

RIVER TEME CATCHMENT MANAGEMENT PLAN CONSULTATION REPORT SEPTEMBER 1995



NRA

*National Rivers Authority
Severn-Trent Region*

YOUR VIEWS

This report is intended to form the basis for full consultation between the NRA and all those with interests in the catchment. You may wish to:

- * comment on the Vision for the Catchment
- * comment on the issues and options identified in the report
- * suggest alternative options for resolving identified issues
- * raise additional issues not identified in the report

All comments received will be considered to be in the public domain unless consultees explicitly state otherwise in their responses.

Following the consultation period all comments received on the Consultation Report will be considered in preparing the next phase, the Action Plan. This Consultation Report will not be rewritten as part of the Action Plan process.

The NRA intends that the Plan should influence the policies and action of developers and planning authorities as well as assisting in the day to day management of the Catchment.

A short paper on the issues was sent to Local Authorities, National Organisations, other representative bodies and representatives of the NRA Statutory Committees in April 1995. All the comments have been incorporated into this document where possible. A list of organisations who have commented is given in Appendix 4. The NRA is grateful for the useful suggestions received.

Comments on the Consultation Report should be sent to:

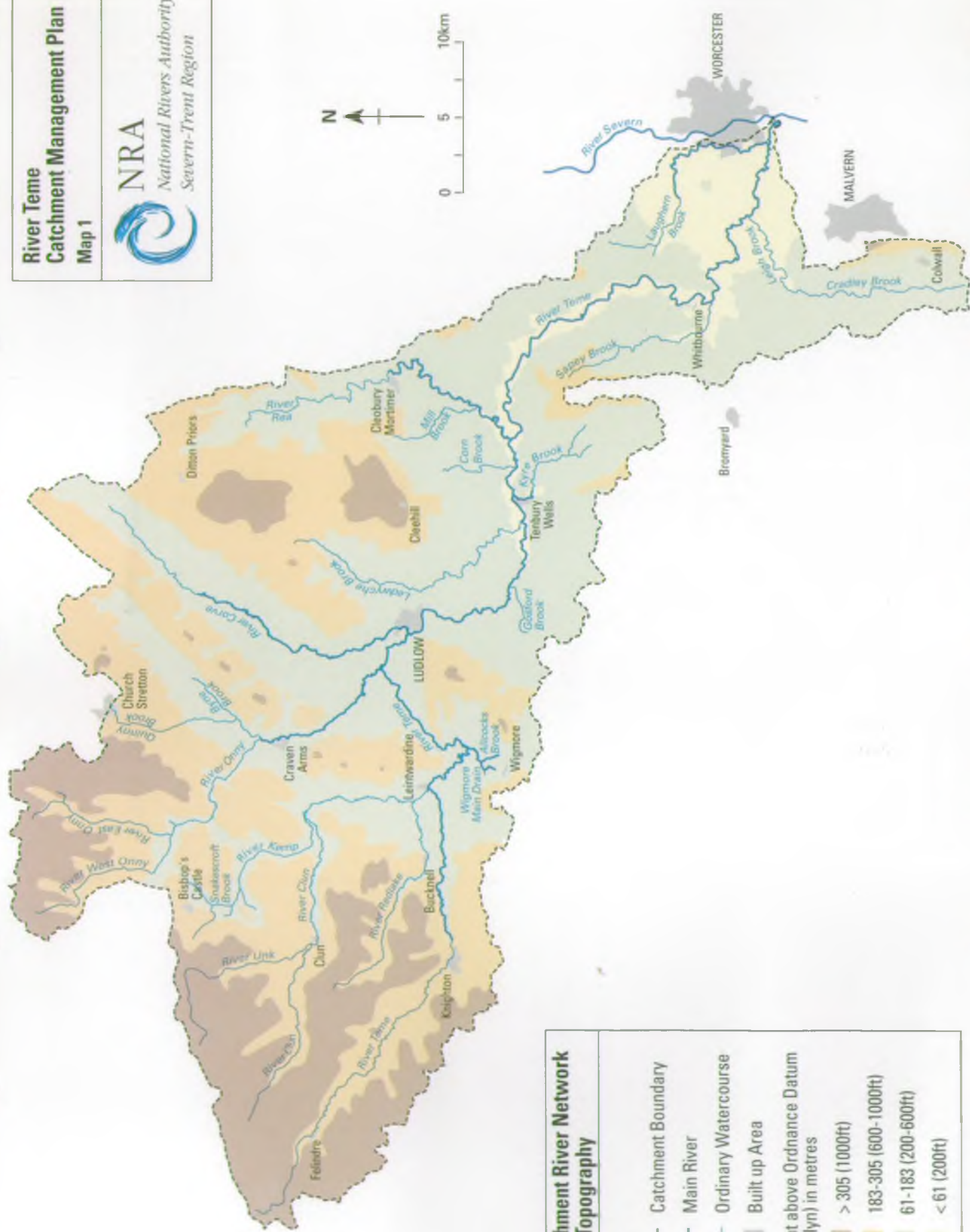
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All contributions should be made in writing by: Friday 1 December 1995

If you or your organisation need further information, or further copies of this Report, please contact Mrs D Murray at the above address or by telephone on 01743 272828.



**River Teme
Catchment Management Plan
Map 1**



**Catchment River Network
and Topography**

KEY

- Catchment Boundary
- Main River
- Ordinary Watercourse
- Built up Area
- Height above Ordnance Datum (Newlyn) in metres
 - > 305 (1000ft)
 - 183-305 (600-1000ft)
 - 61-183 (200-600ft)
 - < 61 (200ft)

September 1995

FOREWORD

The National Rivers Authority was created in 1989 to conserve and enhance the natural water environment and to protect people and property from flooding. In its role as 'Guardian of the Water Environment', the NRA is committed to preparing a sound plan for the future management of the region's river catchments.

This Consultation Report is the first stage in the catchment management planning process for the River Teme Catchment. It provides a framework for consultation and also a means of seeking commitment from those involved to realise the full environmental potential of the catchment.

We look forward to receiving comments and contributions from interested organisations and individuals. These will enable an Action Plan to be produced, balancing the conflicting demands placed upon the natural water environment.

Dr J H Kalicki
Area Manager
Upper Severn Area



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THE NRA's VISION FOR THE RIVER TEME CATCHMENT

*"The pools and rivers wash so clean
The trees and clouds and air,
The like on earth was never seen,
And oh that I were there."*

One hundred years have passed since Housman wrote these lines, and it seems an appropriate time to take stock of the rivers and countryside that inspired them. We owe it to future generations to work towards ensuring a sustainable environment, so that these words will be as true next century as when they were written.

The River Teme rises in the Kerry Hills and is a top quality river of high conservation value throughout its 122 kilometre journey to the Severn just south of Worcester. The high quality of the landscape is reflected by the fact that a large part of the catchment is designated as an Area of Outstanding Natural Beauty. The landscape is varied, ranging from rolling hills to wooded slopes, from hidden valleys to open summits, and from rugged moorlands to the wide pastoral valleys and rich farmscapes of the lowlands. The streams and rivers are an integral part of the catchment's picturesque countryside.

Our overall aim is to safeguard and maintain the highest possible level of protection for the catchment, and to work towards resolving those issues and existing problems that have been identified in the plan. Key objectives are to:

- * Protect, and where appropriate, enhance the habitat quality, biodiversity, fisheries, conservation and landscape value of the river catchment.
- * Improve the water quality of the 12.9 km of rivers where the required longer-term River Ecosystem River Quality Objective is not already met and seek solutions to problems of inadequate sewerage, contaminated land and diffuse nitrate pollution.
- * Manage water resources to maintain and where possible enhance the conservation and fishery value of the catchment.
- * Ensure current levels of protection from flooding are maintained, and improved where appropriate.
- * Ensure increased demands for recreational activities which may impact on the water environment in the catchment are developed in an environmentally sustainable manner.

It seems fitting that we should base our vision for the future of the catchment on Housman's words written a century ago. However, we cannot realise these aspirations without the committed and enthusiastic co-operation of others. To achieve a shared vision we need to work in partnership with local authorities and many other agencies, environmental groups, individuals and all those who have the interests of the catchment at heart.

*"In valleys of springs of rivers,
By Ony and Teme and Clun,
The country for easy livers,
The quietest under the sun..."*

From 'A Shropshire Lad' by A E Housman, published 1896.
(by kind permission of The Society of Authors as the literary representative on the Estates of A E Housman)

RIVER TEME CATCHMENT MANAGEMENT PLAN

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PART 1

THE CONSULTATION REPORT



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SECTION 1.0

THE CATCHMENT MANAGEMENT PLAN PROCESS

1.1 The National Rivers Authority

1.2 The Catchment Management Plan

1.1 THE NATIONAL RIVERS AUTHORITY

1.1.1 Status

The NRA was created in 1989 as an independent environmental agency. Its prime purpose is to protect and improve the water environment in England and Wales and to regulate the use of water by industry, agriculture and the private water and sewerage companies.

The NRA's responsibilities cover rivers, lakes and underground waters. It has statutory responsibilities for water quality, water resources, flood defence, salmon and freshwater fisheries, conservation, navigation and recreation. It also has a duty to protect people and property from flooding caused by rivers and the sea. The responsibilities for water quality and fisheries cover canals and coastal waters.

The NRA is the UK competent authority for approximately 20 European Community (EC) Directives. It is a non-departmental public body, sponsored by the Department of the Environment (DoE). The Ministry of Agriculture, Fisheries and Food (MAFF) has important policy and funding responsibilities in relation to flood defence and fisheries. The Welsh Office has important responsibilities in relation to the NRA's work in Wales.

1.1.2 Statutory Committees

Each Region of the NRA has three statutory Regional Committees covering Rivers, Flood Defence and Fisheries. Each Committee is consulted on a wide range of matters, not just its areas of interest. The Committees meet four times a year in public session. They advise the NRA on how to carry out its functions and are involved in the regional plan and Catchment Management Plans. Each committee is made up of between 15-20 members drawn from the NRA's main customer groups. The Flood Defence Committee has executive powers in relation to flood defence activities.

1.1.3 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.

THE CATCHMENT MANAGEMENT PLAN PROCESS

1.1.4 Aims

- Achieve a continuing overall improvement in the quality of rivers, estuaries and coastal waters through the control of pollution.
- Manage water resources to achieve the right balance between the needs of the environment and those of the abstractors.
- Provide effective defence for people and property against flooding from rivers and the sea.
- Provide adequate arrangements for flood forecasting and warning.
- Maintain, improve and develop fisheries.
- Develop the amenity and recreational potential of inland and coastal waters and associated lands.
- Conserve and enhance wildlife, landscape and archaeological features associated with inland and coastal waters of England and Wales.
- Improve and maintain inland waters and their facilities for use by the public where the NRA is the navigation authority.
- Ensure that dischargers pay the costs of the consequences of their discharges, and, as far as possible, to recover the costs of water environmental improvements from those who benefit.
- Improve public understanding of the water environment and the NRA's work.
- Improve efficiency in the exercise of the NRA's functions and to provide challenge and opportunity for employees and show concern for their welfare.

1.1.5 The NRA's Routine Activities

The Severn-Trent Region is divided into four Areas, each headed by a locally based Area Manager. Most of the functions of the NRA operate at an Area level and this allows an integrated approach to management which gives a responsive service to customers.

The strategic nature of the CMP as a long-term planning tool, directing manpower and financial resources to resolving environmental problems, means that the plan is not designed to reflect fully on routine activity within the catchment. Our everyday work, outlined below, commits substantial resources to managing the water environment.

THE CATCHMENT MANAGEMENT PLAN PROCESS

For pollution control, an important task is to monitor the aquatic environment and any discharges made to it in order to assess compliance with national and European legislation and Consents to Discharge. The pollution of water is a criminal offence and the NRA will prosecute when necessary. Pollution prevention work is extremely important and regular inspections are carried out at various sites.

The responsibilities for water resources include licence determination, charging, policing and enforcement. Through these responsibilities an integrated approach is taken that aims to strike a balance between the needs of abstractors and the environment. Abstracting or impounding water without a licence can lead the NRA to prosecute offenders.

Flood defence activities cover regulation and enforcement, maintenance and emergency response. Regulatory activities include the issuing of land drainage consents. Routine maintenance includes the clearance of debris from watercourses and the maintenance of channels and flood defences. Emergency response involves the continuous monitoring of weather and river levels to forecast where and when flooding is likely to occur and issuing appropriate warnings. During flood events, defences are monitored and operated.

The NRA is responsible for maintaining, developing and improving fisheries. These duties include enforcement of fisheries law, scientific monitoring of fish stocks, fish rearing and stocking, fish rescues and advice to the general public. Fishery bailiffs check licences and ensure that anglers and others abide by the relevant legislation.

To ensure conservation and recreation duties are fulfilled, staff collaborate with numerous external bodies. The NRA also manages many conservation and recreation sites and keeps detailed registers of these. Environmental Assessment procedures are followed to ensure high quality control over the NRA's construction works.

The NRA works closely with Local Planning Authorities (LPAs) through its planning liaison function. Planning applications are considered in relation to their impact on the water environment and a response is made which reflects any concerns of the NRA. Local, Structure and Regional Plans are all carefully considered.

The CMP will form a focus for much of our future activity within the catchment but some of our work will remain reactive as we respond to specific events eg. floods and pollution incidents.

1.2 THE CATCHMENT MANAGEMENT PLAN

The NRA's vision for the future is a healthy and diverse water environment managed in an environmentally sustainable way, balancing the needs of all users of water. Sustainable development is at the heart of international and UK policy and must embrace environmental, social and economic concerns for it to be a workable concept. The NRA's approach is through an integrated approach to river catchment management.

Catchment Management Plans (CMPs) allow the NRA to balance the competing requirements and interests of all users. The process allows the environmental potential of a catchment to be realised in terms of water quality, water quantity and physical features. In the future, CMPs will provide the framework within which the NRA can implement the new system of River Quality Objectives (RQOs). These objectives are use-related and may be given a statutory status following public consultation and agreement by the Secretary of State. Section 5.1 gives further details of the RQO scheme.

The CMPs set out the NRA's vision for the future of individual river catchments. They cover the whole of the catchment area, but are focused on the rivers and the associated river corridors. A river catchment is a discrete geographical area which is drained by a single surface water system. The 21,600 square kilometres covered by the Severn-Trent Region of the NRA consists of only two principal catchments, the River Severn and the River Trent. For management purposes they have been divided into 17 sub-catchments.

The Catchment Management Plan contains an analysis of the issues affecting each catchment, with suggested actions to resolve them. Many of the issues can only be addressed with the co-operation or assistance of other bodies, organisations or industries, so the preparation of CMPs must involve consultation with local communities and other interested parties.

CMP STAGES

The first stage of the CMP process is this Consultation Report, which is laid out as follows:

- PART I The Consultation Report:** This section gives a brief description of the Catchment and presents a range of management issues with suggested options for solution. The bodies responsible for the suggested options are identified.
- PART II Supporting Information:** This section provides background information to Part I. A description of each use of the water environment and its impact in the catchment is included. Targets are given for water quality, water quantity and physical features. These are assessed against the current state of the Catchment.

THE CATCHMENT MANAGEMENT PLAN PROCESS

The **second** stage of the CMP process is the production of the **Action Plan**. This details areas of work and investment proposed by the NRA and others. It explains how comments from the consultation process have affected the issues and options in the CMP. Further consultation will be held with those involved in the actions to seek their commitment prior to publication of the Action Plan. Timescales, targets and estimated costs will be added at this stage.

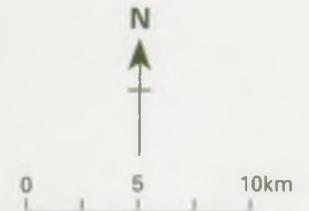
The **third** stage of the CMP process is the implementation of the Action Plan. Progress will be monitored and an **Annual Review** produced. These reviews will examine the need to update the CMP. The period between major revisions will normally be 5 years.

