
Catchment Planner
North Wessex Area
NRA South Western Region
Rivers House
East Quay
Bridgwater
Somerset TA6 4YS
Tel: Bridgwater (01278) 457333 Ext 4765

The NRA and the Environment Agency

The NRA will form the major part of a new organization which will have responsibilities for the environmental protection of water, land and air. The new Environment Agency starts its work of managing the environment in England and Wales on 1 April 1996.



Awarded for excellence

FOREWORD

By the end of the first century AD, the great Roman town of Aquae Sulis was attracting people from all over the Roman world. The principal attraction was the hot springs around which the remarkable bathing complex was constructed, parts of which can still be seen in the modern city of Bath.

The River Avon was also an important feature and in the following centuries the availability of water power played a key role in the affluence of the West Country.

This relationship of man to rivers continues and is most marked in the Lower Bristol Avon. Here the large population places heavy burdens on the water environment while demanding high standards of protection in return.

This Action Plan for the Lower Bristol Avon Catchment joins the Upper Bristol Action Plan (published March 1995) and completes the coverage of the Bristol Avon.

The NRA is committed to using these Action Plans to continue to achieve improvements to the water environment of the Bristol Avon. We would like to extend our thanks to all our consultees and hope that we can go forward in partnership to implement the Plan.

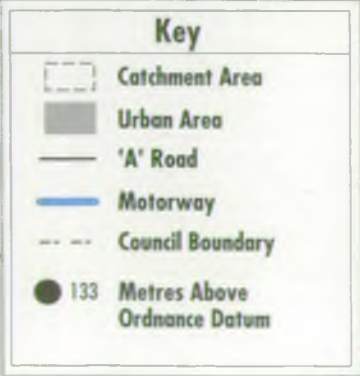


*Chris Birks
Area Manager, North Wessex*

ENVIRONMENT AGENCY



038012



CONTENTS

SECTION	Page
Vision for the Catchment	2
Introduction	3
The Lower Bristol Avon	5
Geology	
Agriculture	
Industry	
Wildlife Landscape Archaeology	
Water Use and Waste Water Disposal	
Water Quality	
Catchment Management Plans and Development Plans	6
Activity Plans	7
1. Development Pressure in the Catchment	7
2. Eutrophication	9
3. Pollution from Farms and Farm Land	10
4. Impact of Urbanization on Water Quality	11
5. Unsewered Areas and Sewerage Infrastructure	13
6. Site Specific Water Quality Issues	15
7. Impacts of Quarrying on Aquifers	19
8. Protecting Groundwater in the Catchment	20
9. Impacts of Abstraction on River Flows	21
10. Improving Flood Defences	22
11. River Resotation and Channel Management	23
12. Conserving River and Wetland Wildlife	25
13. Litter	26
14. Recreational Pressure	26
Map 1 The Lower Bristol Avon Catchment inside cover	
Map 2 Lower Bristol Avon Catchment - River Quality Objectives	4
Appendix 1: Organizations Responding to the Consultation Report	27
Appendix 2: Report on Public Consultation	28
Appendix 3: Abbreviations	30

NRA Copyright Waiver

This document is intended to be used widely and may be quoted, copied or reproduced in any way, provided that the extracts are not quoted out of context and that due acknowledgement is given to the National Rivers Authority up to 31 March 1996 and thereafter to the Environment Agency.

VISION FOR THE CATCHMENT

Key objectives in the management of the catchment will be to:

- ensure water quality is appropriate for the current and potential uses of the catchment;
- reduce nitrate and phosphate inputs to the rivers so that they are closer to a natural state and reduce the potential for algal blooms;
- ensure that existing streamflows are not unacceptably reduced by new abstractions and seek to restore an acceptable level of streamflows where known damage has already occurred;
- ensure legitimate water resource demands are met where possible;
- ensure that the river corridor and water resources in the catchment are protected from the effects of new development by close liaison with local authorities and developers;
- ensure that new development does not increase the risk of flooding by increased runoff or loss of floodplain;
- provide flood defences to people and property at risk from flooding where this is cost effective and environmentally acceptable;
 - maintain, improve and develop the existing good coarse and trout fisheries;
- conserve and enhance wildlife, landscape and archaeological features throughout the river corridor;
- identify and work towards the elimination of pollution from contaminated land;
- promote where desirable the recreational use of water and associated land.

The NRA will work with other organizations and individuals to achieve sustainable development within the catchment by meeting the needs of today while protecting the water environment and without compromising the ability of future generations to meet their own needs.

INTRODUCTION

The National Rivers Authority

We are responsible for:

- maintaining and where necessary improving water quality and controlling pollution;
- managing water resources and controlling water abstraction;
- protecting and improving fisheries;
- protecting and promoting the use of inland and coastal waters for the purpose of recreation;
- providing flood defences and flood warning systems;
- conserving and enhancing the wildlife and natural beauty of inland and coastal waters.

The Environment Agency

From 1 April 1996 the NRA will cease to exist. A new organization called 'The Environment Agency' will take over the work of the NRA, Her Majesty's Inspectorate of Pollution (HMIP) and the Waste Regulation Authorities. Future Catchment Management Plans will be published as the Environment Agency's Local Management Plans and will take a wider look at environmental regulation as well as the management of water.

Catchment Management Plans

The Catchment Management Planning process within the NRA involves the production of three types of document - a Consultation Report, an Action Plan and Annual Reviews.

The Lower Bristol Avon Catchment Management Plan Consultation Report explained how the catchment is used and discussed what could be done to protect or restore the water environment.

This Action Plan summarizes what the NRA, in co-operation with other organizations and individuals plans to do over the next five years to tackle the issues facing the water environment in the catchment. It should be read in conjunction with the Consultation Report.

Progress on Action Plan implementation will be reviewed annually and published as an Annual Review.

Much of the NRA's day to day work is not mentioned in this Action Plan. Only significant problems or initiatives that are under way are listed.

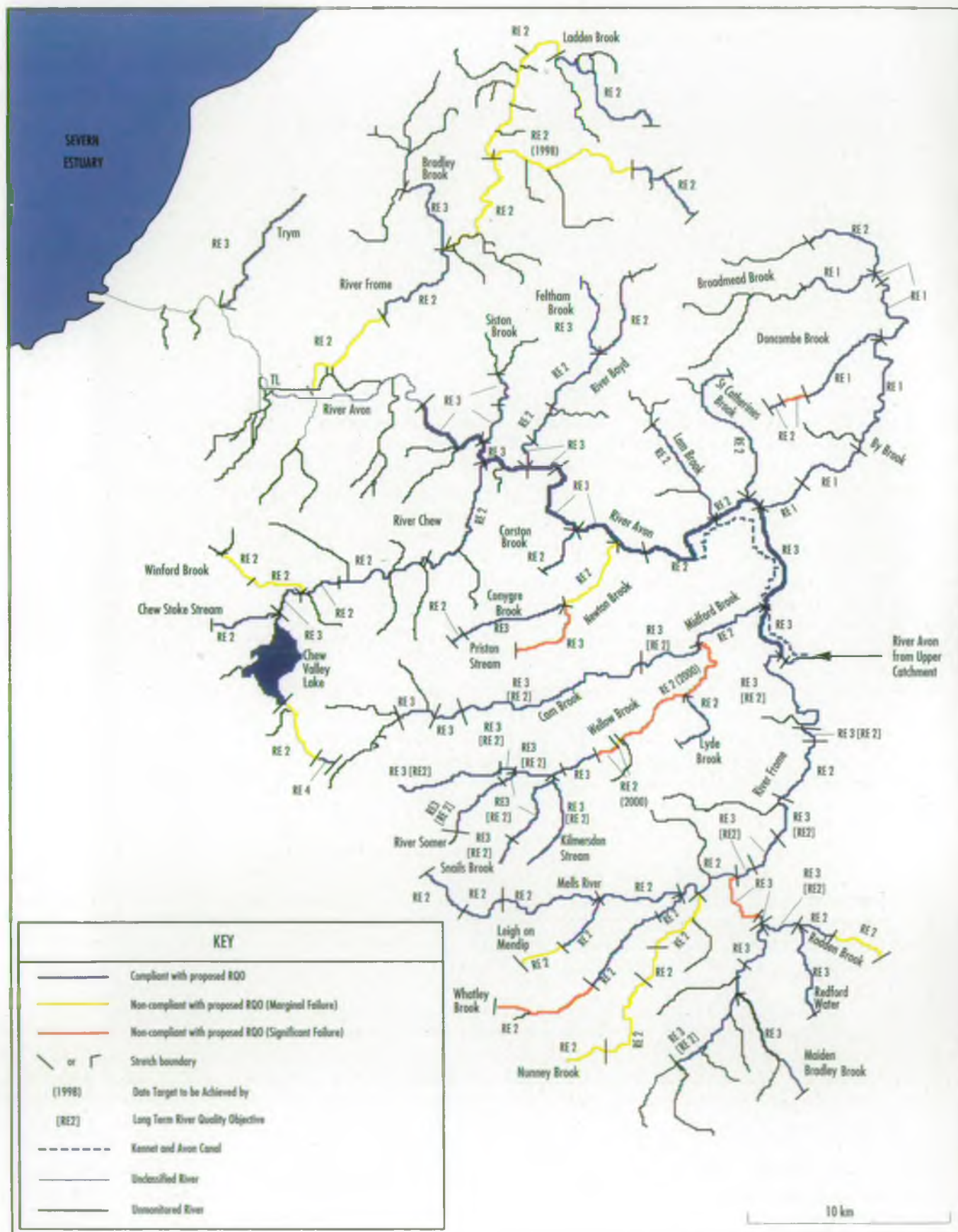
Review of the Consultation Process

We published the Consultation Report in March 1995, and distributed some 500 copies to organizations and individuals including local authorities, environmental groups, industry, farming, fishing and recreation interests.

Two manned exhibitions were held during the consultation period. The first in the Pump Room in Bath and the second at the Galleries Shopping Centre in Bristol. A mobile display was exhibited in libraries in Bristol, Keynsham, Frome and Bath.

We received 65 consultation responses. The organizations that responded are listed in Appendix 1 and a summary of their comments is given in Appendix 2.

MAP 2 - LOWER BRISTOL AVON CATCHMENT - RIVER QUALITY OBJECTIVES (RIVER ECOSYSTEM) AND COMPLIANCE 1994



THE LOWER BRISTOL AVON

The Bristol Avon is a large complex catchment. We have divided it into two sections for our catchment management plans - the Upper and Lower Catchments. This Action Plan deals with the Lower Avon and its tributaries from Avoncliff Weir just west of Bradford-on-Avon to its confluence with the Severn Estuary at Avonmouth. The Upper Bristol Avon Action Plan was published in March 1995.

The largest part of the catchment lies within Avon with small areas in Wiltshire and Somerset. The Kennet and Avon Canal, which is managed by British Waterways, closely follows the river from Bradford-on-Avon to the centre of Bath, where it joins the river.

Geology

The Lower Bristol Avon Catchment has three different geological areas which generate three distinct river types in terms of gradient, flow regime, bed material, clarity of water and communities of plants and animals. The Cotswolds to the north and east of Bath form an oolitic limestone escarpment with steep sided valleys. The Mendip Hills are carboniferous limestone which is harder than the soft oolite of the Cotswolds, with different landscape and steeper sided gorges. The remaining areas are mainly clays which tend to form the softer lowlands.

Agriculture

Outside the substantial and increasing urban areas, much of the pasture land of the rural catchment has been improved for dairy and beef production. There has also been an increase in the amount of land devoted to arable farming over the last 30 years. The steeper valleys of the Mells, Cam, Wellow, By Brook and St Catherines Brook support more permanent pasture and are often used for sheep grazing. Farm discharges can be a problem in this catchment.

Industry

Bristol is famous as one of Britain's major ports which over centuries has brought much wealth and industry into the area. Modern day industry and employment in the area are diverse. Some industries take water for processing or cooling and are consented to discharge treated effluent to the river. The concentration of industry results in a constant risk of accidental pollution. Bath and Bristol are centres of tourism and Bristol is also an important financial centre. The Ministry of Defence has a strong presence in the area. Rolls Royce and British Aerospace occupy a large complex in North Bristol. The food industry is well represented, e.g. Courage Brewery (Bristol), Cadbury (Keynsham) and Eden Vale Food Ingredients (near Frome). Printing and packaging are an important activity being centred mainly in Bristol and the Midsomer Norton/Radstock area. A major manufacturer of wood care products, Cuprinol, is based in Frome. Quarrying and its associated industries are very important especially in the East Mendips where careful regulation is necessary to safeguard water resources.

Wildlife, Landscape and Archaeology

The river corridors have many listed and important historical structures including bridges, water mills, weirs and hatches, as

well as other archaeological features, because the development and wealth of the area was intimately linked with the river. In the wider catchment, changes in land use have impoverished the landscape so that the river corridors have become increasingly valuable linear landscape elements which must be conserved, and enhanced where they have become degraded.

The Lower Bristol Avon Catchment supports a diverse fish fauna and at least 20 species of coarse fish are known to be present. It is highly regarded as a coarse fishery and is important for match and pleasure fishing.

The main River Avon is a slow flowing clay-lowland river which has been modified by historical impoundment, river engineering for the purpose of land drainage and flood alleviation, and by intensive agriculture in the floodplain, so there are very few wetlands remaining in the catchment. However, the river corridor acts as a vital link between other scattered habitats and wildlife corridors in the wider countryside. It is a valuable habitat in its own right and must be conserved.

Water Use and Waste Water Disposal

The catchment has an area of 118,500 ha and is home to approximately 795,000 people, who use the river for both work and play. The Lower Bristol Avon provides opportunities for recreation and amenity. In addition to angling, the river itself is used for a small amount of sailing and canoeing whilst in some places public footpaths and open spaces allow access to the banks for bird watching, walking and cycling. In Bath, trip-boats ply their trade and the Bristol Floating Harbour is a major leisure boating facility. A river bus also operates from Temple Meads Station. From time to time conflicts of interest arise which must be resolved.

The population is forecast to increase to 810,000 by 2001, resulting in major demands on the river for water supply and effluent disposal. Rainfall in the catchment varies from 750 mm/year in the north and east to 1,200 mm/year on the Mendips. This high rainfall is stored in the limestone rocks and this groundwater provides a major source of supply to the Bristol area. River water is taken for public supply at Monkswood Reservoir, Barrow Tanks and Chew Valley Lake.

The water, once used, has to be collected, treated and returned to the catchment. There are 44 sewage treatment works with dry weather flows greater than 20 m³/day operated by Wessex Water Services Ltd. In addition there are 30 other significant discharges to the river. In order to achieve satisfactory water quality, the NRA regulates these discharges to ensure that our river quality targets for the receiving watercourses are met.

Water Quality

The water quality targets that we use in all rivers are known as River Quality Objectives (RQOs). RQOs are used for managing water quality and are based on the River Ecosystem (RE) classification scheme. The River Ecosystem scheme is made up of five water quality classes (RE1 to RE5) which reflect the chemical quality needed by different types of river ecosystem including the types of fishery they are able to support. The RE classification scheme replaces the National Water Council

(NWC) system which was used by the NRA until December 1993.

The Consultation Report introduced proposals for RQOs for the Lower Bristol Avon Catchment based on RE classes. As a result of the consultation process the RQOs for the catchment have been finalized and are shown on Map 2 Lower Bristol Avon Catchment River Quality Objectives (River Ecosystem

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

Classification) and Compliance 1994. This map also shows where current water quality fails to meet its RQO. This assessment is based on three years of routine monitoring data collected between 1992 and 1994, which is held on the NRA's Public Register. These failures are identified as either marginal or significant.

Marginal failures are those where there is at least 50% confidence, but less than 95% confidence that the river stretch has failed its RQO. Significant failures are those where there is 95% confidence that the river stretch has failed its RQO.

We have identified improvements required to bring about compliance with RQOs as actions in Activity Tables 3 and 6.

In addition we have set undated 'long term' RQOs of RE2 for the following river stretches that we would like to achieve but for which there are currently no financial resources available to make improvements:

Somerset Frome from West Barn Farms to Tytherington and from the confluence with the River Mells to the confluence with the River Avon.

Maiden Bradley Brook from Maiden Bradley to the confluence with the River Frome.

Rodden Brook from the confluence with Redford Water to the confluence with the River Frome.

Cam Brook from Hanham House to the confluence with the Midford Brook.

Wellow Brook from Ston Easton to Tynning.

River Somer from Chilcompton to the confluence with the

Wellow Brook.

Snails Brook from the confluence with the Westfield Stream to the confluence with the Kilmersdon Stream.

Kilmersdon Stream from Kilmersdon to the confluence with the Snails Brook.

CATCHMENT MANAGEMENT PLANS AND DEVELOPMENT PLANS

The NRA can control some of the factors which influence the quality of the water environment but has very little control over the way that land is developed. This is controlled by the County and District Planning Authorities through the preparation of Development Plans such as Structure Plans, Minerals Plans, Waste Local Plans, District Wide Local Plans and the planning control system. Planning authorities therefore have a major role to play in helping to safeguard water interests.

The Government has indicated that future development and growth should be sustainable and acknowledge that Development Plans should contribute to this end. The UK Strategy for Sustainability recognizes vital water resource factors where potential conflicts need to be addressed - consumer needs for households, agriculture and industry; drinking water quality; waste water discharges and pollution control; recreation and the aquatic environment. Furthermore the DoE Circular 30/92 indicates that developments should not be at risk from flooding, obstruct flood flows, reduce flood storage or lead to flooding elsewhere. Development, planned and constructed, without regard to such considerations, can lead to danger to life, damage to property, and wasteful expenditure on remedial works whether on the development site or elsewhere.

Development Plans consider economic, social and environmental factors. The importance of incorporating water objectives into such appraisals cannot be overemphasized, where the aim must be to achieve acceptable local environmental quality with development growth and change. Key water objectives likely to emerge for Development Plans are:

- (i) to protect and enhance the water environment, including ponds, rivers and groundwater, for their own sake, for their contribution to nature conservation, recreation and the landscape, and for their contribution to water supply;
- (ii) to ensure that developments do not create or worsen a risk of flooding either at the development site, or elsewhere (either downstream or upstream) arising as a consequence of the development and that appropriate developments take advantage of any river and water environmental amenities.
- (iii) to ensure that developments do not cause pollution and that adequate sewage disposal facilities can be made available.