SECTION 2.0

OVERVIEW

- 2.1 Catchment Description**
 - 2.2 Catchment Monitoring**
 - 2.3 Key Details**
-

**River Teme
Catchment Management Plan
Map 2**

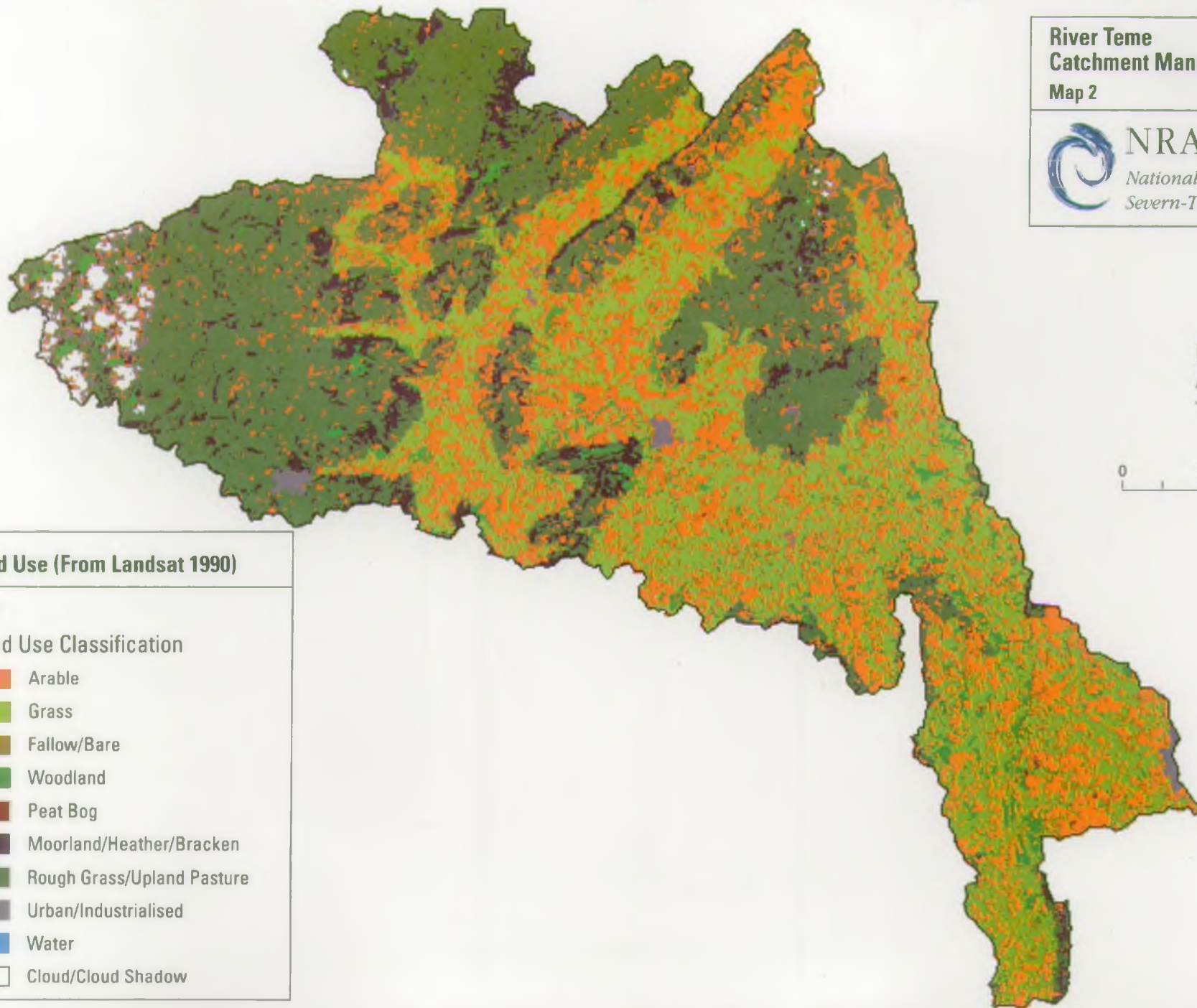


Land Use (From Landsat 1990)

KEY

Land Use Classification

- | | |
|---|----------------------------|
|  | Arable |
|  | Grass |
|  | Fallow/Bare |
|  | Woodland |
|  | Peat Bog |
|  | Moorland/Heather/Bracken |
|  | Rough Grass/Upland Pasture |
|  | Urban/Industrialised |
|  | Water |
|  | Cloud/Cloud Shadow |



2.1 CATCHMENT DESCRIPTION

Introduction

The Teme catchment comprises an area of approximately 1648 square kilometres (636 sq miles) located to the north west of Worcester and extending to the Welsh borders. Most of the catchment is within the counties of Shropshire (61%) and Hereford and Worcester (32.5%), with a small proportion being in Powys (6.5%). The resident population is just over 75,000, with the largest towns being Ludlow, Tenbury Wells and Knighton, although the highest concentration of population (about 11,500) occurs in the western part of Worcester City that just comes within the catchment area.

The River Teme is the second largest tributary of the River Severn. It rises in the Kerry Hills in Mid-Wales from a small spring in Bryn Coch quarry on Cilfaesty Hill at 460 metres above sea level. From near its source the river follows the Welsh/English border for some 27 kilometres. The Teme is a very rural river, passing through only three market towns before it joins the River Severn some 122 kilometres (76 miles) further on just south of Worcester. To its north the catchment is bordered by the Stiperstones, Long Mynd and Wenlock Edge, and to the south east by the Suckley Hills and the ridge of the Malvern Hills.

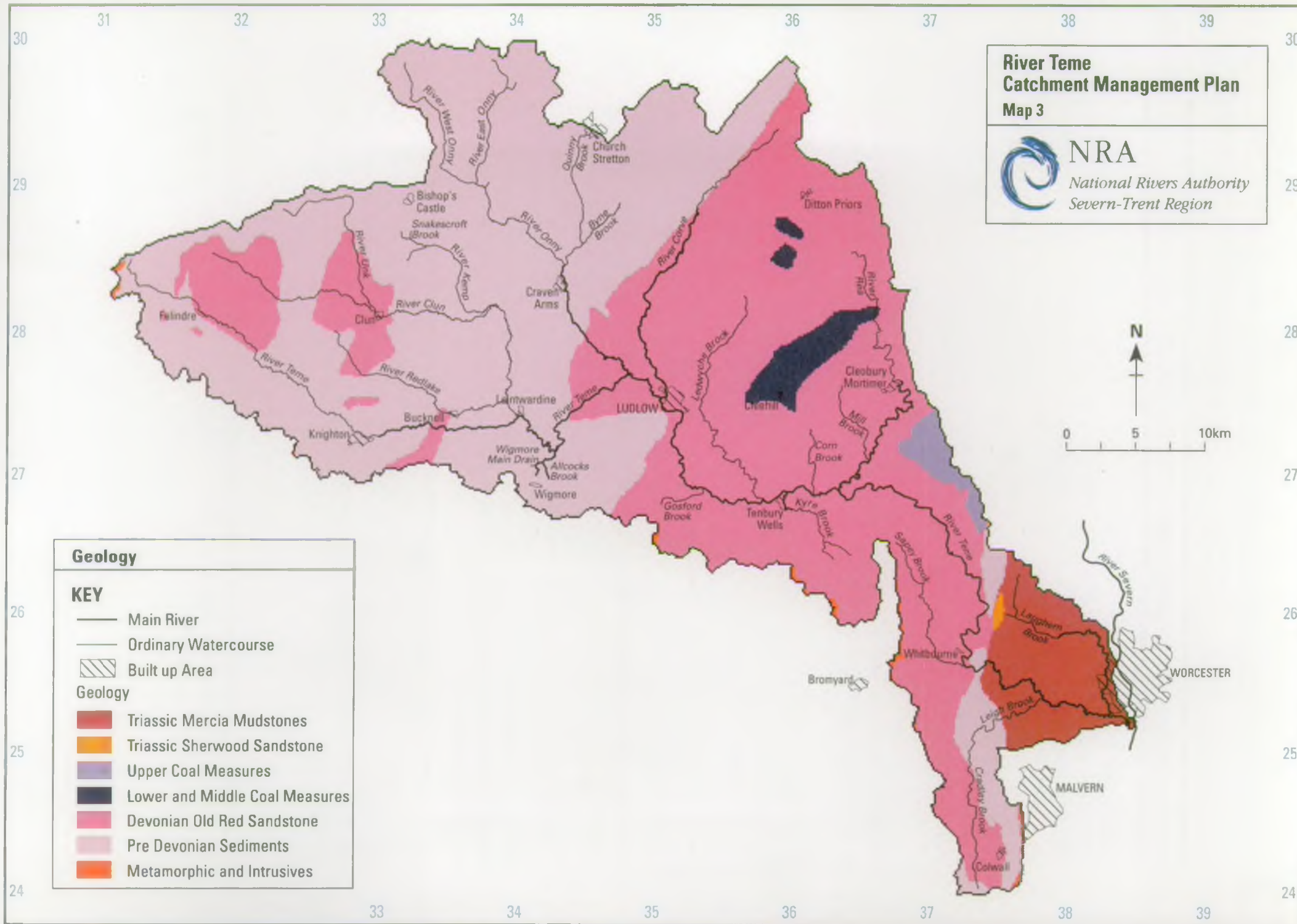
The Teme has many tributaries, including the rivers Clun, Onny, Corve and Rea, and larger brooks such as the Ledwyche, Kyre, Sapey, Leigh and Laughern. The rural nature of the catchment is reflected by high quality rivers, with the Teme and many of its tributaries supporting high class fisheries and providing a variety of habitats for a wide range of flora and fauna.

The unspoilt countryside is widely regarded as some of the most attractive in Britain, and large parts of the catchment are designated as Areas of Outstanding Natural Beauty. The landscape is characterised by rolling hills and attractive valleys, with the sheep-grazed Welsh border uplands in the west giving way eastwards to the softer, more fertile countryside of the English Midlands.


There are no motorways and few major roads in the catchment. The A49 and A488 cross north to south through Ludlow and Knighton respectively. The A49 trunk road and the Cardiff to Crewe railway are contained within an important inter-regional transport corridor. The A44 west from Worcester is also an important route. Many roads follow the river valleys.

Topography

The catchment is predominantly hilly, featuring a wide variety of hill country from the Mid Wales hills through those of South Shropshire, the Stiperstones, Long Mynd, Wenlock Edge and Clee Hills to the Abberly Hills and Malvern Hills near the Teme's confluence with the River Severn. There is very little lowland within the catchment.




River Teme
Catchment Management Plan
Map 3





NRA
National Rivers Authority
Severn-Trent Region

Geology


KEY


 Main River


 Ordinary Watercourse


 Built up Area


Geology


 Triassic Mercia Mudstones


 Triassic Sherwood Sandstone

 Upper Coal Measures

 Lower and Middle Coal Measures

 Devonian Old Red Sandstone

 Pre Devonian Sediments

 Metamorphic and Intrusives

CATCHMENT OVERVIEW

The overall drainage pattern is from north west to south east, with the Teme flowing for the most part close to its southern catchment boundary. The majority of its catchment and tributaries flow to it from the north.

The highest points range from 547m AOD (metres Above Ordnance Datum) at Beacon Hill near Beguildy, 540m AOD on Brown Clee, 536m AOD on the Stiperstones and 323m AOD at Wenlock Edge, with the lowest land levels of 10m AOD at the confluence with the Severn. Many of the valleys, particularly in the Upper Teme, Clun and Onny are deeply incised, creating the unique hill and valley features which are characteristic of this Area of Outstanding Natural Beauty.

Geology and Hydrogeology

The underlying solid geology is shown on Map 3 although much of the catchment is not yet covered by up to date, detailed published geological maps.

The western half of the catchment is underlain by Silurian Strata consisting of mudstones with occasional limestone bands. These do not supply large quantities of water although they may be locally utilised for private supplies and for small public supplies.

The eastern half is underlain by Devonian strata. These are marls with impersistent bands of sandstone which can provide private water supplies and may give rise to springs. The base of the Devonian is the Downton Castle Sandstone which is a thin but laterally extensive medium/coarse grained sandstone. Whilst having only a small capability for storing water, this does provide a pathway for water stored in the overlying strata and can be used for moderate public water supplies both by way of boreholes and springs.

The Coal Measures, shales, sandstones, coals and clays and associated igneous rocks form the Clee Hills near the centre of the area.

The eastern extremity of the catchment reaches into the Mercia Mudstone of the Worcester Basin and there is a small outcrop of Triassic Sandstone near Martley.

The valleys can contain significant thicknesses of drift which provide water for both private and moderate public supplies. Drift deposits include sands, gravels and alluvium.

Whilst none of the public water supply sources are large by modern standards, they are used to supply areas which cannot easily be supplied from elsewhere and so their continued use is essential. Two sources are high in nitrate, so a blending system has evolved in order to supply water with an acceptable nitrate concentration.

Hydrology

The annual average rainfall for the Teme catchment is 840 mm and varies from 1200 mm in the Kerry Hills to less than 650 mm in the lowlands near the confluence with the River Severn.

CATCHMENT OVERVIEW

The available effective rainfall, after allowing for evaporation and transpiration losses, varies from around 400mm or more in the upper reaches to less than 250mm in the lower Teme Valley.

It is a predominantly natural catchment, with the flow regime of the Teme and its tributaries modified very little by human activities. There is a considerable variation between winter floods and low summer flows following periods of dry weather. Although there are no major aquifers to support base-flows in the Teme catchment, water stored in river gravel deposits helps sustain flows during summer. Statistics for the flow measurement station at Tenbury Wells indicate the range of flows in the catchment, and are included in the key details (Section 2.3).

Land Use

The rural nature of the catchment is reflected by the fact that only approximately 1.4% of its area is shown by satellite data (LANDSAT 1990) to be urban. Upland pasture and rough grassland accounts for about a third (33%) of the catchment area. This is mainly in the west and north of the catchment as can be seen on Map 2 (LANDSAT image). This land is used mainly for sheep farming, sometimes in conjunction with beef farming.

Arable land accounts for just under 26% of the area, concentrated mainly in the river valleys and lower land to the south east of the catchment where hop growing is locally important. Agriculture is the most important land use in the catchment (See Section 4.6 for more details). A further 24% is grassland, and woodland is limited to only about 5% of the catchment area. Just over 6% of the catchment is moorland.

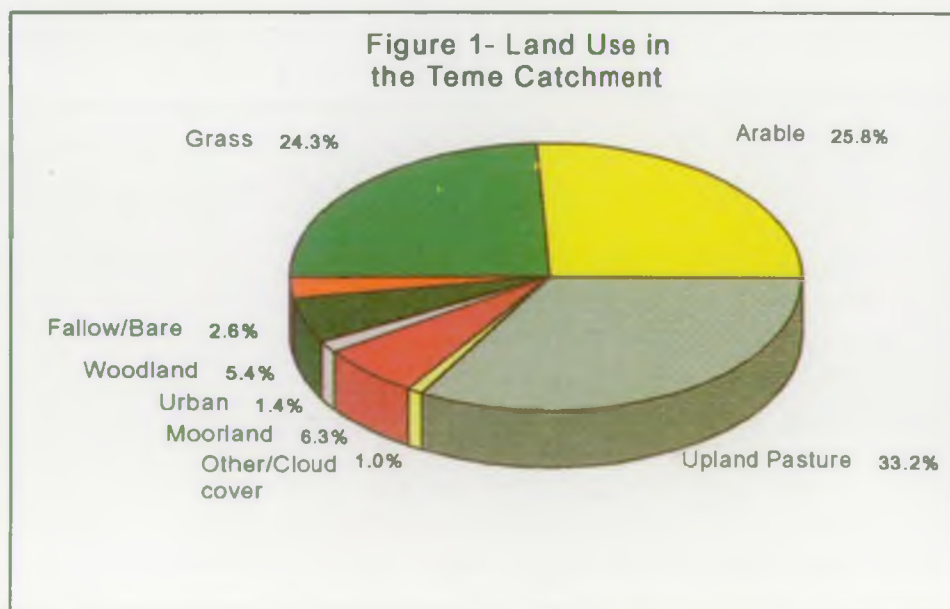


Table 1 Land Use Classification 1990

Class	Land Use	Area (%)	Cumulative % Area	Area (km ²)
1	Arable	25.80	25.80	425.04
2	Grass	24.26	50.06	399.79
3	Fallow/Bare	2.65	52.71	43.66
4	Woodland	5.39	58.10	88.85
5	Peat Bog	0.06	58.16	0.93
6	Moorland/Heather/Bracken	6.30	64.46	103.80
7	Rough Grass/Upland Pasure	33.17	97.63	546.45
8	Urban/Industrialised	1.40	99.03	23.11
9	Cloud/Cloud Shadow	0.97	100.00	15.96
Total of 9 classes		100.00		1647.59

Source: LANDSAT 1990 - Teme Catchment Land Use Map

Settlement is mainly focused on the river valleys, in market towns and larger villages, although there are a number of villages and smaller settlements scattered throughout the catchment. The population density is low, although the very small area of Worcester City that comes within the catchment accounts for over 15% of the total population. There is very little major industry in the catchment.

Water Resources

There is a plentiful supply of surface water resources in the Teme catchment during the winter period. However, flows decrease rapidly in the summer period, resulting in restrictions having to be placed on some surface water abstractions (see Section 5.2).

New abstractors are asked to consider taking water during the winter and storing it for future use, but this is not always financially viable. It does, however, give a more reliable supply of water than summer-only abstraction. Charges for winter water are a tenth of those for summer water, to encourage winter abstraction.

Groundwater resources are not plentiful in the catchment. As mentioned in Issue 8.2 (and shown on Map 8), much of the area is exempt from the need for licensing for groundwater abstraction. The reason for this is that the geology of the area is such that there are no major aquifers (water-bearing layers of rock) in the catchment.

Water for public water supply is abstracted under licence from gravels alongside the rivers by Dŵr Cymru/Welsh Water at Leintwardine and by Severn Trent Water Ltd at Clungunford. Dŵr Cymru also abstracts surface water from the River Teme at Whitbourne. Other groundwater abstractions for public water supply also exist, but being in the exempt area they are unlicensed. There are other minor aquifers in the catchment from which less significant

quantities of water are available or abstracted.

The main uses of surface water and groundwater as a percentage of total licensed water quantity abstracted are: Public Water Supply (53%), Fish Farming (23%), and Spray Irrigation (11.5%).

The majority of licences (135 out of 239) are for agricultural purposes and spray irrigation, giving a total potential abstraction of 1362 Ml/a (Megalitres per annum) , of which 1262 Ml/a is from surface water and only 100 Ml/a from groundwater for these purposes. Although there are only 7 licences for public water supply, they account for 53% of the total quantity abstracted (total of 5546 Ml/a, of which 4285 Ml/a is from surface water and 1261 Ml/a is from groundwater - see Table 3 in Section 4.2).

Water Quality

Throughout its entire 122 kilometres (76 miles) the River Teme is a top quality river suitable for drinking water supply and capable of supporting game and other high class fisheries.

The 1994 General Quality Assessment (GQA) of water quality covered 370 km of river and indicated that 91% of the classified stretches achieved the category of Good (Grades A and B), although some localised stretches of poorer quality occur in the Snakescroft Brook, the River Kemp and the Cradley Brook.

The biological quality of the River Teme and its tributaries is consistently good or very good, with over 99% of the classified stretches achieving quality classes 1 and 2. The diverse fauna of the upper and middle reaches includes high numbers of stoneflies, mayflies and caddisflies, and biological quality is maintained in the lower reaches. Short stretches of poorer quality occur in the lower River Rea and the upper reaches of the Onny and the Leigh/Cradley Brook.

The River Teme and its tributaries support a diverse flora and fauna in a wide range of aquatic habitats with extensive salmonid and cyprinid fisheries, many of which are EC designated. Water is of sufficient quality for potable abstraction at Whitbourne by Welsh Water in the most downstream section of the river.

Flood Defence

The Teme and its tributaries are prone to flooding, with major floods of note in 1795, 1924, 1947, 1955, 1960 and 1965.

The NRA's flood defence powers relate to the control of structures on all watercourses, and the carrying out of maintenance and improvement schemes on Main River. There are 180 km of Main River in the catchment, the extent of which is shown on Map 13. In addition to continuous records at gauging stations, there are flood level records at significant points throughout the catchment, usually adjacent to structures such as bridges. On watercourses

CATCHMENT OVERVIEW

which are not Main River ('ordinary watercourses'), information is not so detailed and the extent of flood plains has not been mapped.

Because of its rural nature the Teme catchment has had no significant flood defence improvement schemes implemented. Proposals for alleviating flood risks in Tenbury Wells were rejected by local opinion in the 1980s. The NRA operates a flood warning scheme on the River Teme downstream of Ludlow. Map 13 shows the flood warning reaches.

The NRA undertakes maintenance works in Main River channels, including dredging, tree and brush work, debris removal and weed cutting. These all help to maintain the flow capacity of the river.

Fisheries

The catchment is characterised by having many high quality and unspoilt fishery habitats, most of which are designated salmonid fisheries under EC Directive (78/659/EEC). Preservation of these high quality and relatively pristine resources is one of the most important fisheries issues for the NRA to address in the Teme area.

Trout and grayling predominate in the upper reaches of the River Teme, and in most of the tributary streams. Good stocks of native brown trout exist in many areas and grayling populations are starting to recover after a prolonged period of decline. Coarse fish increasingly become the dominant species in the river from Ludlow downstream to the Severn confluence, with barbel and chub of particular fisheries significance. The River Teme also supports good runs of salmon, although these have declined in recent years. Access to potential spawning areas for salmon has been greatly improved by the recent construction of fish passes, most notably at Ashford Carbonell Weir in 1991, in an effort to help reverse this decline. Twaite Shad, and possibly the very rare Allis Shad, also enter the lower reaches of the River Teme each year to spawn, usually in April or May.

There are no large stillwaters and no canals in the catchment. Walcot Lakes near Lydbury North and Kyre Pool near Tenbury Wells are among the larger waters providing coarse fishing, together with numerous smaller pools, many of which have been purpose built in recent years. Similarly there are many small stillwater trout fisheries in the catchment, mostly stocked with rainbow trout.

Conservation and Recreation

The complicated geology of the area is responsible for a varied landscape which supports a wide range of habitats and species. There is a total of 59 Sites of Special Scientific Interest (SSSIs) within the catchment, of which 27 are water dependent and include pools, marsh, swamp, wet woodland and wet meadow habitats. The whole of the River Teme (but not the catchment area) is a proposed SSSI as it is considered to be a nationally outstanding example of a large river flowing mainly over old red sandstone, with rich and varied plant, invertebrate, fish and otter communities. A further 20 SSSIs in the catchment have streams or rivers which are a component part of their designation. This reflects the high quality of the River Teme, other rivers and streams within the catchment and habitats associated with

CATCHMENT OVERVIEW

them. There is a large number of Prime Sites for Nature Conservation within the catchment (397), of which 154 are water-related.

The Shropshire Hills Area of Outstanding Natural Beauty (AONB) covers nearly 78,000 hectares (780 square kilometres), the majority falling within the Teme catchment. The western side of the Malvern Hills AONB is also within the catchment. Part of the Radnor Environmentally Sensitive Area (ESA) and most of the Shropshire Hills and Clun ESAs fall within the catchment, with agricultural landscape being a component feature of this designation. The catchment area contains many landscapes of historic interest including historic parks and gardens, and areas of industrial archaeology.

The area has been of historical importance since prehistoric times with the Teme being the focus of settlement, commerce, industry and a source of energy. The political importance of controlling the river is also demonstrated by a wealth of different archaeological and historical features associated with the river.

The catchment is popular for recreational and leisure activities due to its proximity to the West Midlands. Recreational activities taking place include walking, birdwatching, horse riding, cycling, gliding, canoeing and in particular, angling. The area is becoming more popular for these activities and is being promoted for tourism, sport and recreation. This is likely to lead to a greater demand for facilities in the future, with some sites possibly being put under pressure.

2.2 CATCHMENT MONITORING

Introduction

The NRA undertakes an extensive monitoring and survey operation to gather data on rainfall and river flows, water quality, groundwater, fisheries and nature conservation. The information gained by this operation underpins all the NRA's activities.

Rainfall measurements and river flows are used for flood defence and flood warning purposes, and together with groundwater level monitoring are used to assess water resources. The quality of ground and surface waters is fundamental to the water supply industry and for the disposal of sewage and industrial effluents. Fish stocks and habitat surveys provide information on the health of the aquatic environment and are important in matters of sustainability, biodiversity and amenity.

River Levels and Flows

River levels are measured continuously at 6 river level stations each equipped with a chart recorder, of which 5 also have remotely monitored data loggers which are regularly downloaded by the NRA's computer - based river forecasting system. Flood plain surveys are also supported by logged water levels.

River flows are continuously measured at 2 gauging stations and are archived for analysis as well as being available operationally for abstraction control and flood monitoring. More extensive low flow surveys based on spot river gaugings are undertaken during drought periods.

Rainfall

Rainfall is measured by 24 daily gauges, of which 21 send information via the NRA to the Meteorological Office. One of these (at Bayton) is just outside the catchment. They are read by observers who send returns monthly for data quality control and archiving. In addition 5 automatic raingauges record short duration intensity on data loggers and are also contacted by the computer-based forecasting system. Clee Hill weather radar (near Ludlow) provides good coverage for real-time rainfall data used for river regulation and flood forecasting.

Groundwater Levels and other monitoring

There are only 3 regular groundwater level monitoring sites, reflecting the fact that there are no major aquifers in the catchment. Two of these boreholes are associated with the Triassic rocks near Worcester, and the third is in Devonian rocks at Suckley.

Some river level sites are equipped with river water temperature gauges (Bransford) or fish counter data loggers - there is one fish counter in the catchment, at Ashford Carbonell.

**River Teme
Catchment Management Plan
Map 4**



NRA
National Rivers Authority
Severn-Trent Region



**Water Quantity Monitoring
Sites and Rainfall**

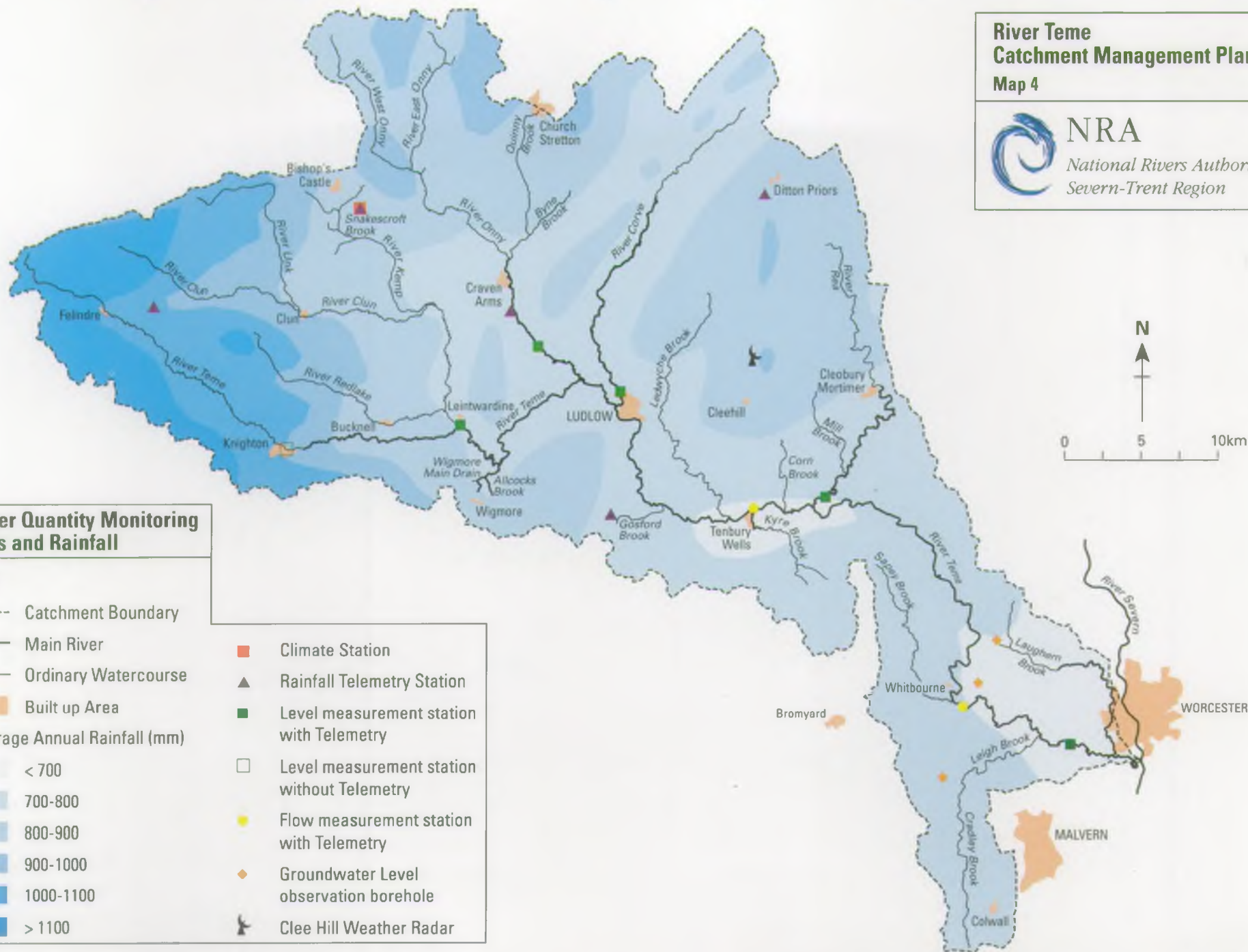
KEY

- Catchment Boundary
- Main River
- Ordinary Watercourse
- Orange shaded area: Built up Area

Average Annual Rainfall (mm)

- Lightest blue: < 700
- Light blue: 700-800
- Medium blue: 800-900
- Dark blue: 900-1000
- Very dark blue: 1000-1100
- Dark blue: > 1100

- Red square: Climate Station
- Black triangle: Rainfall Telemetry Station
- Green square: Level measurement station with Telemetry
- White square: Level measurement station without Telemetry
- Yellow circle: Flow measurement station with Telemetry
- Orange diamond: Groundwater Level observation borehole
- Black bird icon: Clee Hill Weather Radar



CATCHMENT OVERVIEW

One automatic rainfall site at Bishop's Castle is equipped with supplementary wind/temperature sensors used for snowpack melt rates during flood forecasting. There are three snow observers (at Clunbury, Church Stretton and Clee Hill) who calculate the water equivalent of lying snowpacks during periods of high flood risk.

Abstraction

Returns for abstraction licences are submitted by licence holders to enable the NRA to monitor the quantity of water abstracted, and these are checked by undertaking enforcement work on site. A regular monitoring system is in operation whereby the majority of licences are visited every 5 years, and a certain percentage every year.

Water Quality

Water quality samples are taken regularly from a network of 95 river sites (see Map 5). These are analysed for a wide range of substances to assess compliance with EC Directives, River Quality Objectives and for General Quality Assessment, (see Section 5.1 for more details). Consented discharges are also sampled and analysed routinely to ensure standards set by the NRA are being achieved.

As stated previously, groundwater resources are not plentiful, consequently groundwater has not been extensively monitored in the catchment.

Routine assessments are made of the potential impact of new and existing development on water quality. Regular inspections are then carried out at high risk sites as part of the Authority's pollution prevention programme. Typical sites include farms, industrial premises, waste disposal sites and sewage installations.

Biological Monitoring

In addition to chemical sampling the overall quality of watercourses is also assessed using the biology of the riverbed as an indicator. On a scoring system (known as the "BMWP" score) high scores are given to animals found which are known to be intolerant to organic pollution - their presence indicates good water quality. Low scores indicate a predominance of pollution tolerant species and hence poor water quality.

Routine biological monitoring is undertaken at 58 river sites, which are usually matched with water quality chemical sites. Currently each site is sampled twice per year. Individual river catchment surveys are currently undertaken on an ad-hoc basis to either investigate poor routine site results or to assess the impact of a pollution incident.

Fish Stocks

Stocks of all species of fish in the River Teme catchment have been monitored by electric fishing surveys on a regular basis over the last five years at 95 sites on the main river and

CATCHMENT OVERVIEW

tributaries. To take into account changing fisheries priorities there is a new monitoring programme planned for the next five years to cover major and minor coarse fish stocks and salmonid indicator subcatchments. Surveys will be carried out in the Teme catchment as part of this programme in 1995, 1998 and 1999. Salmon redd counts are carried out annually together with collection of anglers' catch returns. An electronic fish counter is present at Ashford Carbonell weir and provides information about the size and timing of the salmon run.

Conservation and Recreation

As part of a national initiative River Corridor Surveys have been undertaken on the Teme and Onny. A survey methodology for river habitats is being tested during 1994 and 1995 on which a national habitat classification scheme for rivers will be based. Several sites within the catchment and on the River Teme have been surveyed as part of the study. Together these surveys will provide an initial means of identifying areas and features requiring protection and enhancement.

For NRA operational works, Environmental Assessments are conducted to assess impacts on all conservation and recreation interests.

2.3 KEY DETAILS

Area 1,648 km²

<u>Population</u> (estimates from 1991 Census)	<u>Year</u>	<u>Population</u>
	1991	75,450
	2001 (predicted)	83,000
<u>Topography</u>	Source of Teme	480 m (AOD)
	Highest Point	547 m (AOD)
	Lowest Point	10 m (AOD)

<u>Administrative Details</u>		<u>Percentage of Plan Area</u>
County Councils	Shropshire County Council	61.2%
	Hereford and Worcester County Council	32.1%
	Powys County Council	6.7%
District Councils	South Shropshire District Council	53.2%
	Bridgnorth District Council	7.3%
	Shrewsbury & Atcham Borough Council	0.7%
	Leominster District Council	16.5%
	Malvern Hills District Council	15.3%
	Worcester City Council	0.2%
	Wyre Forest District Council	0.1%
	Radnorshire District Council	6.1%
	Montgomeryshire District Council	0.6%
NRA	Severn-Trent Region, Upper Severn Area	
Water Companies	Severn Trent Water Ltd	
	Dŵr Cymru/Welsh Water	
Internal Drainage Boards	None	

Main Towns and Land Use

Main towns and settlements in the catchment are Worcester (part) 11,483, Ludlow 9,011, Tenbury Wells 2,500, Knighton 2,500, Church Stretton (part) 2,060, Craven Arms 1,892, Cleobury Mortimer 1,700 and Bishop's Castle 1,569.

The main land uses in the catchment are upland pasture/rough grass 33%, arable 26%, grass 24%.

CATCHMENT OVERVIEW

Water Quality

Length (km) of river in each component of the General Quality Assessment (GQA) 1994.

General Description Component	Chemistry	Biology
	GQA Grade	Inferred Water Quality Class
GOOD	A 165.7	1 325.7
	B 170.8	2 42.6
FAIR	C 25.3	3 1.5
	D 1.6	4 -
POOR	E 6.9	5 0.5
BAD	F -	6 -

No of Consented Discharges 277

Comprising:- 103 water undertaker sewage and storm overflows, 150 private sewage treatment plants, 24 industrial.

Water Resources

Average annual rainfall	840	mm
Total licensed abstraction	10,480	Megalitres per year
Mean flow of River Teme at Tenbury	1,240	Megalitres per day
Maximum recorded flow (since 1956)	21,500	Megalitres per day (249 cumecs)
Mean Annual flood " " "	12,400	Megalitres per day (144 cumecs)
95 percentile exceedence flow " "	134	Megalitres per day
Number of licensed abstractions	239	
of which:- Groundwater	69	
Surface Water	170	

Flood Defence

Length of Main River in Catchment	180	km
Length of floodbanks and flood walls maintained by NRA	0.5	km
No of (urban) flood alleviation schemes	none	
No of operational sluices/pumping stations	none	

Fisheries

Length of watercourse designated under EC Directive for Freshwater Fisheries (78/659 EEC)

Salmonid	300.3 km
Cyprinid - rivers	0
Cyprinid - canals	0

Conservation

Sites of Special Scientific Interest	59	(of which 27 have a wetland interest)
Prime Sites	397	(of which 154 have a wetland interest)
Scheduled Ancient Monuments	200	(of which 47 have a close association with the water environment)

SECTION 3.0

ISSUES AND OPTIONS

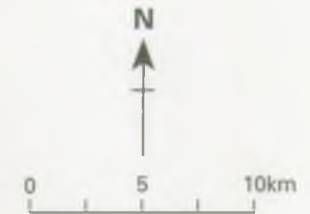
This section of the plan details specific issues in the catchment. The issues have been identified by:

- * comparing Targets with the current State of the Catchment (Section 5).
- * informal consultation with selected organisations in the catchment.
- * considering pollution incidents and flooding complaints.
- * utilising the local knowledge of NRA Staff.