Apart from responding to planning application consultation, it is at present impossible for the NRA to influence further short term changes to the current town and country planning policies and approach. This is because the majority of the accepted growth until 2001 in the Lower Bristol Avon Catchment is

catered for in approved or emerging Development Plans and by committed schemes. Growth of existing towns and the fringes of Bristol over the last 20 years has been influenced by ease of travelling in and around Bristol, and the economic potential brought about by the M4, M5, Severn Bridge and Avonmouth. Improvements of communication routes are continuing and in theory the economic advantages of the catchment should be maintained.

The replacement County Structure Plans for Avon and Somerset will, in due course, be providing for sizeable growth and change to 2011 to meet the DoE Regional Planning Guidance for the South West. For instance in Avon as a whole, the additional housing growth until 2011 is expected to be some 2,950 dwellings per annum. Regional Planning Guidance for the South West (RPG 10 July 1994) emphasizes that availability and quality of water must be taken into account by the local planning authorities (LPAs) and that Development Plans must not provide for development at risk from flooding or that in itself might create flooding.

The most convenient, expedient and available sites may not necessarily be the best for the water environment. With the new Plan-led system there should be no case for development being generated from indiscriminate planning applications for non-sustainable development seeking the soft options of river valleys and floodplains or paying scant regard to downstream flood risks from discharges of generated surface waters. It is appropriate to note that the first effect of urbanization is that a catchment becomes more impermeable, with an increase in stormwater reaching the river. The second effect is that the response of a catchment to rainfall becomes more rapid, potentially increasing the peak flows in the river.

The NRA are responding by producing Catchment Drainage Models to identify flood risk enabling a more realistic assessment to be made during the production of replacement Development Plans.

Under a Memorandum of Understanding with the Association of Local Authorities, the NRA has produced definitive floodplain information to influence future Local Plan preparation in a positive rather than a reactive way. The NRA will carry out further surveys and modelling in urban areas where flood risks are identified (Section 105 Surveys).

ACTIVITY PLANS

The following activity plans summarize the main issues we will be tackling over the next five years. The successful implementation of these activity plans will make substantial progress towards realizing our vision for the catchment. Where we can we have identified costs to the NRA but during the life of this plan our policies and funding priorities may change. Where possible, estimates of costs which may be incurred by other organizations as a consequence of these plans, have also been included.

Future Review and Monitoring

The Environment Agency will be jointly responsible, with other identified organizations and individuals, for implementing this Action Plan and we will monitor and report on progress annually.

1. DEVELOPMENT PRESSURE IN THE CATCHMENT

We respond to consultations on planning applications, and provide input to Local Planning Authority Structure Plans, Local Plans, Mineral Plans, Waste Management Plans and on other matters concerning the water environment.

We have developed catchment drainage models for this catchment which we will use to help local authorities plan for development that does not cause flooding problems. We will continue to encourage local authorities to adopt policies which will:

- guide development away from flood risk areas;
- ensure that development would not increase flood risk;
- protect and enhance the wildlife, natural beauty and historic features of rivers and wetlands.

Land drainage working parties in the 1970s agreed on the response of the various drainage authorities to problems on the two different types of watercourses, 'main river' or 'ordinary watercourse'. Importantly, it was agreed that local authorities would be the drainage authority for ordinary watercourses, whilst the then Wessex Water Authority would deal with main river only. The NRA is proposing to set up a system jointly with the local authorities to ensure that the public receive consistent and helpful responses to issues on both types of watercourse.

We will work with planning and highways authorities at the design stage of new roads to ensure mitigation of the effects on nature conservation and fisheries. We will seek to protect valuable wetland habitats and threatened species such as the otter. We will seek to keep the adverse impacts on river corridor landscape to a minimum.

New road schemes can adversely affect the water environment. During the construction there are pollution threats to water quality, possible increased risks of flooding, loss of floodplain storage, risks of harm to fisheries and other potential adverse ecological impacts. We would seek to be involved at the earliest stage in the consideration of environmental factors in proposals for alternative routes for new roads. We are pursuing the provision of a higher standard of environmental statement to accompany such proposals.

After construction, rainfall which drains from major roads carries contaminants which can pose a threat to water resources. We shall continue to liaise with planning and highways authorities to obtain early involvement in the planning and design of new road schemes in order to ensure best practice for the drainage and disposal of road water runoff including, in some cases, the biofiltration of runoff before it goes to soakaway.

The growth of urban areas such as Bristol, Bath, Frome and Yate has led to increasing pressures on the water environment and river corridors in particular. An increasing population demands greater use of rivers for recreation and amenity. Further demands for new roads are generated. Expansion of commercial and industrial estates without adequate pollution control can cause poor water quality in rivers, and development of buildings and car parks up to the edge of river channels can constrict river corridors and lessen the wildlife interest. Sensitive planning of urban development can incorporate rivers, ponds, lakes and water features that enhance the overall visual and physical amenities and provide for wildlife.

New development increases the paved area draining to the river, increasing the peak flood level and reducing the time from the

rainfall event to the peak flood level. We will ensure that adequate attenuation is incorporated into new developments to maintain flood risk at acceptable levels.

We will work with local planning authorities to ensure that Development Plans include sensitive strategies and proposals with policies that will safeguard and where possible enhance the water environment.

The reorganization of some local authorities will mean the creation of new unitary authorities with effect from April 1996. We will build links with these new authorities to ensure that the interests of the water environment are maintained.

No	Issue	Actions	Responsibility		Cost to NRA £k	Financial Years					Future £k
			Lead	Others		96	97	98	99	2000	
1	Development pressure in the catchment	1.1 Liaise with the local planning authorities to ensure that appropriate policies are included in Development Plans	NRA	Local authorities	10	●	●				
	Potential impact of new roads	1.2 Liaise with planning and highways authorities, consultants and contractors to ensure protection for the water environment before, during and after construction of road schemes	NRA	Local authorities Highways Agency	6	●	●	●	●	●	

2. EUTROPHICATION

Runoff from farmland, drainage from farms, and discharges from sewage treatment works contain plant nutrients such as nitrogen and phosphorus.

A rise in plant nutrients may lead to an excessive growth of algae and other water plants which is known as eutrophication. This can in turn lead to choked rivers and may reduce water quality and the range of plants and animals they can support. Excessive plant growth can slow down low river flows causing silt to be deposited and leading to higher maintenance costs for the NRA and local authorities.

Long sections of the Avon show signs of eutrophication in the summer months.

We are carrying out a two year study (January 1995 - December 1996) to determine whether eutrophic stretches exist on the whole of the River Avon. If the Directive criteria are met we will nominate stretches as Sensitive Areas (EC Urban Waste Water Treatment Directive [91/271/EEC]) and/or Polluted Water (Eutrophic) (EC Nitrates Directive [91/676/EEC]).

We are studying eutrophication nationally through our research and development programme. The results of these studies will be used to develop a National Strategy for the Control of Eutrophication e.g. through use of riverside buffer zones which act to absorb excess nutrients.

No	Issue	Actions	Responsibility		Cost to NRA £k	Financial Years					Future £k
			Lead	Others		96	97	98	99	2000	
2	Eutrophication	2.1 Nutrient enrichment studies - collect chemical and biological data for the Lower Bristol Avon (LBA) (see text)	NRA		32	●					
		2.2 Assess relative contribution of inputs from all sources	NRA	WWSL		●	●				
		2.3 Develop a National Strategy for the Control of Eutrophication	NRA		50 (Total project cost)	●					
		2.4 Implement the National Strategy within the LBA Catchment	NRA		Unknown subject to proposals		●	●			

3. POLLUTION FROM FARMS AND FARM LAND

Polluting agricultural discharges are a problem in this catchment and may affect both surface water and groundwater (for groundwater protection see Issue 8). These may occur as direct discharges such as yard drainage or may be diffuse, entering the river via runoff from the land.

Diffuse pollution can result from:

- excess inorganic fertilizer applied to land
- excess organic waste such as slurry applied to land
- pesticide application to land
- ploughing, which releases silts and nutrients which are normally held in the soil

Accidental spillages of farm wastes or pesticides are an additional

problem. The MAFF Code of Good Agricultural Practice provides guidance to farmers on measures to take to safeguard the water environment.

- We will encourage farmers to work to this Code, if this is not already the case.
- We have identified rivers where farming practice has a big impact on water quality. In these areas we will identify polluting discharges, encourage remedial work (via advice, use of regulations and enforcement) to achieve effective effluent handling and containment.
- We will work to reduce the impact of pesticides in the water environment by following the recommendation of the NRA's R&D Report 17 'Pesticides in Major Aquifers' (published March 1995 by HMSO).

From April 1996 the Environment Agency will have additional powers to act where it considers a pollution risk exists.

No	Issue	Actions	Responsibility		Cost to NRA £k	Financial Years					Future £k
			Lead	Others		96	97	98	99	2000	
3	Pollution from farms and farm land affecting water quality especially on the:										
	Nunney Brook	3.1 Identify farms causing pollution and ensure steps are taken to eliminate the polluting discharges	NRA	Farmers	2	●	●	●	●	●	
	Ladden Brook				7	●	●	●			
	River Chew				3	●					
	Pollution from farms and farm land may be affecting water quality on the:										
	Wellow Brook	3.2 Investigate the causes of non-compliance with RQOs and where farms are contributing, identify farms causing pollution and ensure steps are taken to eliminate the polluting discharges	NRA		3	●	●	●			
	Cam Brook				2	●	●				
	Snails Brook				2	●	●				
	Leigh-on-Mendip Watercourse				2		●				
	Somerset Frome				4	●	●	●			
		3.3 Continue to investigate sources of pesticide inputs to river	NRA	All pesticide users	5	●	●	●	●	●	

4. IMPACT OF URBANIZATION ON WATER QUALITY

Water quality in urban areas, especially in the smaller streams, is adversely affected by inputs from a number of different sources:

- Road runoff - contaminated with oil, tar, rubber and silt.
- Trading estate drainage - not all surface water drains from trading estates have silt and oil interceptors fitted or adequately maintained. Accidental spillages of various chemicals can enter the watercourse.
- Wrongly connected domestic and commercial property drainage - many properties have wastewater drains (from, for example, automatic washing machines and dishwashers) connected to the surface water drain instead of the foul sewer. Surface water drains discharge directly to watercourses without any treatment.
- Sewerage infrastructure faults (see Issue 5) - seepage or storm overflow from inadequate sewers can enter the watercourse.
- Illegal dumping (fly-tipping) and litter (see Issue 13).

Watercourses particularly affected by these factors are:

The Malago and its tributaries;
Brislington Brook;
Combe Brook;
Siston/Warmley Brook;
Bristol Frome (Yate and Bristol) - (Action is being taken as part of the Bristol Frome Action Plan);
Somerset Frome (Frome area);
Snails Brook (Radstock area);
Wellow Brook (Radstock area).
(See Issue 11 for impacts on the ecology and landscape of river corridors).

We will work with local authorities and others to reduce urban river pollution. 'Operation Streamclean', in partnership with Bristol City Council and Wessex Water Services Ltd, has been successful in reducing polluting inputs, particularly from the wrong connections described above. Its future is currently being reviewed.

We will advise developers on the provision of interceptors and possibly biofiltration for silt and oils on road and industrial estate drainage. Our Officers will target industrial estates to advise on pollution prevention and take enforcement action where necessary. We will promote the provision, where possible, of undeveloped margins (buffer zones) to rivers to reduce the amount of pollution reaching the water. These also act as wildlife corridors (see Issues 11 and 12).

No	Issue	Actions	Responsibility		Cost to NRA £k	Financial Years					Future £k
			Lead	Others		96	97	98	99	2000	
4	Impact of urbanization on water quality	4.1 Work with planning authorities to ensure that adequate silt and oil traps are fitted on highway and industrial trading estate drainage	NRA	Planning authorities		●	●	●	●	●	
		4.2 Target trading estates and industrial areas with pollution prevention visits or roadshows, followed up by enforcement activity where necessary (Yate, South Bristol, Norton/Radstock)	NRA		19.2	●	●	●	●	●	
		4.3 Implement Bristol Frome Action Plan	NRA	Local authorities Riparian owners	Progress as funds become available						
		4.4 Liaise with the Waste Regulation Authorities to ensure that traders are complying with the Environmental Protection Act, Environmental Protection (Duty of Care) Regulations 1991	NRA WRAs	NRA and WRA to be part of new Environment Agency from 1/4/96		●	●	●	●		
		4.5 Review the future funding of 'Operation Streamclean' which was started in 1992 in collaboration with Bristol City Council and Wessex Water Services Ltd. This targets wrong connections and sewerage faults	NRA	* Bristol City Council WWSL	46 p.a.						Subject to review
		4.6 Liaise with and encourage local action groups e.g. Agenda 21 Environmental Forum Groups	NRA		3	●	●	●	●	●	

* Annual cost estimates to Wessex Water Services Ltd – £34k
Annual cost estimates to Bristol City Council – £40k

5. UNSEWERED AREAS AND SEWERAGE INFRASTRUCTURE

In some rural areas that are not on mains drainage, pollution by untreated or partly treated sewage is a problem. This is usually caused by leaking 'sealed tanks' or by septic tanks or package plants which are not operating properly. It is expensive to provide first-time sewerage so schemes are only implemented infrequently.

The area of Chewton Mendip/Litton is an example of this problem where badly operating septic tanks pollute the headwaters of the River Chew.

The NRA will continue to encourage local authorities, Wessex Water Services Ltd (WWSL) and OFWAT to find solutions to these problems. Under the Environment Act (1995) the Water Service Companies (subject to certain conditions and in accordance with Government guidelines) now have a duty to provide first-time sewerage for domestic property. The Environment Agency has powers to arbitrate in a dispute between the sewerage undertaker and the owner/occupier of premises. The Act contains other measures which it is hoped will improve the chance of such schemes being implemented.

Many older urban areas do not have separate foul and surface water sewers so storm water runoff enters these combined sewers. The frequent operation of overflows on combined sewers (CSOs) and other problems associated with inadequate sewerage cause untreated sewage to enter ground and surface water. Sewage derived debris is often an associated problem such as along the main Avon downstream of Bath. In Bath, work has been done to identify those CSOs operating prematurely and

those which require screening improvements to eliminate offensive sewage debris. In 1995 Wessex Water Services Ltd started a three year programme of improvements to CSOs in the Bath area.

We will promote campaigns such as 'Bag It and Bin It' which seeks to reduce the amount of sewage debris entering the sewerage system.

In many existing sewered areas the sewerage system needs to be surveyed by Wessex Water Services Ltd and a 'Drainage Area Plan' (DAP) prepared which identifies deficiencies in the system. Improvements can then be planned to prevent storm overflows operating prematurely due to hydraulic restriction, blockages and other problems. The NRA will continue to contribute to Wessex Water's DAPs, in particular identifying CSOs giving rise to pollution.

In the Lower Bristol Avon Catchment, DAPs have been prepared for Bath, Frome, Keynsham, Saltford, Kingswood North and South, Yate, Midsomer Norton and Radstock, Paulton and much of Bristol, and all areas within the Lower Bristol Avon CMP will have DAPs developed within the next few years.

We will negotiate with Wessex Water Services Ltd to identify the priority for storm overflow improvements. Priorities have been agreed up to the year 2005 as part of Wessex Water Services Ltd's Asset Management Plan for 1995-2005 (AMP II), and they will be improving CSOs in Bristol, Bath and Kingswood under their AMP II programme at an estimated cost in excess of £3 million.

No	Issue	Actions	Responsibility		Cost to NRA £k	Financial Years					Future £k
			Lead	Others		96	97	98	99	2000	
5	Unsewered areas and sewerage infrastructure										
	Unsewered areas, in particular Chewton Mendip/Litton	5.1 NRA to encourage local communities, district councils, water companies and OFWAT to seek solutions	NRA	Individuals Local authorities OFWAT WWSL	12	●	●	●	●	●	
	Condition of sewerage infrastructure/combined sewer overflows	5.2 NRA and Wessex Water Services Ltd to continue to consult over the timetabling of Drainage Area Plan work to resolve the situation	NRA WWSL		12	●	●	●	●	●	
	Problems have been identified at Bath, Yate, Bristol, and on the Wellow Brook	5.3 Some CSOs have been improved in these areas and other schemes are on-going. NRA to continue liaison with WWSL to identify and prioritize CSOs requiring improvement *	NRA WWSL		30	●	●	●	●	●	
	Problem of offensive sewage debris resulting from sewerage system overflow	5.4 Promote sewage debris reduction measures such as the 'Bag It and Bin It' campaign	NRA WWSL		Unknown						

* Potential expenditure by Wessex Water Services Ltd £3m+.

6. SITE SPECIFIC WATER QUALITY ISSUES

Since 1990 there has been a steady overall improvement in water quality in the Lower Bristol Avon Catchment. Our routine monitoring of chemical water quality (for the General Quality Assessment) shows that between 1990 and 1994 there has been a net increase of 30% in the length of river which has upgraded in class (213 km out of a total length of 660 km). Whilst some of these changes may be marginal, a more robust analysis using confidence testing has identified significant improvements of approximately 3%.

We aim to achieve a continuing overall improvement in the quality of the Bristol Avon and therefore we seek to improve water quality where our monitoring indicates a problem.

Site specific water quality problems are dealt with here under the

following headings:

- Non-compliance with River Quality Objectives (see introductory section 'Water Quality').
- Non-compliance with EC Directive Standards.
- Third North Sea Conference, Annex 1A.
- Biological quality deterioration.
- Aesthetic problem.

Non-compliance with River Quality Objectives (RQO)

The following rivers (based on 1994 data) show non-compliance with the RQO in these stretches:

Watertcourse	Stretches	RQO	* Non-Compliance
Priston Stream	Northfield to confluence with Conygre Brook	RE3	S
Newton Brook	Confluence with Conygre Brook to Englishcombe, Englishcombe to confluence with the Avon	RE2	M
Doncombe Brook	Upstream Marshfield STW to Downstream Marshfield STW	RE2	S
Wellow Brook	Foxcote to Longbarrow, Longbarrow to Wellow, Wellow to confluence with Lyde Brook, Lyde Brook to confluence with Midford Brook	RE2	S
Winford Brook	Winford to Littleton, Littleton to confluence with the Chew	RE2	M
River Chew	Litton to upstream Sherbourne Lake, upstream Sherbourne Lake to downstream Sherbourne Lake, downstream Sherbourne Lake to upstream Chew Valley Lake	RE2	M
Leigh-on-Mendip	Tadhill to Halecombe Quarry	RE2	M
Whatley Brook	Cranmore to Leighton, Leighton to Asham Wood	RE2	S
Nunney Brook	Wanstrow to Cloford, Cloford to Holwell, Holwell to Southfield House, Southfield House to confluence with Mells River	RE2	M
Somerset Frome	Innox Hill to confluence with Mells River	RE3	M
Bristol Frome	Yate to Algars Manor, confluence with Ladden Brook to confluence with Bradley Brook.	RE2	M
Ladden Brook	Bagstone to Sheephouse Farm, Sheephouse Farm to confluence with Bristol Frome	RE2	M

* S = Significant failure. M = Marginal failure.