The options as presented are the initial views of the Upper Severn Area, Severn-Trent Region of the NRA and do not constitute policy statements. Comments on the issues and options are requested together with any new ideas/suggestions.

Wherever possible those responsible for carrying out each option have been identified. The options presented are intended to facilitate improvements to the water environment for the benefit of all users. Their implementation will require the co-operation of many organisations and individuals.

**River Teme
Catchment Management Plan
Map 6**



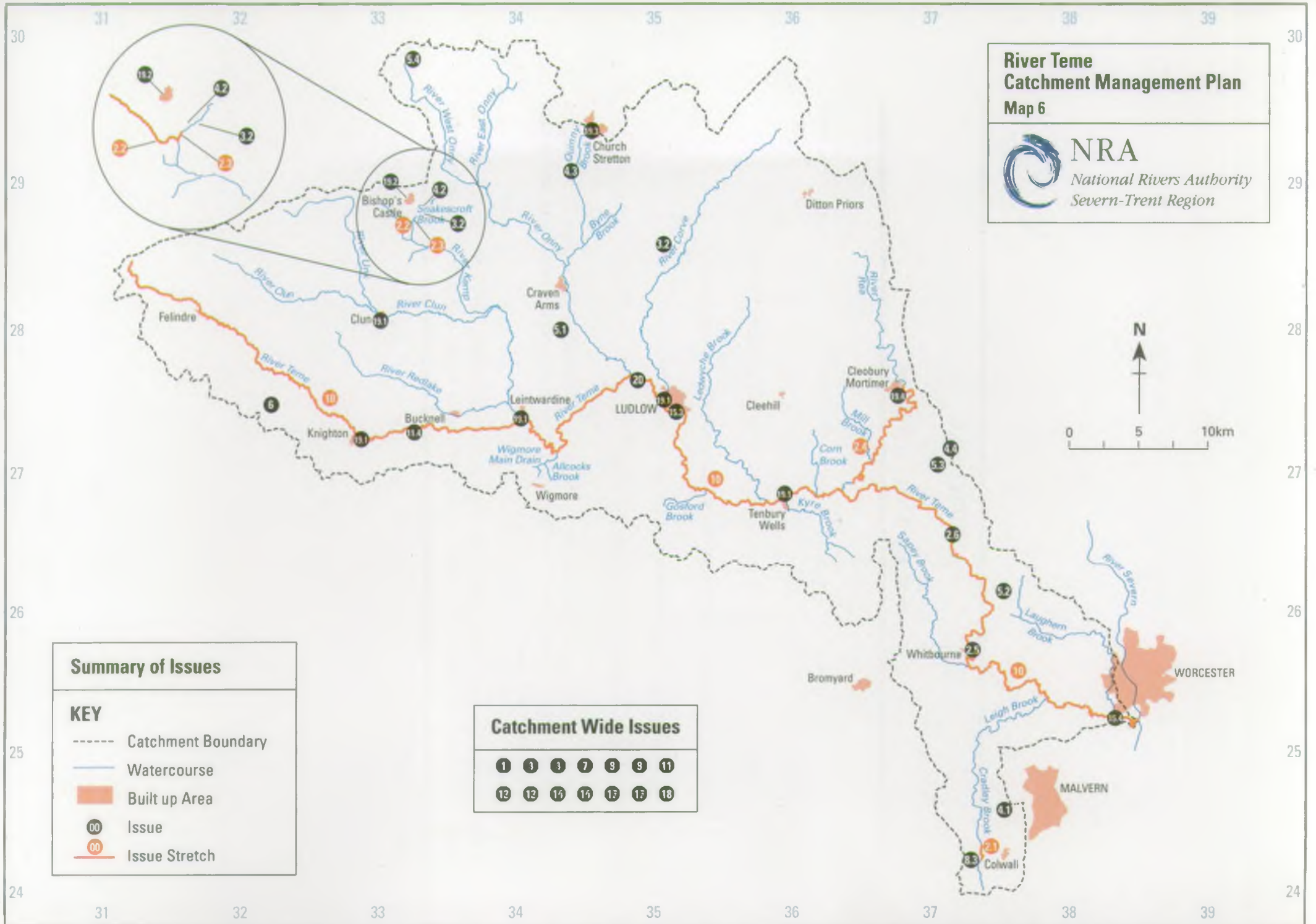
Summary of Issues

KEY

- Catchment Boundary
- Watercourse
- Built up Area
- Issue
- Issue Stretch

Catchment Wide Issues

1	3	3	7	9	9	11
12	12	14	14	15	17	18



3.1 ISSUES IDENTIFIED

The issues that have been identified are not in priority order. Some issues are site specific and are shown on Map 6, whilst others affect the whole catchment.

- Issue 1- Need to safeguard high quality water, water resources and habitats**
- Issue 2- Failure to comply with River Water Quality Objectives and EC Water Quality Directives**
 - 2.1 Cradley Brook at Colwall Mill Farm
 - 2.2 River Kemp at Colebatch Bridge
 - 2.3 Snakescroft Brook
 - 2.4 River Rea between Cleobury Mortimer and Newnham Bridge
 - 2.5 Pesticides upstream of Whitbourne Water Treatment Works
 - 2.6 Control of timber preservation sites
- Issue 3- Agricultural pollution including the effects of ammonia and nitrate**
 - 3.1 Organic waste disposal
 - 3.2 Nitrates
 - 3.3 Problems in assessment of proposed livestock units
- Issue 4- Inadequate rural sewerage**
 - 4.1 West Malvern public Sewage Treatment Plant (STP)
 - 4.2 Bishop's Castle public STP
 - 4.3 Church Stretton public STP
 - 4.4 Clows Top
 - 4.5 Other problem areas
- Issue 5- Pollution risks from contaminated land**
 - 5.1 Aldon Landfill
 - 5.2 Penny Hill Landfill
 - 5.3 Clows Top
 - 5.4 Whitegrit/Shelve old mineworkings
- Issue 6 - Pollution risks associated with Heyope Tyre Tip**
- Issue 7- Deficiencies in the level of flow and quality monitoring**
 - 7.1 Flow monitoring
 - 7.2 Water quality monitoring
- Issue 8- Problems of abstraction licensing in the Teme catchment**
 - 8.1 Surface water abstraction limitations
 - 8.2 Groundwater abstraction limitations
 - 8.3 Lack of dilution in the Cradley Brook catchment
- Issue 9- Protection, enhancement and restoration of riverine and other wetland habitats**
 - 9.1 Protection, restoration and creation of wetlands
 - 9.2 Water Level Management Plans
 - 9.3 Invasive Plants
 - 9.4 Overgrazing

- Issue 10- Notification of the River Teme as a Site of Special Scientific Interest**
 10.1 Flood Defence aspects
 10.2 Water Quality aspects
 10.3 Fisheries aspects
 10.4 Water Resources aspects
- Issue 11- Maintenance, improvement and development of high quality game fisheries**
 11.1 Decline in salmon stocks
 11.2 Preservation of native trout stocks
 11.3 Decline in grayling stocks
 11.4 Periodic drying up of the Upper Teme
- Issue 12- Maintenance, improvement and development of high quality coarse fisheries**
 12.1 Illegal removal of fish
 12.2 Broodstock for rearing programmes
 12.3 Decline in eel stocks
- Issue 13- Impacts of piscivorous birds on fish stocks**
- Issue 14- Protection of rare and threatened species**
 14.1 Protection of mammals
 14.2 Threats to invertebrates
 14.3 Protection of Shad and other fish species
 14.4 Alder Tree disease
 14.5 Decline in Black Poplar
- Issue 15- The increased demand for amenity and recreation**
 15.1 Conflict between angling and canoeing
 15.2 Riverside access
 15.3 Amenity value of Ludlow Weirs
 15.4 Refurbishment of Powick Weir
- Issue 16- Protection of landscape, archaeological and cultural heritage value of the catchment**
 16.1 Need for Landscape Assessment of River Corridors
 16.2 Lack of knowledge of archaeology and cultural heritage
 16.3 Landscape, archaeological and cultural heritage issues
- Issue 17- Erosion and unauthorised river works**
- Issue 18- Pressure for development in flood plain**
 18.1 Development in flood plain
 18.2 Flood plain mapping
- Issue 19- Flooding at specific locations including problems caused by surface water run-off**
 19.1 Flood alleviation and existing development
 19.2 Flooding problems at Bishop's Castle
 19.3 Flooding problems at Church Stretton
 19.4 Flooding problems at Cleobury Mortimer
- Issue 20- Extension of flood warning system**

3.2 DESCRIPTION OF THE ISSUES FACING THE CATCHMENT

ISSUE 1 - NEED TO SAFEGUARD HIGH QUALITY WATER, WATER RESOURCES AND HABITATS

The NRA regards the need to safeguard high quality water, water resources and habitats as one of the highest priority issues to address in this catchment. The catchment has a high proportion of the Region's top grade rivers. River quality is generally good (GQA grades A and B, River Ecosystem classes RE1 and RE2), enabling extensive abstraction for agricultural purposes and also for drinking water further downstream.

Rivers and other water bodies in the catchment support high class fisheries and provide many high quality habitats for a wide range of flora and fauna. Much of the physical habitat is in a semi-natural state, fish populations are healthy and mostly native in origin, and other aquatic life is both abundant and diverse. The proposed notification of the River Teme as a Site of Special Scientific Interest (SSSI), along with the presence of a National Nature Reserve at Downton Gorge highlights the need for protection of such high quality habitats.

Due to the good quality of rivers within the catchment, most watercourses are designated as salmonid fisheries under EC Directive (78/659/EEC). The River Redlake and the Gosford and Byne Brooks have recently been identified as candidates for future EC designation.

Land use has the single most important influence on the water environment. To ensure protection of this high quality catchment, it is important that land use practices are environmentally sustainable. Land use changes, whether from increased urbanisation and other pressures for development, tourism, recreation or agricultural practices, need to be effectively regulated. A better understanding of the complex relationship between land use changes and the water environment, and the time scales involved, is essential if we are to succeed in the long term sustainable management of the catchment. There is a requirement to ensure natural habitats, biodiversity and geomorphological features of water courses are maintained and enhanced where appropriate by the perpetuation/restoration of natural hydrological processes and sympathetic land management practices.

Whilst there are no major aquifers in the catchment, there are a number of locally important public potable supply boreholes. Although none of these sources are large by normal standards, they are used to supply areas which cannot be supplied from elsewhere so their continued use is essential.

The existence of numerous mineral water springs is also a particular feature of the Teme catchment. Many of these are important local sources of private water supply. To safeguard the quality of these sources, protection zones need to be defined. As the area is largely exempt from the requirements for groundwater abstraction licensing (see Issue 8), the NRA does not necessarily have records of the existence of all these supplies. Sites will therefore

need to be collated first to assess the scale of the problem prior to more detailed geological investigations.

Continued good agricultural and forestry practice, monitoring, vigilance and control is necessary to maintain the generally high quality of the water environment in the catchment. This is achieved through planning policies, adoption of MAFF and Forestry Authority codes and guidelines, application of the NRA's regulatory powers and restoration of damaged environments.

Options for action are shown on Page 51.

ISSUE 2 - FAILURE TO COMPLY WITH RIVER QUALITY OBJECTIVES AND EC WATER QUALITY DIRECTIVES

The Water Quality Objectives (WQO) scheme will establish clear quality targets for each river use. These uses include River Ecosystem (RE); Special Ecosystem; Abstraction for Potable Supply; Agricultural/Industrial Abstraction and Watersports. The first phase is restricted to River Ecosystem use, and quality standards have been introduced by the Surface Water (River Ecosystem) (Classification) Regulations 1994.

In the Teme catchment there is generally good compliance with quality objectives and EC Directives, with the following exceptions:

2.1 Cradley Brook at Colwall Mill Farm

It is proposed that the long term objective for this stretch is revised from RE2 to RE3. This is because it is unrealistic to achieve RE2 with the discharge from Colwall Sewage Treatment Plant (STP). The STP currently produces an effluent which is better than its consent limits. The Water Company can legally discharge an effluent which would cause the downstream quality to deteriorate to RE5 - this therefore has to be set as the short term (CMP) objective.

The problem will be solved by imposing more stringent consent conditions at the STP. This cannot be done before the year 2000 because the current Asset Management Planning (AMP2) prioritisation (as required by the DoE to allow the Water Companies to plan their capital expenditure - see Section 5.1) did not include this work. (See also Issue 8.3).

2.2 River Kemp at Colebatch Bridge

Quality has been affected in the short term by a small number of individual pollution incidents believed to be agricultural in origin. Despite investigation the sources have remained unidentified, and consequently a short term objective of RE2 has been set within the CMP period. RE1 cannot be assured until the problems are further investigated and identified. A survey of farms in the catchment will be undertaken.

2.3 Snakescroft Brook

This watercourse receives the drainage from Bishop's Castle, a town with an aged combined sewerage system. It is affected initially by discharges from an unsatisfactory storm overflow, which discharges to a seasonal watercourse. Severn Trent Water Ltd's STP operates within the quality limits imposed by the discharge consent, but discharges to the same seasonal watercourse. In summer months the flow below the outfall consists solely of sewage effluent and the quality of the River Kemp immediately downstream is affected.

The South Shropshire Local Plan proposes a 23% increase in housing for the town within the Plan period (1989-2001), and this will exacerbate the problem unless improvements are carried out. There is a lack of information on responsibility for drainage in the town, which has yet to be resolved. Consequently problems arise with apportioning investment in any capital scheme. The stormwater overflow has been reassessed by Severn Trent Water Ltd recently, and is now scheduled for capital expenditure under AMP2. Improvements are planned to be undertaken before the year 2000, but will need to be part of an overall scheme involving other relevant parties in order to be fully effective (Also refer to issue 19.2). Funding has recently been made available under AMP2 to improve treatment capacity at the STP.

Improvements to the River Kemp will not occur until the above two problems are resolved.

2.4 River Rea between Cleobury Mortimer and Newnham Bridge

The biological quality of this stretch of watercourse is lower than would normally be expected from the chemical quality of the river, and is indicative that either intermittent pollution, or pollution not detected by routine monitoring, is affecting the biology of the river. It is considered that the causative factor is likely to be of agricultural origin.

2.5 Pesticides upstream of Whitbourne Water Treatment Works

Welsh Water abstract from the River Teme at their Whitbourne Water Treatment Works for potable supply. At the abstraction point the river has pesticide levels which comply with the Surface Water Abstraction Directive Statutory Instrument 1990 No 1148 (which concerns itself with river water quality used for potable abstraction).

However, there have been occasional breaches of the standards which are required by the Water Supply (Water Quality) Regulations 1989 which comes under the enforcement of the Drinking Water Inspectorate. This requires that individual pesticides do not exceed 0.1 µg/l. There are also DoE guideline limits for each individual pesticide. There have been occasional breaches of the 0.1 µg/l limit, but not the DoE limit, for the herbicides (to which the term 'pesticides' is also applied in this context) Mecaprop, Simazine, Isoproturon and MCPA. These breaches occur seasonally, mainly in Spring and early and late Summer. There is no indication of any adverse effect to the river biology as the regular biological sampling shows the river to be in the 'very good' range for biological species. It is not known if the source of the high levels is diffuse or point source discharges, but an investigation is underway.

2.6 Control of timber preservation sites to ensure compliance with EC Dangerous Substances Directive

There are a number of sites which use listed dangerous substances as a wood preservative treatment. Complete site containment of the processes is the recommended method of pollution prevention, but where this has not been fully achieved discharges from the site are controlled by formal consent.

One such site is a company at Stanford Bridge, where Pentachlorophenol (PCP) has been identified in the site drainage and the formal Discharge Consent process is in progress. Consent limits are proposed for PCP and other chemicals used on site. Much improvement has already been achieved by the company, and it is proposed to apply decreasing PCP consent limits over the next two years to achieve full compliance with the Directive on all receiving watercourses. Although the River Teme has always complied in this respect, it is the small receiving watercourse which requires additional protection.

Refer to Sections 4.3, 5.1 and Map 18 for further information. Options for action are shown on Page 52.

ISSUE 3 - AGRICULTURAL POLLUTION INCLUDING THE EFFECTS OF AMMONIA AND NITRATE

3.1 Organic waste disposal

Intensive livestock production is a particular feature in some parts of the Teme catchment. The intensive raising of poultry is prevalent throughout the catchment, and a small number of sizeable pig farms also exist.

It is normal agricultural practice to spread organic waste from the raising of livestock onto land to maintain its productivity. Waste must be spread with due regard to the protection of watercourses and groundwater, and should be carried out in accordance with MAFF's Code of Good Agricultural Practice for the Protection of Water 1991.

The improper management of organic waste can lead to point source pollution of surface waters as well as diffuse pollution of groundwater. Land must be used to spread waste for the benefit of crop growth, and not merely as a method of waste disposal. Excess nitrates not utilised by plants will leach into groundwater and watercourses.

The water quality of the Teme is generally very good, although localised agricultural discharges have caused temporary quality problems and resulted in fish kills. Improvement works to slurry stores have taken place with assistance from MAFF's Farm and Conservation Grant Scheme, which has now unfortunately terminated. Some targeted areas need further investigation (See Issue 2.2).

3.2 Nitrates

The Water Companies have potable borehole supplies within the catchment, but in the more rural areas there is no mains water and private supplies are locally important. In some areas, nitrates are already a problem for water supply (for example, Oakeley Farm borehole near Bishop's Castle has nitrate levels above 50 mgN/litre).