Compliance is expressed in terms of marginal and significant failures. Marginal failures are those where there is at least 50% confidence, but less than 95% confidence, that the river stretch has failed its RQO. Significant failures are those where there is 95% confidence that the river stretch has failed its RQO. In the case of significant failures, RE class attainment will always be at least one RE class lower than the RQO.

Non-compliance with EC Directive Standards

Two currently used surface water abstraction points exceeded the Standards of the EC Surface Water Abstraction Directive (SWAD) for dissolved and emulsified hydrocarbons:

- 1 Barrow Reservoir.
- 2 Chew Valley Lake.

A third site - Avon Newton Meadows is not currently used but has a valid licence.

The cause of the exceedance is not known.

We are currently concerned about the suitability of the methods for the analysis of phenols and dissolved and emulsified hydrocarbons specified in the Directive (see Appendix 5 of the Consultation Report). Exceedances of the Directive's Standards cannot always be attributed to polluting discharges, and we suspect that some may be due to natural compounds resulting from the breakdown of vegetation. We are involved in discussions with the DoE, with a view to improving the analytical methods used.

The NRA will continue to report where the EC SWAD Standards have been exceeded. However, as there are no obvious polluting sources of these compounds in the catchment we are not planning to undertake any further studies until we receive direction from DoE.

Third North Sea Conference - Annex 1A

At the second and third North Sea Conferences in 1987 and 1990, the UK Government made a commitment to reduce the load (load = concentration x flow) of certain substances known as 'Annex 1A' substances (see Appendix 6 of the Consultation Report) entering tidal waters from rivers and direct discharges. Loads of most Annex 1A substances are to be reduced by 50% but loads of mercury, cadmium and lead are to be reduced by 70%. Reductions are to be achieved by 1995 compared to a 1985 baseline or a 1991/92 baseline where data for 1985 is unavailable.

We are responsible for carrying out monitoring and identifying significant sources of these substances. We identify significant sources by ranking loads of Annex 1A substances in rivers and direct discharges according to their size. A discharge is significant if it belongs to the group of discharges that contribute the first 95% of the total load entering tidal waters. In accordance with DoE guidelines we identify where reductions can be made.

Significant loads of copper have been found at the Annex 1A monitoring point at Keynsham on the River Avon. For many

substances the UK Government has met its commitments to achieve reductions in loadings. Following the 4th Ministerial Conference on the North Sea (June 1995), we are awaiting guidance from DoE to determine what further action we must take to reduce loads of Annex 1A substances.

Aesthetic problem

The Consultation Report raised the problem of discharges of oil from Short Street surface water outfall polluting the Feeder Canal and Floating Harbour.

We have investigated the problem and in March 1995 the principal source was identified and remedial action taken. Since then there has not been a recurrence.

Biological quality deterioration

Biological monitoring is used to support chemical water quality monitoring. The biological monitoring is important as it can pick up the impact of intermittent pollution which might be missed by the routine chemical sampling programme.

River stretches are assigned to a class:

BIOLOGICAL CLASS	DESCRIPTION
A	Good
B	Moderate
C	Poor
D	Very poor

During the monitoring period 1990-1992, three river stretches showed a deterioration in quality:

MONITORING POINT	CLASS CHANGE
1 River Chew at Keynsham	A to B
2 Wellow Brook at Writhlington	B to C
3 Doncombe Brook	A to B

These deteriorations in biological class support the chemical quality evidence for these stretches. Biological quality often improves as chemical quality is improved. The actions described in Activity Table 6 are expected to show an improvement in biological quality. We will continue to monitor biological quality as part of our routine monitoring programme.

No	Issue	Actions	Responsibility		Cost to NRA £k	Financial Years					Future £k
			Lead	Others		96	97	98	99	2000	
6	Site specific water quality issues										
	Non-compliance with River Quality Objectives in the following stretches:	Investigate the causes and formulate action plans to remedy the problems:	NRA	Landowners Farmers WWSL							
	Priston Stream - Northfield to confluence with Conygre Brook	6.1 Priston Stream. Recent impoundment upstream of monitoring point reducing dilution - NRA to investigate			2	●	●				
	Newton Brook - Confluence with Conygre Brook to Englishcombe, Englishcombe to confluence with the Avon	6.2 Newton Brook			2	●	●				
	Doncombe Brook - Upstream Marshfield STW to downstream STW	6.3 Doncombe Brook. Sampling point relocated to avoid mixing zone from Marshfield STW			2	●	●	●			
	Wellow Brook - Foxcote to Longbarrow, Longbarrow to Wellow, Wellow to confluence with Lyde Brook, Lyde Brook to confluence with Midford Brook	6.4 Wellow Brook. See Issue 3			6 (total)* see Activity Table 3	●	●				
	Winford Brook - Winford to Littleton, Littleton to confluence with the Chew	6.5 Winford Brook			2	●	●				
	River Chew - Littleton to upstream Sherbourne Lake, upstream Sherbourne Lake to downstream Sherbourne Lake, downstream Sherbourne Lake to upstream Chew Valley Lake	6.6 River Chew			2	●	●				

(total)* includes the cost already allocated in Activity Table 3 or 4

No	Issue	Actions	Responsibility		Cost to NRA £k	Financial Years					Future £k
			Lead	Others		96	97	98	99	2000	
6	Non-compliance with River Quality Objectives in the following stretches:	Investigate the causes and formulate action plans to remedy the problems:									
	Leigh-on-Mendip watercourse - Tadhill to Halecombe Quarry	6.7 Leigh-on-Mendip watercourse. See Issue 3			2 (total)* see Activity Table 3	●	●				
	Whatley Brook - Cranmore to Leighton, Leighton to Asham Wood	6.8 Whatley Brook			2	●	●				
	Nunney Brook - Wanstrow to Cloford, Cloford to Holwell, Holwell to Southfield House, Southfield House to confluence with Mells River	6.9 Nunney Brook. See Issue 3			2 (total)* see Activity Table 3	●	●	●	●	●	
	Somerset Frome - Innox Hill to confluence with Mells River	6.10 Somerset Frome. Improvements to Frome STW have been made by WWSL. River reach is impacted by urban runoff			2	●	●				
	Bristol Frome - Yate to Algars Manor, confluence with Ladden Brook to confluence with Bradley Brook	6.11 Bristol Frome. Failure was partly due to sewerage problems which are being remedied by construction of the Frome Valley Relief Sewer by WWSL. NRA to investigate other causes of water quality problems, such as runoff from trading estates			11.2 (total)* see Activity Table 4	●	●	●	●	●	
	Ladden Brook - Bagstone to Sheephouse Farm, Sheephouse Farm to confluence with Bristol Frome	6.12 Ladden Brook. See Issue 3			7 (total)* see Activity Table 3	●	●				
	Exceedence of the hydrocarbon standards of the EC Surface Water Abstraction Directive at Chew Valley Lake and Barrow Reservoir	6.13 Following guidance from the DoE, if necessary investigate the reason(s) for the exceedances and then take action where possible	NRA/DoE								
	Significant loads of copper near South Pier at the mouth of the Bristol Avon and at Keynsham	6.14 Investigate the metals load and assess possible action as part of the Annex 1A load reduction programme, in the light of guidance from DoE	NRA/DoE	Metal dischargers	Depends on DoE						

(total)* includes the cost already allocated in Activity Table 3 or 4

7. IMPACTS OF QUARRYING ON AQUIFERS

The catchment is underlain by large areas of major aquifer, most notably the Carboniferous Limestone aquifer of the Mendips. The limestone is in great demand and the East Mendips is a major production area of hard rock for the construction industry, producing more than 10 million tonnes of crushed stone in 1992.

Quarrying impacts both on water resources and on quality and even the watercourse itself may be threatened as was for example the Brinsham Stream just to the North of Chipping Sodbury. The flow from some limestone springs has been reduced and in some, the quality degraded as a result of quarrying below the water-table. Discharge of quarry dewatering water also changes flow regimes with risk of damage to the natural ecology of the affected watercourse.

We believe that the Bath Hot Springs are put at risk by depression of the natural Mendip groundwater level and may be threatened by further quarry developments both there and at Wick, north west of Bristol. The importance of the Bath Hot Springs, even with a level of uncertainty of connection with any specific quarry site, makes it imperative that a precautionary approach is adopted to the control of sub-water-table quarries in the area of potential risk.

We will work with the Minerals Planning Authorities, other local authorities and the quarrying industry to monitor spring flows, water quality, and groundwater levels to check the effects of the quarrying.

We will continue to liaise with the quarrying industry and local authorities over the environmental impacts of quarrying, mitigation measures, and proposals for new mineral extraction permissions.

We will protect groundwater resources by implementing Policies B1-4 of our national Policy and Practice for the Protection of Groundwater (PPPG):

B1 - For any proposal which would physically disturb aquifers, lower groundwater levels, or impede or intercept groundwater flow, the NRA will seek to achieve equivalent protection for water resources and the water environment as if the effect were caused by an abstraction controllable under the Water Resources Act 1991.