Candidate Nitrate Vulnerable Zones (NVZs), in accordance with the EC Nitrate Directive (91/676/EEC) and with compulsory adherence to modified agricultural practices, have been defined for Oakeley Farm and Diddlebury sources. These are currently undergoing the specified consultation process. Oakeley Farm has also been designated a Nitrate Sensitive Area (NSA) - a voluntary scheme whereby farmers receive compensation for agreement to more restrictive agricultural practices, although the interest in joining the scheme has been low.

3.3 Problems in assessment of proposed livestock units

In its role as a consultee for planning applications, the NRA is encountering problems in assessing applications for intensive livestock units. It is often difficult to assess whether such proposals are within the limits of sustainability due to the lack of supporting information being provided by applicants.

The disposal of organic wastes should be a material consideration and ideally should be fully covered by Local Planning Authorities (LPAs) when determining planning approval. LPAs should ensure that appropriate supporting evidence is submitted, although in some cases Development Plan policies do require adequate provision for the management of waste and residues which arise.

Some livestock units (especially poultry and pig units) require large areas of land for spreading manure and slurry. Expansion of existing livestock enterprises increases the risk that insufficient land is available for the spreading of additional waste. In these instances alternative disposal sites must be sought, to avoid overspreading. It is therefore very important that applicants give due consideration to waste disposal, ideally by the production of a Farm Waste Management Plan.

Refer to Sections 4.6, 5.1 and Map 8 for further information. Options for action are shown on Page 53.

ISSUE 4 - INADEQUATE RURAL SEWERAGE

Problems resulting from inadequate sewerage facilities originate from one or more of the following:

- areas served by an inadequate public sewerage system

- areas where private sewage treatment plants or septic tanks pollute a watercourse
- areas where septic tanks discharge to unsatisfactory soakaways

4.1 West Malvern public Sewage Treatment Plant (STP)

The STP discharges into the head of the West Malvern Brook. The effluent complies with the conditions of the discharge consent, but very high storm flows and low dilution in the receiving brook cause a periodic localised deterioration in water quality and the development of unsightly sewage fungus. The brook is not classified, but would be expected to be of the same high River Quality Objective as Cradley Brook, into which it flows.

Flow studies have been carried out to quantify the problem and, subject to the restrictions of AMP2 (see Issue 2), a proposal has been agreed with Severn Trent Water Ltd to ameliorate the effect by making better use of existing plant. The effectiveness of this approach will be monitored, but if there is still a problem the longer term objective will be to incorporate this site into AMP3 for capital works improvement in the period beyond 2000.

4.2 Bishop's Castle public Sewage Treatment Plant

The problems are described under Issue 2 (2.3).

4.3 Church Stretton public Sewage Treatment Plant

The STP discharges to the upper reaches of the Quinny Brook. The effluent complies with the conditions of the discharge consent, but localised deterioration can be caused by high storm flows and frequent operation of the storm overflow due to infiltration problems in the sewerage system, and by low dilution on the receiving stream.

Improvement work has been undertaken at the STP but the infiltration problem is still being progressed. Concern is expressed by the NRA that proposed housing schemes may have a deleterious effect on the situation.

4.4 Clows Top

Clows Top drains to the head of Dumbleton Brook. There are two private STPs, which serve a number of households and discharge to the brook. There are also numerous septic tank discharges to soakaways and some which drain to the brook, resulting in pollution. Much has been accomplished in liaison with Leominster District Council Environmental Health Department to identify and rectify unsatisfactory septic tank discharges, but only further monitoring can tell if the matter will be fully resolved. Problems of serious failure to comply with consents at one of the two private sewage discharges have largely been resolved with the installation of a new plant.

4.5 Other problem areas

The NRA is opposed to the proliferation of small sewage treatment plants. However, pressure for development in unsewered areas can lead to the installation of numerous small plants. A prime example of this is in the village of Whitegrit, where there is generally poor ground permeability. A recent report to the District Council recommends requisitioning of a mains sewerage scheme for the village. Another example is the village of Upper Sapey, which has a small public STP. Recent proposals to overcome sewerage problems in the village include plans for one development to enter into a capital contribution scheme with Severn Trent Water Ltd. to replace their works with a modern plant which will also take in the new development.

Clungunford is a small village with numerous septic tanks and four private STPs. The village is within the catchment of several drinking water sources operated by Severn Trent Water Ltd, and is on the District Council's programme for sewerage requisition schemes in the future. Further development is allowed for in the Local Plan, and until such time as the village is sewered proliferation of both STPs and septic tanks should be resisted.

Other areas where the lack of mains sewerage and pressure for development has led to some proliferation of private STPs include Mamble, Bayton and Newnham Bridge, these are areas where comprehensive sewerage schemes should be considered.

Several local council-owned sewage treatment plants have had a poor record of consent compliance. These plants are now in new ownership and a programme of evaluation and updating these works has been started which will be closely monitored.

Other settlements with pollution or environmental health problems caused by inadequate sewerage include Clunbury, St Michael's and Oldwood Common, Woofferton, Bushmoor, Orleton/Catherton Common, Hopton Wafers/Hopton Bank, Culmington, Wentnor, Stoke St Milborough, Neen Sollars, Broome, Doddington, Norbury, Long Meadowend. A sewerage scheme is expected to proceed in the near future at Hopton Wafers. Settlements where problems are likely to occur should further development take place include Aston Munslow, Munslow and Bridges. Populated areas not served by a public sewerage system with, in the main, particularly heavy ground unsuitable for septic tank soakaway disposal include Eardiston, Frith Common, Menithwood, Clows Top and Wichenford.

Close liaison between the NRA and Local Authorities in the catchment is of great importance in order to seek the best way forward in dealing with sewerage problems and to prioritise requisition schemes. Such schemes require finance from the householders involved, and concerns are being expressed that this is resulting in poor uptake of connections and/or unviable schemes. Provisions contained within the Environment Act may change the method of dealing with some sewerage schemes in the future.

Refer to Section 4.3 for further information. Options for action are shown on Page 54.

ISSUE 5 - POLLUTION RISKS FROM CONTAMINATED LAND

There are a number of sites within the catchment where problems occur, or may have potential to occur, with a consequent impact on groundwater or surface water. One of these sites, Heyope tyre tip, is considered separately in Issue 6.

5.1 Aldon Landfill

Aldon landfill, near Onibury, has been in operation since 1974 for the disposal of household, civic amenity and commercial and industrial wastes. It is licensed to take a maximum daily volume of 2851 tonnes. The site is located in a dry valley with underlying geology of limestone and shales, and is unlined. The whole site is steeply sloping towards a small tributary of the River Onny. A private drinking supply exists close by.

Leachate is arising from both the active part of the site and from the older restored areas, and is currently being collected and tankered away for off-site treatment. On-site treatment is currently being investigated by the site operators. Contamination has been detected in a borehole at the lowest point of the tip. In the future, consideration may need to be given to collection and removal from this part of the site also. The NRA is liaising closely with the site operator and monitoring the situation carefully.

5.2 Penny Hill Landfill

Penny Hill landfill site at Martley has over twenty water monitoring points within and around the site. Although situated about 1 km to the east of the River Teme, the site drains away from the Teme to the Laughern Brook, a tributary which joins the Teme near to the Severn confluence. The monitoring points consist of local wells, springs and surface waters as well as installed monitoring boreholes.

Leachate from within the site is permeating through the base of the landfill and producing localised groundwater contamination. There has been no evidence of surface water contamination from the site.

Remedial measures include pumping out leachate from the waste for disposal by tanker to reduce the level inside to a minimum, and capping the tipped areas to prevent the ingress of rainwater. The waste regulator, Hereford & Worcester County Council, is in the process of revising the Waste Management Licence. This includes the requirement on the operator to undertake a defined monitoring/sampling programme. When this is revised and issued, the NRA can then revert to an auditing role which will include sampling but on a reduced frequency.

5.3 Clows Top, disused mineshaft

A survey of groundwater quality in the Clows Top area in 1988 revealed contamination by chromium. The source was found to be inadvertent contamination from a company using

CCA (chromium/copper/arsenic) as a wood preservative. Concentrations in a nearby flooded mineshaft of 80 mg/l of chromium were found. Some breakout into Dumbleton Brook was identified, but at concentrations below the relevant environmental quality standard.

Following NRA advice, the company involved installed a reverse osmosis plant which extracted the chromium from water pumped and from the shaft. This was a long term project, and chromium concentrations in water in the shaft have been reduced to under 10 mg/l. Monitoring will continue to assess any further change.

5.4 Whitegrit/Shelve old mine workings

There are many old shafts and spoil heaps associated with mining in the mid-Shropshire hills. The headwaters of the River West Onny flow through old spoil heaps. Cattle deaths associated with metal poisoning have occurred, although rarely as most farmers prevent access for watering. It is considered best to leave such areas undisturbed or encourage vegetation. Consequently proposals to disturb such sites have been resisted.

Refer to Sections 4.4, 4.5, 5.1 and Maps 10 and 11 for further information. Options for action are shown on Page 55.

ISSUE 6 - POLLUTION RISKS ASSOCIATED WITH HEYOPE TYRE TIP

A tyre tip at Heyope, near Knucklas in Radnorshire, owned and operated by Motorway Remoulds of Knighton, has been burning since an arson attack in 1989. The site is located in the valley drained by a watercourse which is now culverted beneath the site and discharges to the Ffrwdwen Brook. Since the fire, the watercourse beneath the site has been contaminated with the by-products of burning tyres and has caused pollution downstream. During the initial stages of the fire contamination was detected in the River Teme 85km downstream, with potential implications for a potable supply intake.

Water quality has been monitored since day one and has continued on a regular basis. There has been close liaison with the company, the Waste Regulation Authority (Radnorshire District Council), The Welsh Development Agency (WDA) and Powys Fire Service. Much investigative work has been undertaken to seek solutions to the problems at the site. A scheme to divert the streams has been drawn up and agreed, with grant aid being available from the WDA. In addition, the possibility of extinguishing the fire using liquid nitrogen is being pursued.

Some remedial action has already been taken by the company including installation of oil interceptors and construction of temporary stream culverts, although the management and temporary nature of these are of concern. A high level of inspection is required to prevent oil pollution downstream and permanent stream diversions are needed urgently. Unfortunately, various problems involving finance and land acquisition are involved.

Additionally the upper part of the site, well away from the fire and where shredded tyres have been buried, is causing highly ochrous leachate to be produced. In addition to iron, various organic compounds, albeit at low concentrations, have been identified.

Currently this leachate is draining through the site and adding to the pollutants arising from the lower part of the site. The NRA is requesting that action be taken to reduce leachate levels by better control of water flows both onto and into this part of the site. The existing site licence currently does not provide for restoration and aftercare and monitoring of the site.

Options for action are shown on Page 56.

ISSUE 7 - DEFICIENCIES IN THE LEVEL OF FLOW AND QUALITY MONITORING

7.1 Flow monitoring

The existing level of flow measurement in the catchment could currently be considered inadequate. There are a number of locations in the catchment where river levels are routinely monitored. Two of these monitoring stations, the Teme at Tenbury and at Knightsford Bridge, have a continuous record of river flows. There are six other level monitoring stations:- the Teme at Knighton, Leintwardine and Bransford; the Corve at Ludlow the Onny at Onibury; and the Rea at Newnham.

Intermittent flow measurements are carried out on the River Onny, which is used as a control point for surface water abstraction.

A review of the flow measuring network is required as it is considered that the Tenbury gauge may be too far downstream to adequately control upstream abstractions. The Knighton station could be upgraded to assist in flood warning.

7.2 Water quality monitoring

The main function of Continuous Water Quality Monitors is to give immediate warning by telemetry to the NRA when there is a deterioration in one of the measured parameters (usually Dissolved Oxygen, pH, Ammonia, Turbidity, Conductivity, Temperature) with the secondary function of providing a record of these qualities.

Monitors are gradually being installed nationally, but as yet the Teme, a "low risk" river compared to most, has none. It is important for the rivers used as water supply sources that as many safeguards as possible are incorporated so that abstraction can be stopped before any supply water is affected. Apart from the Welsh Water abstraction at Whitbourne, the Teme is an important tributary of the River Severn which itself has three large abstraction intakes downstream of the Teme confluence.

The obvious points to install monitors are upstream of the Whitbourne intake and just upstream of the River Severn confluence. This is seen as an objective to be achieved as soon as possible and preliminary work is already in progress.

Refer to Sections 5.2 and Map 4 for further information. Options for action are shown on Page 57.

ISSUE 8 - PROBLEMS OF ABSTRACTION LICENSING IN THE TEME CATCHMENT

8.1 Surface water abstraction limitations

There is a limited availability of water resources to support surface water abstractions during the summer as the River Teme does not have the benefit of a low flow regulation reservoir. The existing licensing policy is to include a condition in new licences which requires the licence holder to cease abstraction when notified by the NRA that the flow of the River Teme measured at Tenbury gauging station has fallen below a prescribed value. In dry summers this could mean cessation of abstraction by mid-July and as early as June in extreme years. For the period between 1989 and late August 1995 the flow was less than the secondary threshold of 191 Ml/d for 415 days, and less than the primary threshold of 159 Ml/d for 320 days. The policy for new licences on smaller watercourses in the Teme catchment is to issue the licence subject to a local prescribed flow set at a value to protect downstream needs.

Abstractors are encouraged through charging incentives to consider winter abstraction and storage, although this is not always possible. The NRA could revoke existing licences in the Teme catchment to further rationalise water availability, although funding would need to be found.

8.2 Groundwater abstraction limitations

A large part of the catchment is exempt from licensing for abstraction from groundwater. This exemption is as a result of the Severn River Authority (Exceptions from Control) Order 1967 established under the Water Resources Act 1963.

The exemption covers the large area of relatively impervious rocks where limited quantities of groundwater are found. However, the catchment does contain numerous small wells and boreholes providing private water supplies. Many of these are consumptive with not all the water abstracted returned to the catchment, such as water used for bottling of water. In this context there is concern in case the current diversification of farming should result in exploitation, rather than the traditional good husbandry, of water resources.

As a result of the Order, the NRA has no control on proposed or existing abstractions which are to take place, and has no routine statistics on actual abstraction which is taking place, although this data is being secured in specific cases. The NRA is, however, aware of some of the larger abstractions such as those for Public Water Supply. The exemption removes the

normal protection against derogation provided to the existing abstractors under the Water Resources Act 1991. Any new borehole proposals, which typically would require a licence, therefore can only be screened for their effect on neighbouring wells via Common Law or by Local Planning Authorities exercising their planning powers. There have been a number of groundwater abstraction proposals put forward in the last few years which have caused concern to surrounding groundwater abstractors. Had these not been in the exempt area, the NRA could have exerted some control and protected existing sources.

It is also believed that the larger abstractors (eg: Water Companies) would welcome the control which licensing would give. If there were a licensing system then the NRA would, during the investigations associated with the application for the licence, have had located all surrounding sources, have had them monitored during a test pumping to determine their vulnerability and if derogation is expected, request the new abstractor to compensate prior to any Licence being issued (as exists in the non-exempt area).

Abstraction of groundwater from boreholes may affect nearby wetlands by local lowering of water tables. An investigation into whether wetland Sites of Special Scientific Interest (SSSIs) are/would be affected by groundwater abstractions is required to assess and quantify the problem in the Teme catchment.

A review of the exempt status of the area is appropriate. This will involve gaining as much information as possible on existing groundwater abstractors.

8.3 Lack of dilution in the Cradley Brook catchment

There are known problems of low available dilution in the headwaters of the Cradley Brook catchment, west of Malvern (also see Issue 2.1). Abstraction of water is thought to be one of the contributory factors. The valley lies within the 'Exempt Area' (referred to in 8.2) and thus the NRA does not have a record of the groundwater abstractors within the area.

There are several small surface water abstractions, the largest of which is the Licence of Right held by the water bottling company at Colwall. This is for a maximum of 109 cubic metres per day and 39,883 cubic metres per year.

Investigations are therefore required to ascertain whether it is abstraction which is causing the low flows, or indeed whether there are any other contributory factors.

Refer to Sections 4.2, 5.2 and Map 8 for further information. Options for action are shown on Page 58.

ISSUE 9 - PROTECTION, ENHANCEMENT AND RESTORATION OF RIVERINE AND OTHER WETLAND HABITATS

Many of the aquatic and wetland environments within the River Teme catchment are of high conservation value requiring an appropriate level of protection and maintenance of

biodiversity through the application of the NRA's and other bodies' regulatory powers (see Issue 1). Additional protection will be afforded to the River Teme by the proposed Site of Special Scientific Interest (SSSI) notification (see Issue 10). However, flood plain or wetland habitats such as old meanders, oxbows and wet pastures outside of the SSSI also need to be conserved. Support should also be given to incentive schemes such as the Countryside Commission's Countryside Stewardship and MAFF's Habitat Improvement Scheme.

9.1 Protection, restoration and creation of wetlands

There has been a marked decline in wetland habitats within the catchment over the last decade which in turn has impacted on various birds, primarily wading species such as lapwing, snipe, curlew and redshank. The numbers of lapwing, both here and in other parts of the country, have dropped so much that it is likely to be classified as a Red Data Book species, ie: nationally endangered. Remedial action at suitable sites should be investigated and targets set.

Control of water levels on flood plain grassland and gravel extraction within the flood plain can offer excellent opportunities for habitat creation. Left as pools and wetland, and along with appropriate management of the surrounding areas, such activities offer potential for restoring old and creating new wetlands.

When land use changes occur on a sufficiently large scale they often cause significant damage and loss of wetland habitats. Although not major land uses within the catchment, an expansion of either large scale coniferous afforestation or wind farms could pose a threat to remaining wetlands, particularly in the uplands, and possibly indirect environmental problems eg. downstream siltation.