B2 - The NRA will object to a new proposal for mineral extraction where there will be demonstrable harm to water resources and the water environment, unless measures to mitigate any effects can be agreed within planning controls.

B3 - The NRA will normally object to proposals where the obstruction of groundwater flow is likely to cause undesirably high groundwater levels or cut off groundwater flow, unless measures to mitigate any effects can be agreed.

B4 - The NRA will encourage best practice regarding the backfilling of any abandoned shaft, well, borehole, tunnel or adit in order to prevent pollution or loss of water resources.

No	Issue	Actions	Responsibility		Cost to NRA £k	Financial Years					Future £k
			Lead	Others		96	97	98	99	2000	
7	Impacts of quarrying on water resources										
	Quarrying activity may have caused water quality standards to be exceeded for the total zinc standard of the Freshwater Fish Directive on the Mells River	7.1 Investigate the cause of non-compliance and take action to resolve the problems if possible	NRA	Dischargers	1	●	●				
	The threat to the Brinsham Stream	7.2 Oppose plans to remove the stream bed by quarrying and press for a tunnel under the stream bed to join the adjacent sites	NRA		Unknown						
	The threat to the Bath Hot Springs	7.3 Continue monitoring the Hot Spring and water levels in the Mendips and other limestone aquifers	Somerset County Council and Avon County Council Minerals Planning Authori- ties	NRA Bath City Council Quarry producers	25	●	●	●	●	●	5 p.a.

8. PROTECTING GROUNDWATER IN THE CATCHMENT

This river catchment includes large areas of major aquifers which provide high quality water supplies to many thousands of people and essential summer baseflows to rivers. We shall seek to protect groundwater from all types of threat. The effects of quarrying are a particular concern (see Issue 7). Farming practices and the disposal of farm wastes are an additional threat (see Issue 3). For example, we see the practice of intensively farming free-range pigs on the Mendips as a potential threat to groundwater quality. (The latter is also a threat to the landscape of an AONB.)

We will encourage farmers to comply with the MAFF Code of Good Agricultural Practice for the Protection of Water where they are not already doing so. We will encourage farmers to produce farm waste management plans.

At Combe Down, Bath City Council have recognised the need to infill parts of underground mine workings which were in danger of collapse, and which lie beneath built up areas. The NRA and Wessex Water Services Ltd had been concerned that leachate from the infill material could pollute water sources.

Consultants acting for Bath City Council are investigating the environmental impact of infill materials. They are providing an environmental statement in support of the Council's strategy. In due course a formal planning application will be made accompanied by an environmental statement. As statutory consultee, the NRA will examine the application to seek satisfaction that water resources are not polluted.

We will protect groundwater by implementing our national policy which is contained in the NRA publication 'Policy and Practice for the Protection of Groundwater' (PPPG).

No	Issue	Actions	Responsibility		Cost to NRA £k	Financial Years					Future £k
			Lead	Others		96	97	98	99	2000	
8	Protecting groundwater in the catchment	8.1 Implement NRA policy for the protection of groundwater (PPPG)	NRA			●	●	●	●	●	
		8.2 Work with farmers on the Mendips to encourage them to produce waste management plans	NRA		6	●	●	●	●	●	
		8.3 Encourage farmers to avoid intensively farming free-range pigs within source protection areas by education, and participation in relevant organizations	NRA	MAFF FWAG Mendip Env. Forum	4	●	●	●	●	●	
	Combe Down mine stabilization infill	8.4 Continue to liaise re proposals for stabilization of mines. Assess environmental impact statement and, as statutory consultee, comment on planning application. Monitor baseline water quality. Monitor water quality after any infilling takes place	Bath CC NRA WWSL		Unknown	●	●	●			

9. IMPACTS OF ABSTRACTION ON RIVER FLOWS

The River Avon provides water for many abstractions. One such abstraction is licensed at Newton Meadows just downstream of Bath where Wessex Water Services Ltd (WWSL) have a licence to abstract 31.9 Ml/d from the River Avon. This as yet unused source has been identified as one potential option to help meet the growing demand within the Avon/Wiltshire supply zone of WWSL. It is possible that increased resources may need to be developed for public water supply from within the catchment. These increased demands would need to be carefully appraised for their potential effect on the river. This situation may occur if:

- water companies and water users do not implement adequate demand management and leakage control practices to restrain growth in the demand for water;
- demand increases in spite of demand management measures being in place;
- the option of increasing abstraction from the lower reaches of the Avon is pursued in order to solve problems associated with groundwater abstraction in the Upper Avon around Malmesbury. The Upper Bristol Avon Catchment Management Plan identified abstractions from groundwater by WWSL and Bristol Water in the Malmesbury area, as a major issue for concern. A series of short term options to improve the situation is being investigated. In 1995 trial pump tests to increase summer flows in the river produced encouraging results, but the sustainability of these measures has yet to be proven. A long term option is to reduce abstractions around Malmesbury and increase abstraction in the Avon's lower reaches. The costs associated with such a long term option are estimated at between £7 million and £18 million. These estimates will need to be refined and the benefits associated with low flow alleviation require evaluation.

Two schemes could be evaluated:

- an increased licensed abstraction at Newton Meadows to augment Wessex Water Services Ltd supplies;
- a pumped storage scheme sourced from the Lower Avon above Bristol, for Chew Valley Lake to augment Bristol Water Company's supplies. This would operate mainly in the winter.

Liaison between the NRA and the water companies is on-going.

On the Kennet and Avon Canal the flight of locks at Caen Hill and the 15 mile Long Pound to the east of Devizes use large amounts of water. An existing back-pumping arrangement extends from Claverton on the Lower Avon to Devizes. British Waterways are in the process of installing a pumping scheme at Devizes to supplement their arrangements to provide water for the Caen Hill locks. The scheme should be complete by March 1996.

When water is in short supply the existing licensed public water supply downstream of Bath at Newton Meadows would have priority use of the river water over the canal supply.

The NRA anticipate that British Waterways will undertake an Environmental Impact Assessment as part of future scheme planning and that the scheme will include water conservation measures e.g. improving the condition of the Long Pound to reduce leakage.

On the St Catherines Brook we will continue to work with WWSL to investigate the effects of low flows and seek to achieve modifications to the stream support system if this is shown to be necessary.

No	Issue	Actions	Responsibility		Cost to NRA £k	Financial Years					Future £k
			Lead	Others		96	97	98	99	2000	
9	Impacts of abstraction on river flows										
	Increased water abstraction for public water supply	9.1 Seek resolution to the problems associated with groundwater abstraction in the Upper Bristol Avon Catchment, in conjunction with Wessex Water Services Ltd and Bristol Water (see also UBA Action Plan)	NRA	WWSL Bristol Water	Unknown	●	●	●	●	●	
		9.2 Continue liaison on the need for and timing of a detailed investigation of a pumped storage scheme for Chew Valley Lake	NRA	Bristol Water	Unknown	●	●	●	●	●	

No	Issue	Actions	Responsibility		Cost to NRA £k	Financial Years					Future £k
			Lead	Others		96	97	98	99	2000	
9	Impacts of abstraction on river flows										
	Increased water abstraction for public water supply	9.3 Promote and implement appropriate demand management and leakage control policies	NRA WWSL Bristol Water		Unknown	●	●	●	●	●	
		9.4 Evaluate the potential for increasing the authorized abstraction from the Avon at Newton Meadows	NRA	WWSL	Unknown						
		9.5 Assess benefit of low flow alleviation	NRA		20	●					
	Kennet and Avon Canal - water demand for Caen Locks and Long Pound	9.6 Improve the condition of the Long Pound to reduce leakage	British Waterways			●	●	●	●		
		9.7 Extend the back-pumping arrangements to source the Long Pound from Claverton, near Bath	British Waterways	NRA		●					
	The impact of perceived low flows in the St Catherines Brook	9.8 Evaluate the Phase 1 findings of the WWSL Report and consider further action	WWSL	NRA	Depends on study result	●	●				

10. IMPROVING FLOOD DEFENCES

A management framework has been agreed to ensure that resources are targeted on the greatest needs, and supporting systems are being introduced into the Region. When designing and maintaining flood defences we take account of many factors including the impact of global warming.

The NRA advises local planning authorities on flood risks associated with development, in accordance with the Department of the Environment Circular 30/92. Survey work to indicate floodplain extent was completed in 1995. Further survey and modelling may be undertaken to improve this information in those urban areas where flood risks are identified. These areas will be determined through liaison with local planning authorities, and will largely arise out of the effects of land allocations in Development Plans.

No	Issue	Actions	Responsibility		Cost to NRA £k	Financial Years					Future £k
			Lead	Others		96	97	98	99	2000	
10	Improving flood defences	10.1 Introduce a national integrated Flood Defence Management System	NRA		Unknown (National Cost)	●					
		10.2 Undertake surveys to support flood risk advice to local planning authorities	NRA	Planning authorities	45	●	●				

11. RIVER RESTORATION AND CHANNEL MANAGEMENT

Since the 1940s major land drainage schemes have enabled more intensive farming. Wetlands have been drained, and river corridor vegetation removed or reduced to a single tree width on the bank crest. The result is that habitat diversity has been reduced, important shading has been lost and increased amounts of pesticides and nutrients now run off into the river. We will promote the provision of buffer zones where appropriate. These are vegetated strips of land along the river margins (10-100 m wide) removed from intensive agriculture, which reduce inputs of nutrients, silt, and livestock waste to the river, as well as improving habitat diversity and landscape.