The demand for improved road access is also likely to place long term demands on rivers and wetlands in the catchment. Schemes at Marshbrook and Onibury as well as the proposed Worcester western bypass have, or may cause damage to riverine habitats. Additionally the removal of old bridges and the installation of new concrete structures offer no suitable niches, such as holes and ledges, for bird and bat species.

9.2 Water Level Management Plans (WLMPs)

The management of water levels can have significant impacts on the conservation value of wetland areas. MAFF/DOE/Welsh Office have produced "Conservation Guidelines for Drainage Authorities (1991)" and a subsequent procedural note (1994) detailing the requirements for Water Level Management Plans especially in high priority areas such as Sites of Special Scientific Interest (SSSI). These plans are seen as means by which water level requirements for a range of activities (eg agriculture, flood defence, conservation) can be balanced and integrated.

English Nature (EN) has recently identified Burrington Meadows SSSI (low priority) and the proposed River Teme SSSI (see Issue 10) as sites in the Teme catchment which in their view require WLMPs. The NRA is not the operating authority on the Burrington Meadows site,

but will be discussing plan requirements for the River Teme proposed SSSI with EN in due course.

9.3 Invasive plants

The presence and extent of invasive plants such as Japanese Knotweed, Giant Hogweed and Himalayan Balsam are not well documented in the catchment. Once well established, these plants pose a significant threat to native flora by dominating riparian habitats. An assessment of their distribution is required, followed by measures to prevent further spreading in the catchment if appropriate.

9.4 Overgrazing

Sheep grazing along watercourses has resulted in significant lengths of watercourses being devoid of tree and scrub cover. A majority of watercourses lined with mature and semi-mature trees suffer from excessive grazing, thus preventing natural regeneration. Unless action is taken to reduce grazing pressures along watercourses in the catchment, the reduction of tree and scrub cover will continue, adversely affecting the ecology of the river system. However, where unimproved and semi-improved pasture exists, sympathetic levels of grazing are necessary to maintain and improve the ecological interest.

Refer to Sections 4.10, 5.3.1 and Map 15 for further information. Options for action are shown on Page 59.

ISSUE 10 - NOTIFICATION OF THE RIVER TEME AS A SITE OF SPECIAL SCIENTIFIC INTEREST (SSSI)

The NRA supports the proposal by English Nature to notify the River Teme as a Site of Special Scientific Interest.

The River Teme is considered to be a nationally outstanding example of a large river flowing mainly over Old Red Sandstone, with rich and varied plant, invertebrate, fish and otter communities. It is because of this that English Nature is proposing to notify the whole river as a SSSI. The planned date for notification is 1996/7. An effective potentially damaging operations (PDO) list, which accompanies the SSSI notification, is required to ensure that the long term conservation value of the river is safeguarded. The NRA's views will be considered in the production of this PDO list. Equally important will be the negotiation of agreed management actions with riparian land managers and fisheries interests.

10.1 Flood Defence aspects

In compiling the PDO list, flood defence maintenance activities such as tree maintenance and shoal/island removal may need to be reviewed.

The proposed notification of the River Teme as a SSSI, and possible attendant Water Level

Management Plan, will sharpen the conflict of interest between those wishing to see the river habitat and morphology conserved, and those whose use of riparian land depends on management of the river and its bankside vegetation to hold the flood risk and drainage freeboard at current standards. It will necessitate defining the existing standards of flood risk and the maintenance regimes needed to sustain them. Adequately quantifying the effects of bankside tree management, or other in-river maintenance works, on freeboard and flood risk will be very difficult.

10.2 Water Quality aspects

The proposed notification of the River Teme as a SSSI emphasises the importance of maintaining a high water quality in the river, and this is further endorsed by the NRA's river quality objectives for the watercourse. Water quality is affected by what occurs in the whole catchment rather than just in the River Teme corridor, and in order to protect the SSSI, protection needs to be afforded to the whole catchment.

English Nature is seeking to maintain and enhance the ecology of SSSI rivers by the introduction of special ecosystem targets for phosphate. EN have suggested that phosphate removal needs to be considered at Ludlow sewage treatment plant. However, before committing Severn Trent Water Ltd to the costs of such treatment, it must be shown that the works contributes significantly to phosphate levels in the river. This is doubtful in such an agricultural catchment, where the use of fertilisers is normal practice. Consequently additional monitoring is being undertaken to quantify various inputs.

10.3 Fisheries aspects

The proposed SSSI notification will provide additional protection for fish populations in the catchment, especially for migratory salmonids and for Twaite and Allis Shad. However, concern has been expressed by anglers on possible restrictions on current and future fisheries management practices and in particular on stocking policies, fish removals and bankside maintenance. These issues will need resolution between EN and angling representatives. The NRA's views on these matters are referred to in Issues 11 and 12.

10.4 Water Resources aspects

From the water resources aspect the SSSI status could have an impact on the NRA's existing licensing policy for surface water abstraction direct from the River Teme and possibly from the tributaries, since abstraction of water is usually a PDO. However, the purpose of PDO listing is to ensure consultation occurs whereby nature conservation interests can be adequately taken into account. Modification of current policy may or may not prove to be necessary on conservation grounds.

The NRA's policy for the licensing of surface water abstractions is to issue licences subject to a prescribed flow (see Issue 8.1). The abstraction can only take place when the flow is above a pre-determined value. The policy is to be reviewed, and negotiations will be required with EN prior to the notification of the SSSI to ensure that the review is all-embracing.

Options for action are shown on Page 60.

ISSUE 11 - MAINTENANCE, IMPROVEMENT AND DEVELOPMENT OF HIGH QUALITY GAME FISHERIES

The River Teme and its tributaries contain high quality fisheries for salmon, trout and grayling which require the continuing protection of existing high grade habitats and good water quality through the application of the NRA's regulatory powers (see Issue 1).

11.1 Declining salmon stocks

Salmon catches in the River Teme, in common with most rivers throughout England and Wales, have been at a low ebb in recent years. This is particularly true for large multi-sea-winter spring-run salmon, the stock component most valued by anglers. Measures such as byelaw restrictions on method and seasons, and voluntary catch and release of fish may be needed to reduce the exploitation of the diminished stocks.

Salmon stocks should increase over the coming years as the benefits of fish passes constructed by the NRA at Powick, Ashford, Bromfield, Stokesay and Newnham Weirs are realised. Many kilometres of potentially high quality spawning and nursery rivers remain inaccessible, however, because of obstacles, both natural and man-made. Construction of salmon passes at Buckton Weir on the River Teme, Tetstill Weir on the River Rea and at Knapp and Hopton Court Weirs on the Leigh Brook, together with improvements at Stokesay and Halford Weirs on the River Onny, would open up much of these unused areas and thereby greatly increase the potential for salmon production. Where fish pass constructions are not feasible or viable, such as on the Ledwyche Brook, adult salmon could be physically placed above an obstacle to spawn or the upstream area could be stocked with hatchery-reared salmon fry to make use of the potential rearing capacity of the river.

Salmon stocks could further benefit from habitat improvements such as spawning gravel rehabilitation (e.g. on the Ledwyche Brook) and removal of fallen trees and debris to improve access on various tributary streams (e.g. Leigh Brook, Corn Brook, Sapey Brook).

A number of adult salmon are currently trapped each year on the River Teme by the NRA to provide a source of eggs for rearing on at one of the Authority's hatcheries. The resulting progeny are stocked out into rivers in the Teme catchment, above impassable obstacles, to encourage salmon into areas newly opened up by fish passes, and to make up for pollution losses when they occur. These practices should continue in order to address the problem of declining salmon runs and to maintain the genetic integrity of the stocks.

Monitoring of salmon runs in the River Teme could be greatly facilitated if an electronic fish counter is installed in a proposed new flow gauging weir at Knightwick.

River Teme salmon form part of the overall North Atlantic stock. Whilst control and improvement measures can be applied to single rivers, they must form part of a wider strategy

aimed at protecting and improving all stages of their life cycle.

The NRA is likely to be faced with a shortfall in Grant in Aid (GIA) funding for salmon work in the future. Alternative sources of funding may therefore need to be sought if anti poaching work, salmon rearing, fish passes and other improvement works are to continue.

11.2 Preservation of native trout stocks

The river upstream of Bromfield Weir near Ludlow is almost exclusively fished for trout, as are many of the tributary streams. To protect salmonid interests in the upper reaches it may be desirable to designate many of these areas specifically as game fisheries, with management practices to suit. Such practices could include restrictions on stocking policies and the removal of unwanted coarse fish species where appropriate.

Native brown trout populations are a nationally threatened resource. Many of the rivers in the Teme catchment still contain thriving stocks of these fish, particularly in the upper reaches of the Teme and in tributary streams such as the Rivers Clun, Onny, Corve, Rea, Ledwyche and Corn Brook. The genetic integrity of native trout stocks may have been diluted in some stretches of the rivers by introductions of hatchery-reared trout of diverse origin, and numbers of wild fish may have declined in some instances. Rainbow trout have also been introduced on occasions in the past and some of these fish are known to have escaped from fish farms in the catchment. To protect the native brown trout populations it may be necessary to prohibit stocking in rivers where this does not currently take place and restrict stocking in other rivers to brown trout only, preferably of local origin and of a size comparable to the wild fish.

11.3 Decline in Grayling stocks

Historically the Teme has been one of the best grayling rivers in the region, but in common with other rivers in the Severn catchment, grayling stocks suffered a severe decline during the mid 1970s, possibly as a result of the droughts and very high water temperatures at that time. Stocks have been very slow to recover, but some encouraging increases in numbers have been recorded in the last few years. Grayling are present throughout the river, but most notably from Tenbury upstream to Leintwardine, and in the tributaries such as the Onny and Clun. Attempts could be made to boost grayling populations by rearing programmes and restocking, preferably with fish from River Teme origins. The introduction of stocks from other rivers, particularly from Southern chalkstreams, is currently discouraged by the NRA on the grounds of disease prevention and possible impacts on the genetic integrity of native fish.

11.4 Periodic drying up of the Upper Teme

The periodic drying up of the River Teme upstream of Brampton during dry summers causes significant environmental problems, especially with loss of fish stocks. During severe events, long lengths of river dry up completely, resulting in extensive mortalities of fish and other aquatic life. In less severe droughts, stretches of the river may be restricted to a series of

pools linked only by sub-surface water flows through river gravels. These pools gradually dry up as the drought continues and fish trapped in them become increasingly vulnerable to herons and other predators. Where feasible, NRA fisheries staff rescue the trapped fish and transfer them to areas where the river is still flowing.

Refer to Sections 4.9, 4.12, 5.3.2 and Maps 19, 20 for further information. Options for action are shown on Page 61.

ISSUE 12 - MAINTENANCE, IMPROVEMENT AND DEVELOPMENT OF HIGH QUALITY COARSE FISHERIES

The River Teme from Ashford Carbonell to its confluence with the River Severn is one of the best river coarse fisheries in England and Wales, and is especially noted for its specimen sized barbel and chub. Most other riverine species of coarse fish are also present, including roach, dace, bream, pike, perch and gudgeon. The Teme supports such valuable fisheries primarily because of the high quality of its physical, chemical and biological riverine habitats and its rich and diverse invertebrate fauna. It is vital that the NRA and other responsible bodies protect these interests through appropriate application of their regulatory powers (see Issue 1). Monitoring of coarse fish populations is carried out to assess the ongoing status of the stocks and to identify any problems at an early stage so that appropriate steps can be taken to maintain the quality of the fishery.

12.1 Illegal Removal of Fish

Reports have been increasingly received in recent years of alleged thefts of large barbel from the river, taken on rod and line. The fish are then supposedly sold on and stocked into other waters. The removal of specimen sized barbel will inevitably reduce the value of the fishery to many anglers and steps should be taken to eliminate this practice. Fishery owners and lessees have redress in law under the Theft Act 1986 to deal with this problem, but current Fisheries Byelaws preclude the NRA from taking action, other than in relation to the subsequent stocking out of such fish which requires NRA consent. A review of byelaws may be appropriate to help deal with this matter.

12.2 Broodstock for Rearing Programmes

Small numbers of barbel, chub and dace are presently caught each year from the River Teme by the NRA and used as brood fish for supplying eggs for rearing on at the NRA's Calverton Fish Farm. The brood fish are returned to the river after stripping, together with a proportion of the resulting progeny. This helps to maintain and improve fish stocks in the River Teme itself and also provides major supplies of fish for stocking other waters throughout the country to the benefit of fisheries generally. This practice should be continued for the foreseeable future.

12.3 Decline in eel stocks

Eel stocks have declined in rivers throughout Europe in recent years, and the River Teme is no exception in this respect. Restocking programmes with elvers (young eels) are carried out in most years by the NRA depending on availability and cost, and this is likely to continue. In addition, simple passes have now been developed to help elvers to naturally progress upstream and repopulate depleted areas. Elver passes should be installed at obstacles on the River Teme in future years when repair works, renovation of structures or other opportunities arise.

Refer to Sections 4.9, 4.12, 5.3.2 and Map 21 for further information. Options for action are shown on Page 62.

ISSUE 13 - IMPACT OF PISCIVOROUS BIRDS ON FISH STOCKS

An increase of fish-eating birds in the catchment, most notably cormorants and goosanders, has caused concern amongst anglers and brought pressures for culling. MAFF have recently issued a number of licences for the control of these birds on the nearby River Wye. A clear, scientifically based case showing significant economic damage to fisheries and the failure of other control methods is needed before any consideration would be given for such action in the Teme catchment.

The NRA is keen to ensure that MAFF and WOAD undertake full consultation over any licence applications to control piscivorous birds.

Options for action are shown on Page 63.

ISSUE 14 - PROTECTION OF RARE AND THREATENED SPECIES

A variety of rare and threatened species exist throughout the catchment, including species notified under Annex II of the European Habitats Directive. The protection of these species, along with the protection of the habitats upon which they are dependent, is essential. Targets should be established aimed at the achievement/maintenance of favourable conservation status for rare species.

14.1 Protection of mammals

The upper reaches of the Teme catchment have been a stronghold for otters and a resource from which further expansion to other parts of the catchment is taking place. The habitat requirements of otters include undisturbed areas of river plus bankside tree and shrub cover.

Disturbance to otters is caused by mink hunting. Mink have spread into the catchment in recent years and this has been followed by the use of 'mink' hounds to control them. Other less disruptive control methods should be used in areas where mink are a known problem.

Additionally many bat populations, particularly Daubentons bats, are dependent on rivers, river corridors and their surrounding habitats for feeding and roosting. A greater understanding of their distribution within the catchment is required in order to ensure their protection.

14.2 Threats to invertebrates

The native British crayfish is a protected species under the Wildlife and Countryside Act 1981. Crayfish populations are under serious threat of extinction on a local, regional and national scale. The threat arises principally from the farming of non-native signal crayfish that carry a disease, "crayfish plague", which is invariably fatal to the native species. Once the disease gets into a watercourse the entire population of native crayfish within that river system are often eradicated. Within the catchment, this is known to have occurred in the River Clun. Controls on the introduction of signal crayfish are exercised by MAFF. In order to protect native crayfish, consideration should be given to making the Teme catchment a 'no go' area for introductions of alien crayfish species.

Club-Tailed Dragonfly (*Gomphus vulgatissimus*), a very localised species, breeds within the lower reaches of the Teme. However, there is insufficient data on species distribution of other dragonflies to support effective conservation. This needs to be addressed. The River Teme is also a stronghold for the nationally rare riffle beetles (*Oulimnius major* and *Macronychus quadrituberculatus*). The pearl mussel (*Margaritifera margaritifera*), a protected species, was recorded in the River Teme at Powick and River Clun at the Teme confluence in 1994/5.

14.3 Protection of Shad and other fish species

Twaite and Allis Shad both enter the River Teme to spawn, although the latter species is extremely rare. Powick Weir presently appears to restrict the upstream passage of shad to potential spawning areas further upstream, although it is possible that access might occur via the Laughern Brook, a tributary which links with the weir bypass channel. To protect and possibly enhance the numbers of these rare fish, it is necessary to investigate their present distribution and if practicable extend their spawning range.

In addition to Twaite and Allis Shad, salmon, bullhead and lamprey are also notified under Annex II of the European Habitats Directive. These species occur within the catchment, and must be protected.

14.4 Alder tree disease

Alders are the dominant tree species along rivers in the catchment. Alder tree disease (Phytophthora) has appeared in the area in recent years and its potential impact is of great concern. If alders were lost for all or part of the catchment this would have serious consequences for the ecology of rivers. The extent and possible impact of this disease should be investigated and assessed.

14.5 Decline in Black Poplar

Black Poplar trees (*Populus nigra* subsp. *betulifolia*) are becoming scarce. This is usually attributed to a lack of both suitable habitat and female trees. The Teme catchment area is recognised by the National Black Poplar Working Group as being of particular importance for these trees. Patchy records of their distribution are held by various groups and these should be collated to give a catchment wide picture. Some specialist nurseries are producing cuttings from identified trees, but this needs to be stepped up if present genetic diversity is to be maintained. Because of their scarcity, care needs to be taken with the location of new planting sites in order to maintain the historical and botanical continuity for this species. Black Poplars were often used as important landmarks and many local customs and legends are associated with them. The exact locations of the individuals of the ageing population is important historically as they constitute a type of living archaeology.

Refer to Sections 4.10, 5.3.1 for further information. Options for action are shown on Page 64.

ISSUE 15 - THE INCREASED DEMAND FOR AMENITY AND RECREATION

15.1 Conflict between angling and canoeing

Although there is believed to be no legal right of navigation on the River Teme, canoeists have been canoeing the river formally and informally for many years. A recent ban imposed by fishery owners and angling clubs on canoeists from using the river between Ashford Carbonell and Tenbury Wells, however, has caused ill feeling between the two groups.