The river has been impounded by weirs changing both natural river levels and flows. We will advise local planning authorities of the impact on the water environment of any proposed impoundments such as the Bristol Avon Weir and the Avon Barrage.

Rivers can provide attractive open spaces in our towns but often increasing development has resulted in urban riversides being completely built up, often with industrial sites backing onto rivers. Urban flood defence schemes such as Keynsham Park, Bitton, Bath and Frome town centres have resulted in straight channels with concrete or steel piled banks unsympathetic to the needs of wildlife and detrimental to the landscape. Major road schemes have reduced the landscape value of river valleys and affected river corridors.

On main rivers, the NRA can manage channels sympathetically through its routine maintenance operations. However, the major responsibility lies with riparian landowners. The NRA believes that the greatest improvements can be achieved through riparian owners becoming more aware of their own responsibilities for river channel management. We will produce and distribute guidance notes on this subject.

Over the long term we wish to see river corridors restored to a more natural state to improve their landscape value and habitat diversity. We will help to develop restoration schemes for some of the worst affected rivers. We depend on the goodwill and co-operation of riparian owners to help us restore rivers and the support of organizations such as local authorities and the NFU, CLA, MAFF, Countryside Commission, the Forestry Authority and FWAG.

Where possible, with our partners, we will help to implement Joint Action Plans such as the Bristol Frome Action Plan which could include the following measures:

- plant trees for shade to lessen the growth of invasive aquatic plants where appropriate;
- persuade farmers to pull back fencing from the river bank and voluntarily establish natural buffer zones to absorb pollution and enhance the landscape;
- re-introduce meanders, pools and riffles, and ox-bows on straightened sections;
- recreate wetlands next to the river

On the Bristol Frome it is intended that a multi-functional, collaborative programme of works, to be carried out in conjunction with a variety of different agencies, will be implemented over a 5-10 year rolling programme. Partners involved include the local planning authorities, Countryside Commission (particularly through Countryside Stewardship grant scheme - the operation of this scheme will transfer to MAFF on 1 April 1996 - and the Forest of Avon), Forestry Authority, local parish councils and community groups.

On the Somerset Frome, in Frome town, we will work with the local planning authority, conservation groups and others to produce an urban riverside enhancement scheme which will aim to both improve amenity and allow a wildlife corridor to continue through the urban area. We shall prepare an Action Plan, in consultation with others, for the Somerset Frome which will identify improvement measures. The timing and preparation of this Action Plan will be dependent on resource availability.

The NRA will support and work with projects promoted by other organizations which aim to enhance conservation and recreation in river catchments such as the River Avon Project and the proposed By Brook Countryside Management Project.

No	Issue	Actions	Responsibility		Cost to NRA £k	Financial Years					Future £k
			Lead	Others		96	97	98	99	2000	
11	River restoration and channel management										
	Degradation of the Bristol Frome and tributaries	11.1 Together with our partners, continue work on the Bristol Frome Action Plan	NRA	Riparian owners MAFF NFU CLA FWAG CoCo Forestry Authority Parish councils Community groups Local authorities	Depends on funds from year to year plus staff time £2k p.a.	●	●	●	●	●	
	Loss of wetland in river corridors	11.2 Study the findings of the NRA Wetlands R&D Project and where appropriate implement in the catchment	NRA		Depends on size of scheme	●	●	●	●	●	
	Need to improve river channel management	11.3 Distribute guidance notes	NRA	Parish councils Civic trusts NFU	1	●					
	Need to enhance urban river corridors	11.4 Work with local planning authorities and others to produce enhancement schemes where opportunities arise	Local planning authorities	NRA Civic trusts Wildlife trusts Riparian owners	5	●	●	●	●	●	
	The impact of agricultural intensification on the river corridor	11.5 Work with MAFF to enable grant-aided schemes such as Countryside Stewardship and Water Fringe Options to be used to develop buffer zones	MAFF	NRA Farmers Riparian owners	7.5	●	●	●	●	●	
	Need to improve the Somerset Frome	11.6 With partners, produce an Action Plan for the Somerset Frome	NRA	Local authorities Riparian owners Community groups	Unknown	●	●				

12. CONSERVING RIVER AND WETLAND WILDLIFE

We are committed to maintaining and extending the biodiversity of rivers and wetlands.

To do so we need good information on the plants and animals that depend on rivers and wetlands in the catchment. We will work with other organizations to assess the biodiversity of the catchment and establish an audit procedure to appraise and monitor for example:

- the area of floodplain wetlands;
- the number of breeding dippers;
- the length of river supporting water voles.

English Nature - the Government's advisor on species and habitat conservation - plays the lead role in developing species and habitat conservation Action Plans under the biodiversity initiative. When Plans are established we can promote them when carrying out our own duties. In the meantime we will continue to encourage sound management of rivers and wetlands and promote wildlife conservation in balance with other river uses. We will give priority to:

- protecting the most diverse stretches of river and the remaining areas of wetland;

- improving biodiversity by improving water quality and habitat diversity through channel improvements (see Issue 11);
- restoring degraded areas (see Issue 11) as part of an action plan such as the Bristol Frome Action Plan or as part of other work such as a flood defence scheme.

Further objectives are to:

- carry out desk studies of the status and distribution of rare and threatened species (e.g. water voles, Loddon pondweed, white water lily, great dodder, river water dropwort, white-clawed crayfish, white legged damselfly and scarce chaser);
- record distribution of alien species principally Himalayan balsam, Japanese knotweed and consider whether control measures are feasible;
- assist with national surveys (e.g. alder die-back);
- continue to collate survey data and analyze and update aerial photos;
- improve otter habitat by sympathetic river management, provide where suitable, log pile otter holts and develop links to adjoining catchments.

Achieving these objectives will depend on funds becoming available.

No	Issue	Actions	Responsibility		Cost to NRA £k	Financial Years					Future £k
			Lead	Others		96	97	98	99	2000	
12	Conserving river and wetland wildlife										
	Need for detailed information on rare or threatened species	12.1 Carry out desk studies of survey data	NRA		5		●	●			
		12.2 Set biodiversity targets	EN	NRA County wildlife trusts Local authorities	5	●	●				
	Need for information about the distribution of alien species principally Himalayan balsam, Japanese knotweed	12.3 Complete River Corridor Survey of catchment and produce a distribution. Give advice on control measures to riparian owners and interest groups	NRA		2.5		●	●			
	Need for a link between catchments to encourage recolonization by otters	12.4 Develop safe overland routes between catchments	NRA		2.5		●	●			

13. LITTER

Litter affects many public places, particularly town centres. It can be thrown into rivers or blown from land nearby. It can obstruct important flood relief culverts. Removing litter automatically at screens is costly and can cause problems during floods. Floating booms are unsightly and can catch a lot of weed and woody debris which is difficult to separate from the litter.

Litter does not normally affect the quality of the water and so the NRA will normally only remove litter when it is causing or likely to cause an obstruction to flood flows.

The Environmental Protection Act 1990 gives local authorities the power to deal with litter in public places. The NRA will liaise with the local authorities to develop a strategy to control litter.

No	Issue	Actions	Responsibility		Cost to NRA £k	Financial Years					Future £k
			Lead	Others		96	97	98	99	2000	
13	Litter	13.1 Develop and implement strategy for dealing with litter on NRA owned land and property	NRA			●					
		13.2 Identify worst locations and liaise with local authorities to develop strategies for litter control	NRA	Local authorities	1	●					

14. RECREATIONAL PRESSURE

The Bristol Avon provides recreational opportunities for the large population within the catchment. The main Avon through Bath and Bristol, is particularly heavily used and conflicts of interest do arise.

Although the NRA is not a Navigation Authority in any part of the Bristol Avon, we will work with other organizations to try to resolve conflicts between different users.

Of particular concern is the increase of recreational and commercial boating with its attendant likely effects of increased bank erosion and decline in aquatic plants. There is also deep local concern for the safety of small craft on the Avon upstream of Pulteney Weir.

The NRA owns very little land on the Bristol Avon but we will review the recreational potential of any land we own. We will promote safe recreation within the river corridor, working with local authorities and others to plan for improved facilities and management. We are working with the local authorities and landowners to improve and consolidate the footpath network in the Bristol Frome valley as part of the Bristol Frome Action Plan. Consultants acting for the local authorities are assessing the feasibility of making the Avon Valley route available for multi-purpose recreational use.

We will balance the need for recreation with our duty to safeguard the river environment and conserve wildlife.

No	Issue	Actions	Responsibility		Cost to NRA £k	Financial Years					Future £k
			Lead	Others		96	97	98	99	2000	
14	Recreational pressure										
	The need to plan facilities and improve management of recreation	14.1 Liaise with the local planning authorities to ensure appropriate policies are included in Local Plans	Local planning authorities	NRA	See Issue 1	●	●				
	Conflicts of interest between users of the Lower Avon	14.2 Continue to participate in the Lower Avon Users Consultative Committee	Interest groups Riparian owners Local authorities	NRA	2.5	●	●	●	●	●	
	The duty to provide for recreation on NRA owned land (N.B. the NRA owns very little land in this catchment)	14.3 Review the recreational potential of NRA owned land within the catchment	NRA		5	●	●				

ORGANIZATIONS RESPONDING TO THE CONSULTATION REPORT

The following organizations and individuals sent in written responses or queries to the Consultation Report. We also received 11 responses from members of the public. The NRA gratefully acknowledges all comments received.