The NRA is concerned that the ban may lead to serious confrontation and has offered to act as impartial mediator between interested parties, i.e. landowners, anglers and canoeists. It may be in everyone's best interest if a reasonable compromise could be achieved in resolving this issue.

15.2 Riverside Access

There are few definitive riverside footpaths in the catchment, thus limiting the potential for public enjoyment of rivers. Scope therefore exists for collaborative developments with owners, local authorities and other bodies to increase access opportunities. Any recreational developments, however, need to be considered carefully in relation to the need to safeguard high quality riverine habitats but efforts will be made to improve access where appropriate.

15.3 Amenity value of Ludlow Weirs

Concern has been expressed through local media and the Town Council about the state of disrepair of the weirs on the River Teme through the town of Ludlow. The question of restoration of the weirs for amenity purposes has been raised. The weirs are of uncertain ownership and costs of repair could be prohibitively high. Further investigations may be

appropriate.

15.4 Refurbishment of Powick Weir

Powick Weir, which is owned by the NRA, is presently in a state of partial renovation. As a result, the visual amenity value of the site is poor, public safety may be compromised, and adverse impacts on adjacent salmon fishing interests has occurred. Funding problems and possible damage to the archaeological importance of the weir, have so far precluded completion of the renovation works. Steps should be taken to resolve this situation. Possible impacts of the new Worcester bypass, due to skirt the edge of the weir, will also need to be carefully considered.

Refer to Sections 4.13, 5.3.3 and Map 17 for further information. Options for action are shown on Page 65.

ISSUE 16 - PROTECTION OF LANDSCAPE, ARCHAEOLOGICAL AND CULTURAL HERITAGE VALUE OF THE CATCHMENT

16.1 Need for Landscape Assessment of River Corridors

The landscape quality of the catchment is extremely high, requiring a high level of protection through the application of regulatory powers by the NRA and other bodies(see Issue 1). The NRA will make every effort to conserve and enhance river corridor and wetland landscapes.

Detailed landscape assessments are available for the upper parts of the catchment and much of the area is covered by statutory and non statutory designations such as Areas of Outstanding Natural Beauty (AONBs), Environmentally Sensitive Areas (ESAs) and Areas of Great Landscape Value. Further assessment is required to determine the quality of the remaining landscape within the catchment.

16.2 Lack of knowledge of archaeology and cultural heritage within the catchment

The catchment area is rich in archaeological sites, historic buildings such as mills (many of which are listed), weirs, historic parks and gardens, and areas of industrial archaeology. A number of archaeological sites are close to watercourses, and in the upper reaches Bronze Age burial mounds can be found in valley floors. To assist in the protection of such sites, the NRA should maintain a database of site details. Whilst the NRA seeks to maintain and increase its knowledge of archaeological and historical sites, it does not have the necessary archaeological expertise and may not have the resources to interpret these sites. Input is therefore required from the relevant County Archaeologists to help achieve this aim.

16.3 Landscape, archaeological and cultural heritage issues within the catchment

The river valleys play a critical part in the overall landscape of the ESA areas. The principle of grants under ESA type systems for ensuring the continuity of landscape and historical features, such as stone walling, hedge laying, woodlands and orchards, should be supported.

There is a need to determine wildlife, landscape and conservation priorities within an agreed ecological/landscape framework - a structure which will aid decision making and influence policy.

Archaeological and historical issues in the catchment are not well known or understood. Close liaison between the NRA and the County Archaeologists needs to be established to identify such issues and to ensure mechanisms exist for their adequate protection. Lack of resources in Local Authorities may limit this objective.

Many of the weirs on the River Teme are of archaeological and historical importance and the impact of any new fish passes needs to be fully investigated (also see Issue 11).

Refer to Sections 4.11, 5.3.1 and Map 16 for further information. Options for action are shown on Page 66.

ISSUE 17 - EROSION AND UNAUTHORISED RIVER WORKS

Unauthorised river works involving the straightening of rivers to combat erosion problems, and the removal of gravel shoals, occur from time to time (e.g. Upper Teme in 1992 and River Clun in 1994) with consequent damage to the water environment. This is perceived as likely to be an increasing problem within the Teme catchment.

It is appreciated that agricultural land is lost through river erosion. However, preventing erosion in one place often exacerbates it in another. Cutting off a meander will increase the gradient, setting off erosion downstream and sometimes upstream. This may ultimately lead to serious habitat degradation. The effects of straightening, tipping, infilling of old meanders and the removal of gravels has damaging implications for salmon spawning and waterside birds as well as for other aquatic life.

Controls on these activities are exercised through the Water Resources Act 1991 and NRA Byelaws for statutory Main Rivers only, the Salmon and Freshwater Fisheries Act 1975, Planning controls (in some cases), and Waste Disposal regulations in a limited number. The controls on ordinary watercourses (i.e. non- Main River) are very limited.

At issue is the conflict between the riparian owners' desire to protect land from erosion, the interests of adjacent landowners, and the conservation of the natural erosion/deposition regime with its associated wildlife habitats.

Options for action are shown on Page 67.

ISSUE 18 - PRESSURE FOR DEVELOPMENT IN FLOOD PLAIN**18.1 Development in flood plain**

The catchment is predominantly hilly with a scarcity of low altitude land which is at gradients suitable for development. A large proportion of the low altitude land that does exist is in the valley bottoms and within flood plains. As a result there are pressures to permit development in flood plain.

The inappropriate development or use of flood plain will:

- create flood risks to the developments themselves, necessitating otherwise avoidable expenditure on their control
- increase flood risks elsewhere by:
 - a) restricting flood plain flows
 - b) reducing the flood plain storage effect on flows passing downstream.

the effects are cumulative - particularly (b) - making it impossible to set any "limits" which over a period of time will not negate the objectives of any flood plain preservation policy.

Flood plain areas are also important for nature conservation interests, and have the potential to be greatly improved with suitable management.

The NRA, as a statutory consultee of the Planning Authorities, seeks to prevent development encroaching into the flood plain and wetland habitats to avoid any increase in flood risk to people and property. There are also some places where past development has severely restricted flood plain flows and enhanced flood levels. Such development could be considered unsustainable in the long term. In conjunction with the development of local plans it will be prudent to produce policies for redevelopment of such sites designed to return them to flood plain use as and when the opportunities arise.

Although caravan sites in flood plain are not yet established to the degree that they are elsewhere in the Severn catchment, there is some pressure in this direction. The scenic beauty of the area is likely to lead to growth in tourism, with an associated need for caravan sites, both touring and static. Riverside sites appear to be an idyllic setting, but caravan sites in flood risk areas create two main problems: the risk of damage to caravans, and even life, by flooding; and the often occurring progression from touring caravans to static caravans to mobile homes/permanent residential development. Although the main season of use of caravans is the summer months when flood risks are lowest, summer storms have produced some major floods. Such floods can happen very quickly and cannot be adequately catered for with flood warning systems.

At issue is the conflict between pressure for development in the flood plain (whether it arises from housing, commercial/industrial development, roads or caravan sites/needs of tourism), against the costs to present and future generations of doing so.

18.2 Flood plain mapping

Although some lengths of the major rivers (notably the Teme) have definitive flood plain, the extent of the definitive (1 in 100 year return period) flood plain is not mapped for all major watercourses in the catchment. Flooding in certain areas is well documented and information is gathered during and after flood events by both the NRA and Local Authorities. In order to control the flood plain effectively it is necessary to have an accurate definition of its extent.

Department of the Environment Circular 30/92 (Welsh Office 68/92) required that a major input into Development Plans should be surveys of flooding problems and flood plain. The production of flood plain maps is covered by a Memorandum of Understanding between the NRA and the Association of District Councils. A programme of modelling, surveying and mapping is being carried out in an order of priority and having regard to areas of pressure for development. By provision of information that can be shown on LA Development Plans, the land use demands of flood plains and similar constraints can be properly made and recognised. The programme for the River Teme is being carried out, with aerial survey completed and modelling completion due in 1997. Development potential exists at Bishop's Castle, Ludlow, Craven Arms, Church Stretton and to a lesser extent at Bucknell, Knighton, Tenbury, Eardiston, Brimfield, Orleton, Leintwardine, Newnham Bridge, Leysters, Richards Castle, Wigmore, Bayton, Mable, Clows Top and Cleobury Mortimer.

Refer to Sections 4.8, 5.3.4 for further information. Options for action are shown on Page 68.

ISSUE 19 - FLOOD RISKS AT SPECIFIC LOCATIONS INCLUDING PROBLEMS CAUSED BY SURFACE WATER RUN-OFF

19.1 Flood alleviation and existing development

Parts of a number of towns in the catchment are at risk of flooding from substantial watercourses. The Section 105 Survey refers to the total number of flooding problems in the catchment, but the following locations are the principal ones of concern:

Location	Watercourse	At risk
Knighton	R. Teme	Commercial, domestic property, roads
Clun	R. Clun	Domestic property
Leintwardine	R. Teme	Roads, property
Ludlow	R. Teme and Corve	Commercial and domestic property, roads
Tenbury Wells	R. Teme/Kyre Brook	Commercial and domestic property, roads

For these problems to be overcome, it is necessary that any solution meets the following criteria:- i) it is possible to engineer a solution whose costs are exceeded by the benefits by a sufficient margin, ii) it is wanted by the beneficiaries and iii) the environmental impact is acceptable.

The solution of these problems usually requires works with significant environmental impact, either visually in the use of flood defence walls, or visually and ecologically in the use of in-river works. The interests of those that benefit from flood alleviation may be in conflict with those who wish to conserve the landscape and local ecology. The NRA periodically reviews the feasibility of flood alleviation schemes on Main River. As it is now 10 years since Tenbury Wells was last considered this will need to be revisited in the near future.

Flooding problems are restraining future development to varying degrees at three localities: Bishop's Castle, Church Stretton and Cleobury Mortimer:

19.2 Flooding problems at Bishop's Castle

Watercourses have been culverted through the town and in parts are incorporated in the combined sewerage system. These are inadequate due to their age, inherent undersize, lack of maintenance, increased throughput from development, and structural collapse causing frequent road and property flooding. The need for development in the town to grow, as indicated in the Local Plan, can only exacerbate this situation which has existed for over 20 years (also refer to Issue 2.3).

The NRA and its predecessors have consistently opposed development in Bishop's Castle until such time as these problems have been overcome. Despite the efforts of the District Council (the drainage Authority with powers to carry out measures to alleviate flooding on non Main River watercourses), the County Council ('riparian owner' of highways under which many of the culverted sections are located), and the Water Company (operator of the sewerage system), little progress has been made in promoting and apportioning the costs of a scheme that would overcome the problems and permit further development. These problems pose a serious impediment to the regeneration of the town. At issue are the interests of local property owners suffering the damage of flooding and those of the district councils and developers promoting development. Alterations to local watercourses could also give rise to environmental conflicts.

19.3 Flooding problems at Church Stretton

Church Stretton is located on both east and west sides of the Stretton valley and on the watershed between the Teme catchment to the south and the Cound to the north. Both watercourses draining the area are prone to flooding and inadequate freeboard.

Further development will exacerbate the existing problems, although not on the same scale as at Bishop's Castle. However, development allocated for Church Stretton is mostly on a small plot-infilling basis, making it extremely difficult to demonstrate the impact of any individual developments. The effects, however, are cumulative.

It is up to the local authority to use its drainage powers to provide the surface water drainage infrastructure to cater for this type of development.

19.4 Flooding problems at Cleobury Mortimer

Although not so uniquely situated as Church Stretton, Cleobury Mortimer suffers from a similar problem in that the watercourse draining the town on its southern boundary is inadequate to accept run-off from further development. However, the problem is exacerbated by development being permitted so close to the watercourse that in places maintenance or improvement of works to the watercourse can only be carried out with great difficulty. The River Rea in Cleobury Mortimer is also a high quality aquatic habitat requiring appropriate environmental protection.

Refer to Sections 4.8, 5.3.4 and Map 13 for further information. Options for action are shown on Page 69.

ISSUE 20 - EXTENSION OF FLOOD WARNING SYSTEM

A flood warning system extends upstream on the River Teme from Powick as far as Ludlow. There are considerable areas of agricultural land and some roads upstream of Ludlow at risk of flooding but for which no service is available at present.

An extension of this service would necessitate the installation of further river level/flow gauges upstream. A need for this service by those at risk of flooding would have to be demonstrated if the additional costs are to be justified. The justification may be made easier where there is a concurrent need for the data for flow and quality monitoring as discussed in Issue 7.

Refer to Sections 4.8, 5.3.4 and Map 13 for further information. Options for action are shown on Page 70.

3.3 A SUMMARY OF THE ISSUES, AND OPTIONS FOR ACTION

The issues and options facing the catchment, described in the previous section, are shown in summary tables in the following pages. These are intended to provide quick reference to the issues and options that need to be addressed. The abbreviations used can be found in the Glossary (Appendix 6) at the back of the report.

Wherever possible the body responsible for carrying out each option has been identified. In some cases this is an individual or organisation other than the NRA. The options as presented are intended to facilitate improvements to the water environment for the benefit of all users. Costs, both capital and revenue, could be regarded as a constraint to most of the issues. The Action Plan will provide more detailed budget and timetable implications.

This should not be taken as a definitive list of issues, nor should the proposed options be taken to be the only ones available. The NRA's routine ongoing activities play an important role in addressing a number of issues. We hope that interested parties will debate these issues and pass their comments to the NRA for consideration when preparing the Action Plan.

ISSUE NO: 1	Need to safeguard high quality water, water resources and habitats		
OPTIONS	Responsibility	Benefits	Constraints
a. Seek additional EC fisheries designations on the River Redlake, Gosford Brook and Byne Brook.	NRA	Improved level of protection for existing fish stocks.	
b. Designate protection zones for groundwater supply sources.	NRA	Protection of locally important water resources.	Lack of geological knowledge and monitoring data in minor aquifers makes modelling of areas difficult or impossible.
c. Identify risks to water supply boreholes by undertaking surveys.	NRA	Reduced risks.	Lack of defined zones. Inadequate legislation to enforce work in industrial premises.

Notes:-

In addition to the above options, the NRA will address this issue through its routine and ongoing activities (refer Section 1.1.5). In particular, water resources, water quality, aquatic habitats and biodiversity will be protected through the planning liaison process, by application of the NRA's regulatory powers and groundwater protection policies, and through implementation of the NRA's area conservation and fisheries strategies. The NRA will also seek to encourage restoration of contaminated land.

An option for investigating the impact of land use changes is dependent on the outcome of a proposed pilot study in the River Severn - Upper Reaches catchment, where the problem is currently considered to be greater.

ISSUES AND OPTIONS

ISSUE NO: 2	Failure to comply with River Quality Objectives and EC Water Quality Directives		
OPTIONS	Responsibility	Benefits	Constraints
a. Improve Colwall STP as soon as feasible.	STW Ltd NRA	Achievement of RQO downstream of Colwall STP on Cradley Brook.	Not funded under AMP2, will be competing with priorities under AMP3.
b. Investigate causes and instigate remedial action - R. Kemp upstream of Colebatch.	NRA	Improved quality. Maintain objectives.	
c. Ensure improvements to Bishop's Castle sewerage system.	STW Ltd LPAs Highways Authority NRA	(See Issue 4.b)	(See Issue 4.b)
d. Implement improvements to Bishop's Castle STP under AMP 2.	STW Ltd	Improved quality. Maintain objectives.	Lack of dilution in receiving watercourse.
e. Investigate causes of poor biological quality in R. Rea and identify any remedial action needed.	NRA Farmers	Maintenance of RQO.	
f. Investigate pesticide sources on R. Teme upstream of Whitbourne WTW.	NRA	Compliance by Welsh Water Ltd with Water Supply (Water Quality) Regs 1989.	May be diffuse sources impossible to trace.
g. Control of timber preservation sites.	NRA HMIP HSE	Maintain compliance with EC Directives.	

Note: -

In addition to the above options, the NRA will address this issue through its routine and ongoing pollution prevention activities (refer Section 1.1.5).

ISSUES AND OPTIONS

ISSUE NO: 3	Agricultural pollution including the effects of ammonia and nitrate		
OPTIONS	Responsibility	Benefits	Constraints
a. Promote policies in Development Plans and liaise with LPAs to ensure applicants submit supporting information with planning applications for intensive livestock units.	NRA LPAs	Improved awareness of LPAs in taking account of water resources and quality when appraising such developments.	Time constraints.
b. Target farm inspections - identification of remedial action needed.	NRA Farmers MAFF/WOAD	Identify potential sources, reduce risk.	Manpower resource.
c. Monitor effectiveness of NVZs in reducing nitrates.	DoE	Quantify benefits.	Manpower implications.
d. Investigate feasibility of providing community-based anaerobic digester.	Shropshire CC NRA	Additional disposal route. Energy provision.	Siting. Finance.

Note:-

In addition to the above options, the NRA will address this issue by promoting the Codes of Good Agricultural Practice for the Protection of Water and Soil, encouraging farm waste management plans and uptake of free advisory visits by MAFF/WOAD, and enforcing the Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) Regulations.

ISSUES AND OPTIONS

ISSUE NO: 4	Inadequate rural sewerage		
OPTIONS	Responsibility	Benefits	Constraints
a. Amend discharge consent for West Malvern STP within constraints of AMP2.	NRA	Improved downstream water quality.	May require additional amendment not possible within AMP2.
b. Improve Bishop's Castle sewerage system (See also 2c).	S. Shropshire DC STW Ltd NRA LPA Developers Shropshire CC	Reduced flooding of properties with sewage. Reduced frequency of operation of SWO. Improved downstream water quality.	Costs. Lack of information on responsibility for various parts of system. Requires widespread co-operation.
c. Improve Church Stretton sewerage system, and problem of infiltration. Control developments.	STW Ltd NRA LPA Developers	Reduced operation of overflow. Improved downstream water quality.	Costs. Pressure for development.
d. Allow new sewage disposal only to land soakaway and public sewage works in Upper Sapey.	NRA LPA	Avoids proliferation of private STPs.	Availability of suitable land for soakaway disposal.
e. Investigate discharges to Dumbleton Brook at Clows Top.	NRA LA	Assessment of further sewage disposal problems.	
f. Identify locations and establish impact of inadequate sewerage & sewage treatment facilities within catchment.	NRA LA STW Ltd	Knowledge of extent of problem.	Requires co-operation of many organisations.