Organizations

ARC Southern
 Avon and Tributaries Angling Association
 Bath Boating Company
 Bathford Parish Council
 Bristol City Council
 Bristol Friends of the Earth
 Bristol Marine Conservation Society Local Group
 Bristol Water Plc
 British Canoe Union
 British Waterways
 CAMAS UK Ltd
 Combe Hay Parish Council
 Council for the Protection of Rural England
 Countryside Commission
 County of Avon
 Cranmore Parish Council
 Dunkerton Parish Council
 East Harptree Parish Council
 English Heritage
 English Nature
 Englishcombe Parish Council
 Forest Enterprise
 Forests for the Community Bristol/Avon

Foster Yeoman Ltd
 Frome Town Council
 Hinton Poultry Limited
 HMIP
 Inland Waterways Association
 Keynsham Town Council
 Kingswood Borough Council
 Long Ashton Parish Council
 MAFF
 Malago Valley Conservation Group
 Mendip District Council
 Mendip Quarry Producers
 Morris & Perry Ltd
 National Trust
 Nempnett Thrubwell Parish Council
 Northavon District Council
 Pioneer Concrete Holdings Plc
 Riparian Owners Avon River
 Royal Yachting Association
 Saltford Parish Council
 Somerset County Council
 Somerset Wildlife Trust
 South Stoke Parish Council
 Sports Council
 The House Builders Federation
 Tytherington Parish Council
 University of the West of England
 Wansdyke Council
 Wessex Water Services Ltd
 Wiltshire County Council
 Wiltshire Wildlife Trust
 Wimpey Minerals Ltd

Report on Public Consultation

We received 65 written responses to the Consultation Report. Some of the comments and concerns of consultees are summarized here.

1. The impact of quarrying on aquifers

Most consultees referred to this topic.

The quarrying industry criticized the NRA for exaggerating the impact of quarrying on water resources. The industry was also critical of the NRA for recommending that hardstone quarrying in the long term should cease in the Mendips in favour of using other non-aquifer rocks, such as granite, elsewhere. The industry maintained that this question was a matter for Government policy and that there was a range of other factors to consider, besides water resources, that we had not discussed in our Catchment Management Plan Consultation Report.

A number of points of detail were disputed by the industry and alternative hypotheses presented to address some controversial topics such as the threat to the Bath Hot Springs and the yield from some water supply boreholes.

Organizations and individuals who did not have a commercial interest in the future of quarrying did not share the concerns of the industry. However some local authorities did point out the importance of quarrying to the local economy while at the same time registering their concern that continuing quarrying should not jeopardize the integrity of the aquifer and the future quality of rivers and wetlands in the catchment.

Many consultees could not reconcile the continued quarrying of stone, particularly aquifer, with the principle of sustainable development and biodiversity conservation, and advocated the more widespread use of recycled materials in place of quarried stone.

Our comments:

Quarrying the aquifer is the single most pressing threat to the stability of water resources in this catchment. Because of this we dealt with the problems and challenges of planning and regulating quarrying in detail in the Consultation Report.

We also list our concerns about quarrying and other developments which may affect groundwater in our national publication - Policy and Practice for the Protection of Groundwater.

We will continue to liaise with the quarrying industry and local authorities over the environmental impacts of quarrying, mitigation measures and applications for new mineral extraction permissions.

2. Rivers as amenities in towns and cities

A number of local authorities highlighted the importance of rivers as wildlife and amenity features, particularly in built-up areas. Consultees welcomed the profile that we gave to this topic.

Some consultees pointed out that the amenity and particularly the recreational value of rivers could be harmed by water quality problems such as the discharge of sewage debris from storm overflows.

One consultee suggested that a good way to improve society's appreciation of rivers would be to target information at schools, especially as the National Curriculum contains topics about water and rivers.

Our comments:

Most of the towns in this catchment have developed around rivers. Historically, rivers were often neglected in towns and development has restricted their wildlife and amenity value. Nowadays, when planners look for opportunities to improve the quality of open spaces we encourage them to protect and improve rivers in towns. There are some good examples of river improvements where the NRA has worked with local authorities and developers to improve the amenity and wildlife value of rivers such as the River Frome in Bristol.

In some places flood defence structures have damaged the amenity value of the river. When we are maintaining or improving these structures we will consider if their impact can be reduced.

Work is underway to improve sewerage facilities in Bath and on the Bristol Frome - two areas that were mentioned in our Consultation Report. This work will reduce the frequency that sewage debris reaches the river from stormwater overflows.

We have produced booklets for primary schools (the 'Riverwork' series) and secondary schools (the 'Sources' series) which are designed to help teachers with the National Curriculum key stages 1 & 2 and 3 & 4. These booklets are available from our head office Tel. 01414 624400.

3. Waste in the County of Avon

The County of Avon covers a large part of the Lower Bristol Avon Catchment. Most of the domestic waste arising in Avon is disposed of out of the County or by incineration at Avonmouth, although the Avonmouth incinerator must close in 1996.

Avon County Council has published a non-statutory Planning Policy Guidance Statement on waste disposal. This states the County's preference for filling disused quarries and reclaiming derelict land as opposed to allowing green field sites to be subject to landraising.

In their response to our Catchment Management Plan, Avon County Council pointed out that the NRA's preferred method of dealing with domestic waste that is disposed of to land - using a land raising method - was a technique that the Council chose not to encourage in Avon. Avon County Council's preference is to use old mineral quarries subject to engineering safeguards that should prevent pollution.

Our comments:

We have published our views nationally on disposing of waste to land in our Position Statement on Landfill and the Water Environment. This statement highlights the pollution risks associated with landfill and confirms our support for the waste hierarchy (minimize, recycle, waste to energy, waste pretreatment, landfill). This hierarchy regards landfill as the least preferred, although unavoidable, method of disposing of waste. This statement also refers to our Policy and Practice for the Protection of Groundwater which states that we prefer sites to be located away from vulnerable major aquifers.

Landraising - our preferred method of disposing of domestic waste to land - minimizes the pollution risks to the water environment. However, we recognize that there are many other factors that planning authorities have to consider when planning the disposal of waste, including the availability of land. In some circumstances disused mineral quarries can be acceptable as landfill sites but they must be engineered and managed carefully if water pollution risks are to be minimized - particularly if they are sited on aquifers.

4. Development planning and control

Some consultees asked us to clarify our role in planning and controlling development. A number of consultees urged us to encourage planning authorities to plan and control development in ways which would protect and enhance the water environment.

Our comments:

County and District Planning Authorities plan and control development in the catchment. Although they must consult the NRA they do not have to follow our advice.

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

- through the planning system we can assist local planning authorities to allocate land for development by commenting on local plans, identifying constraints such as flooding or pollution risks and highlighting where the river environment can be enhanced by sympathetic development. We will continue to advise on water related issues in our comments on structure and district wide local plans.*
- we can advise planning authorities on the control of development by offering formal and informal comments to planning authorities on planning applications and development guides. We can also control some developments using our own powers for example Land Drainage Consents.*

Development need not always be harmful to rivers. With careful planning and design the wildlife and amenity value of rivers can be enhanced by some types of development - particularly in built-up areas.

5. The effect of farming on water quality

We received a number of comments on this topic. Many consultees were disappointed to learn of the water quality problems that were caused by poor farming practices and urged us to do all that we could to encourage better storage and handling of waste on farms. MAFF highlighted the value of their farm waste management advisory visits and suggested that they could work with us to target visits in the worst affected areas. Another consultee - the National Trust - highlighted the benefit of their whole farm management approach which considers pollution prevention along with other aspects of environmentally sensitive farm management.

Our comments:

Our pollution prevention work on farms has helped to improve water quality in many parts of the country. With the support of MAFF and the co-operation of farmers we hope that conditions will improve in this catchment.

APPENDIX 3

ABBREVIATIONS

AONB	Area of Outstanding Natural Beauty
BCU	British Canoe Union
CLA	Country Landowners Association
CMP	Catchment Management Plan
Co Co	Countryside Commission
CSO	Combined Sewer Overflow
DAP	Drainage Area Plan
DoE	Department of the Environment
EC	European Commission
EEC	European Economic Community
EN	English Nature
FWAG	Farming and Wildlife Advisory Group
GQA	General Quality Assessment
HMSO	Her Majesty's Stationery Office
LA	Local Authority
LPA	Local Planning Authority
MAFF	Ministry of Agriculture, Fisheries and Food
MOD	Ministry of Defence
NFU	National Farmers Union

NRA	National Rivers Authority
NWC	National Water Council
OFWAT	Office of Water Services
PHABSIM	Physical Habitat Simulation
R&D	Research and Development
RE	River Ecosystem
RQO	River Quality Objective
STW	Sewage Treatment Works
UBA	Upper Bristol Avon
UWWTD	Urban Waste Water Treatment Directive
WRA	Waste Regulation Authority
WWSL	Wessex Water Services Limited

UNITS

km	kilometre(s)
MI	megalitre(s)
mm	millimetre(s)
m³/d	cubic metre(s) per day
km²	square kilometre(s)