Note:-

In addition to the above options, the NRA will promote policies for inclusion in Development Plans to prevent further problems in critical locations and will liaise with Local Authorities over provision of sewerage schemes.

ISSUES AND OPTIONS

ISSUE NO: 5	Pollution risks from contaminated land		
OPTIONS	Responsibility	Benefits	Constraints
a. Investigate and assess methods of leachate management and control at Aldon Landfill.	Shropshire Waste Management in consultation with NRA and WRA	Reduce risk to groundwater and surface water.	Cost - long term.
b. Determine degree of leachate contamination around Penny Hill Landfill.	WRA Operators (Shanks & McEwan) NRA	Allows remedial action to be taken to prevent deterioration.	Difficult hydrogeological situation and difficult to clean up sufficiently.
c. Evaluate change in quality of contaminated minewater at Clows Top and modify clean up programme accordingly.	NRA	Maintenance of improvement in groundwater quality.	As b above.
d. Discourage disturbance and encourage vegetative cover when appropriate at old mineworkings at Whitegrit/Shelve.	NRA WRA LAs	Reduced downstream pollution.	
e. Review Waste Management site licences.	WRAs in conjunction with NRA	Ensures appropriate future management.	Manpower resources.

Note:-

In addition to the above options, the NRA will address this issue by implementing its 'Policy and Practice for the Protection of Groundwater' and through routine and ongoing pollution prevention activities.

ISSUES AND OPTIONS

ISSUE NO: 6	Pollution risks associated with Heyope Tyre Tip		
OPTIONS	Responsibility	Benefits	Constraints
a. Seek engineering and Waste Management solutions in liaison with interested parties.	Owners NRA Radnorshire DC WDA	Control/improve existing problem.	Cost. Co-operation from adjacent landowners.
b. Review Waste Management site licence.	Radnorshire DC NRA	Update site licence to include appropriate aftercare and future controls.	Appeal procedure.

Note:-

In addition to the above options, the NRA and interested parties will continue to monitor and assess the site drainage and the receiving watercourse.

ISSUES AND OPTIONS

ISSUE NO: 7		Deficiencies in the level of flow and quality monitoring	
OPTIONS	Responsibility	Benefits	Constraints
a. Review need for new flow measurement station on River Teme upstream of Tenbury Wells (also see Issues 8 and 18).	NRA	Would provide a control point for abstractions in the upper catchment.	Suitable site availability. Requirement to vary some of the licences in the upper catchment. Environmental impact of new flow gauge.
b. Install automatic water quality monitors on River Teme.	NRA	Early warning of pollution to allow potable abstraction to be stopped. 24 hr data produced to aid water quality interpretation and investigation.	Funding. Suitable site availability.

ISSUE NO: 8	Problems of abstraction licensing in the Teme Catchment		
OPTIONS	Responsibility	Benefits	Constraints
a. Review whether new control point is required for abstractions in the upper catchment.	NRA	May provide additional flow for protection of aquatic environment.	Existing licences may need varying.
b. Review licensing exemptions policy.	NRA in consultation with STW Ltd, DCWW, and other abstractors	Consistency of regulatory role. Improved protection from derogation for existing abstractors.	Difficulty in resource assessment. Register of existing abstractors will be required. Statutory baseline challenged - can be a lengthy process. National policy guidelines.
c. Investigate relationship between abstraction and low flows for dilution in Cradley Brook headwaters.	NRA	Protection of aquatic environment.	
d. Investigate effects of groundwater abstractions on wetland SSSIs.	NRA in consultation with EN/CCW	Greater understanding and protection of wetland SSSIs.	
e. Review surface water licensing policy, specifically the resource allocation for summer abstractions.	NRA in consultation with NFU/FUW, CLA, and DCWW	Protection of base flows.	Wider abstraction and storage requires financial investment.

ISSUES AND OPTIONS

ISSUE NO: 9	Protection, enhancement and restoration of riverine and other wetland habitats		
OPTIONS	Responsibility	Benefits	Constraints
a. Identify historic breeding areas for wading birds and recreate suitable habitats.	RSPB, NRA Landowners	Increased breeding populations of wading birds.	Landowner permissions. Potential loss of some agricultural ground/productivity.
b. Restore and create new wetlands in the Leintwardine area, upstream of Knighton and when other opportunities arise, such as gravel extraction works.	NRA Wildlife Trusts Landowners MAFF/WOAD	Increased wetland habitats, habitat diversity and associated flora and fauna. Diversification opportunities for landowners/managers.	Landowner permissions. Potential loss of some agricultural ground/productivity.
c. Encourage bridge designers to incorporate holes and ledges into new structures for enhancing bird and bat habitats.	NRA DoT Highways Agencies Highways Authorities	Increased nesting and roosting provisions for bats and birds.	Lack of willingness from some engineering designers.
d. Investigate requirements for Water Level Management Plan on River Teme.	NRA/EN MAFF/WOAD Landowners	Protection of water dependent sites of conservation interest.	Limitations on river management practices.
e. Assess prevalence of invasive weeds in the catchment and prevent further spreading.	NRA LAs	Restoration of natural riparian vegetation.	Practicality.
f. Reduce livestock grazing on land immediately adjoining rivers and wetland habitats.	Landowners MAFF/WOAD FA	Improved bankside vegetation.	Landowner agreement. Availability of incentive funding.

Note:-

See Issue 1. In addition to the above options, the NRA will address this issue through its routine and ongoing activities (refer Section 1.1.5). Countryside Stewardship extension of the Water Fringe Habitat Scheme and other appropriate schemes should be promoted in riparian locations.

ISSUE NO: 10	Notification of the River Teme as a Site of Special Scientific Interest		
OPTIONS	Responsibility	Benefits	Constraints
a. Negotiate joint management protocol and produce agreed PDO list following appropriate consultations.	NRA EN/CCW	Statutory protection of River Teme habitats and important flora and fauna.	Limitations on development, riparian land use and river management practices.
b. Develop strategy for dealing with activities in SSSI which may be on PDO list.	NRA EN/CCW	Ensures processing of applications etc. within obligatory timescales and legal requirements. Avoidance of unnecessary bureaucracy.	Impact on proposals for flood alleviation schemes in urban areas. Resource implications.
c. Designate appropriate Special Ecosystem targets and assess compliance with targets.	NRA EN/CCW	Ensures quality and appropriate investment if needed.	
d. Negotiate agreed management statements with owners/occupiers following notification.	EN/CCW	Mutual understanding of ongoing/desired management activity and voluntary agreement on conservation measures.	

ISSUES AND OPTIONS

ISSUE NO: 11		Maintenance, improvement and development of high quality Game Fisheries	
OPTIONS	Responsibility	Benefits	Constraints
a. Review byelaws and voluntary restrictions on salmon fishing methods.	NRA Fishery Owners Angling Clubs, Anglers	Reduced exploitation of multi-sea-winter salmon. Long term increase in this stock component.	Reduced catches and reduced short term value of fisheries.
b. Construct salmon passes at Buckton Weir (Teme), Tetstill Weir (Rea), Knapp and Hopton Court Weirs (Leigh Brook).	NRA	Access for salmon to potential spawning and nursery areas upstream. Increased salmon runs.	Costs and future reductions in Grant in Aid (GIA) funding.
c. Improve salmon passage facilities at Stokesay (Teme) and Halford Weirs (Onny).	NRA	As above.	Reductions in GIA funding.
d. Improve salmon spawning gravels and access to Ledwyche, Leigh, Corn and Sapey Brooks.	NRA	Increased salmon runs.	Reductions in GIA funding.
e. Undertake appropriate salmon rearing and stocking programmes.	NRA	Increased salmon runs.	Reductions in GIA funding.
f. Maintain salmon anti-poaching work.	NRA	Protection of salmon stocks.	Reductions in GIA funding.
g. Install salmon counter on proposed Knightsford Bridge flow gauging weir.	NRA	Improved monitoring of salmon runs.	Reductions in GIA funding.
h. Designate upper Teme and tributaries as game fisheries.	NRA Fishery Owners Angling Clubs	Maintenance of high quality game fisheries.	Restrictions on other types of fishery interests.
i. Determine and implement Section 30 stocking consent policy for trout.	NRA	Protection of native brown trout populations.	Limitations on stocking policies.
j. Establish rearing and/or restocking programmes for grayling, using native broodstock if possible.	NRA Fishery Owners Angling Clubs	Improvements in grayling stocks.	Availability of River Teme broodstock.

Note:-

See Issue 1. In addition to the above options, the NRA will address this issue and safeguard habitats through its routine and ongoing activities (refer Section 1.1.5). Fish will be rescued from 'drying up' lengths of the River Teme where appropriate.

ISSUES AND OPTIONS

ISSUE NO: 12	Maintenance, improvement and development of high quality Coarse Fisheries		
OPTIONS	Responsibility	Benefits	Constraints
a. Theft Act enforcement action, byelaw reviews and public awareness campaign.	Fishery Owners Angling Clubs NRA	Reduction or prevention of illegal coarse fish removals from the River Teme.	
b. Obtain coarse fish broodstock for rearing and restocking programmes.	NRA	Improvements in River Teme coarse fish stocks and supplies of farm reared fish for other areas.	
c. Carry out elver restocking programmes.	NRA	Improvements in eel stocks.	Availability and cost of elvers.
d. Construct elver passes on River Teme weirs.	NRA	Improvements in eel stocks.	Weir building, repair or renovation opportunities.

Note:-

See Issue 1. In addition to the above options, the NRA will address this issue and safeguard habitats through its routine and ongoing activities (refer Section 1.1.5), and by monitoring coarse fish populations through survey programmes.

ISSUES AND OPTIONS

ISSUE NO: 13	Impact of piscivorous birds on fish stocks		
OPTIONS	Responsibility	Benefits	Constraints
a. Investigate impacts of piscivorous birds on local fish stocks where appropriate.	NRA	Possible protection of fish stocks. Will enable the NRA to accurately respond to enquiries.	

Note:-

In addition to the above options, MAFF/WOAD should ensure appropriate consultation on applications to control piscivorous birds.

ISSUE NO: 14	Protection of rare and threatened species		
OPTIONS	Responsibility	Benefits	Constraints
a. Identify key habitat types and species within the catchment and develop and implement targets and objectives for their protection eg bats, dragonflies.	EN/CCW NRA Wildlife Trusts	Protection and recovery of habitats and species potentially at risk.	Data quality and accessibility.
b. Maintain and improve bankside cover and other riparian habitat for otters.	NRA, EN/CCW Wildlife Trusts Landowners	Consolidation and increases in otter populations.	Landowner permissions.
c. Identify current distribution of alien crayfish in the catchment.	NRA MAFF/WOAD	Assessment of scale of crayfish problem.	
d. Develop policy on alien crayfish and restrict introduction into the catchment.	MAFF/WOAD NRA, EN/CCW	Protection of native crayfish populations.	Restrictions on crayfish farming opportunities.
e. Determine the current spawning distribution of shad in the catchment and take steps to increase this if practicable.	NRA	Increased populations of shad.	
f. Determine the extent and possible impact of alder disease in the catchment.	EN/CCW, NRA Wildlife Trusts Forestry Authority	Assessment of scale of possible disease problem and potential loss of bankside tree cover.	
g. Collate records of black poplar distribution along rivers and floodplains and promote new planting at suitable sites.	NRA, EN/CCW Forestry Authority LAs Black Poplar Working Group	Identification of existing trees, identification of potential planting sites, increased numbers of black poplars in catchment.	Landowner permissions.
h. Promote availability of local stocks of black poplars.	NRA, specialist nurseries Forestry Authority LAs Black Poplar Working Group	Readily available trees of suitable genetic stock.	Viability and availability of cuttings.

ISSUES AND OPTIONS

ISSUE NO: 15	The increased demand for amenity and recreation		
OPTIONS	Responsibility	Benefits	Constraints
a. Resolve access and river use conflicts between canoeists, anglers and riparian owners.	British Canoe Union Landowners Angling bodies NRA	Better regulated use of the river for canoeists.	Lack of legal rights by canoeists. Landowners and anglers agreements.
b. Improve riverside access in the Teme/Severn confluence area, and at other suitable locations.	LAs, CoCo NRA	Improved informal recreational and amenity opportunities.	Landowner permissions.
c. Investigate viability and costs of restoring weirs through Ludlow.	Ludlow Town Council, weir owners, NRA English Heritage S.Shropshire DC	Maintenance of historic weirs and the existing river regime with its associated amenity value.	Very high costs. Uncertain ownership. Impacts on salmon migration routes.
d. Investigate options for repair of Powick Weir and implement if appropriate.	NRA Worcester City Council	Maintenance of protected archaeological structure. Improvements to salmon fishing, salmon migration and visual appearance of the weir.	High costs, possible lack of available funding. Impacts on historic value of site.

ISSUES AND OPTIONS

ISSUE NO: 16	Protection of landscape, archaeological and cultural heritage value of the catchment		
OPTIONS	Responsibility	Benefits	Constraints
a. Identify key landscape, archaeological and heritage issues in the catchment, develop policies and implement improvements where appropriate.	Archaeological Trusts NRA, LAs, CoCo/EN/CCW	Protection and improvement of sites. Enhance priority setting.	
b. Carry out landscape assessment of river corridors.	NRA, CoCo, LAs	Aid to protection of high quality landscapes.	
c. Investigate scope for archaeological river corridor surveys.	Archaeological Trusts NRA	Aid to protection of archaeological interests.	

Note:-

In addition to the above options, the NRA will address this issue by ongoing activities including maintaining a database of archaeological and historic sites, liaising closely with County and Trust Archaeologists (in particular over NRA operations which have the potential to damage sites), and promoting ESA, Countryside Stewardship and other appropriate schemes.

ISSUES AND OPTIONS

ISSUE NO: 17		Erosion and unauthorised river works		
OPTIONS	Responsibility	Benefits	Constraints	
a. Promote awareness in agricultural community of damaging impacts of unauthorised river works.	NRA NFU/FUW MAFF/WOAD EN/CCW LPAs	Maintenance of ecological status and fishery.	Potential loss of agricultural land through erosion.	
b. Enforce Water Resources Act 1991 to prevent unauthorised river works.	NRA	Maintenance of ecological status and fishery. Protection of adjacent landowners from increased impacts of erosion.	Limitations to farming practices.	
c. Enforce fisheries legislation to protect salmonid spawning gravels from unauthorised river works.	NRA	Protection of salmonid rearing potential of rivers.	Limitations to farming and mineral extraction practices.	

Note:-

The NRA will also promote the use of 'soft' bio-engineering works for bankside protection.

ISSUES AND OPTIONS

ISSUE NO: 18	Pressure for development in flood plain		
OPTIONS	Responsibility	Benefits	Constraints
a. Install more level and flow gauging stations. (Also see Issues 7 and 20)	NRA	Better data for flood plain definition and advice to customers.	Capital costs of more stations and revenue to run them.
b. Carry out ground level surveys and computer modelling.	NRA	Flood plains can be identified without actual flood information. Improved data for development control.	Costly, time consuming, need to prioritise.
c. Update Flooding Survey for S105 Water Resources Act 1991.	NRA	Data available for use by Planning Authorities and in pre-planning applications by developers.	Maintenance of up to date maps requires constant technical input.

Note:-

In addition to the above, the NRA will address this issue through its routine and ongoing activities; in particular by pressing for policies to protect flood plain from development, and restoration of natural flood plain in appropriate circumstances, to be included in Development Plans.

ISSUES AND OPTIONS

ISSUE NO: 19	Flooding at specific locations including problems caused by surface water run-off		
OPTIONS	Responsibility	Benefits	Constraints
a. Investigate feasibility of flood alleviation scheme for Knighton.	LA	Alleviation of flooding of commercial and domestic property and roads.	Capital cost, existing development restricting access.
b. Enforce maintenance work and investigate feasibility of flood alleviation scheme for Clun.	LA	Alleviation of flood risk to domestic property.	Capital cost, environmental impact.
c. Investigate feasibility of flood alleviation scheme for Leintwardine.	NRA	Alleviation of flood risk to roads/property.	Capital cost, environmental impact.
d. Investigate feasibility of flood alleviation scheme for Ludlow.	NRA	As c above.	As c above.
e. Re-examine feasibility of flood alleviation scheme for Tenbury Wells.	NRA	As c above.	As c above.
f. Design and implement flood alleviation scheme for Bishop's Castle.	LA/STW Ltd	Alleviation of flooding and provision for further development.	Capital cost, and apportionment of those costs.
g. Design and implement surface water drainage improvements for Church Stretton.	LA/STW Ltd	Provision for further development.	Capital cost, and environmental restraints.
h. Design and implement flood alleviation scheme for Cleobury Mortimer.	LA	As g above.	As g above.

ISSUES AND OPTIONS

ISSUE NO: 20	Extension of flood warning system		
OPTIONS	Responsibility	Benefits	Constraints
a. Identify need and implement where appropriate extension of flood warning system (also see Issues 7 and 18).	NRA	Timely warning of flooding for road closure and livestock evacuation.	Capital and revenue costs.

PART II

SUPPORTING INFORMATION

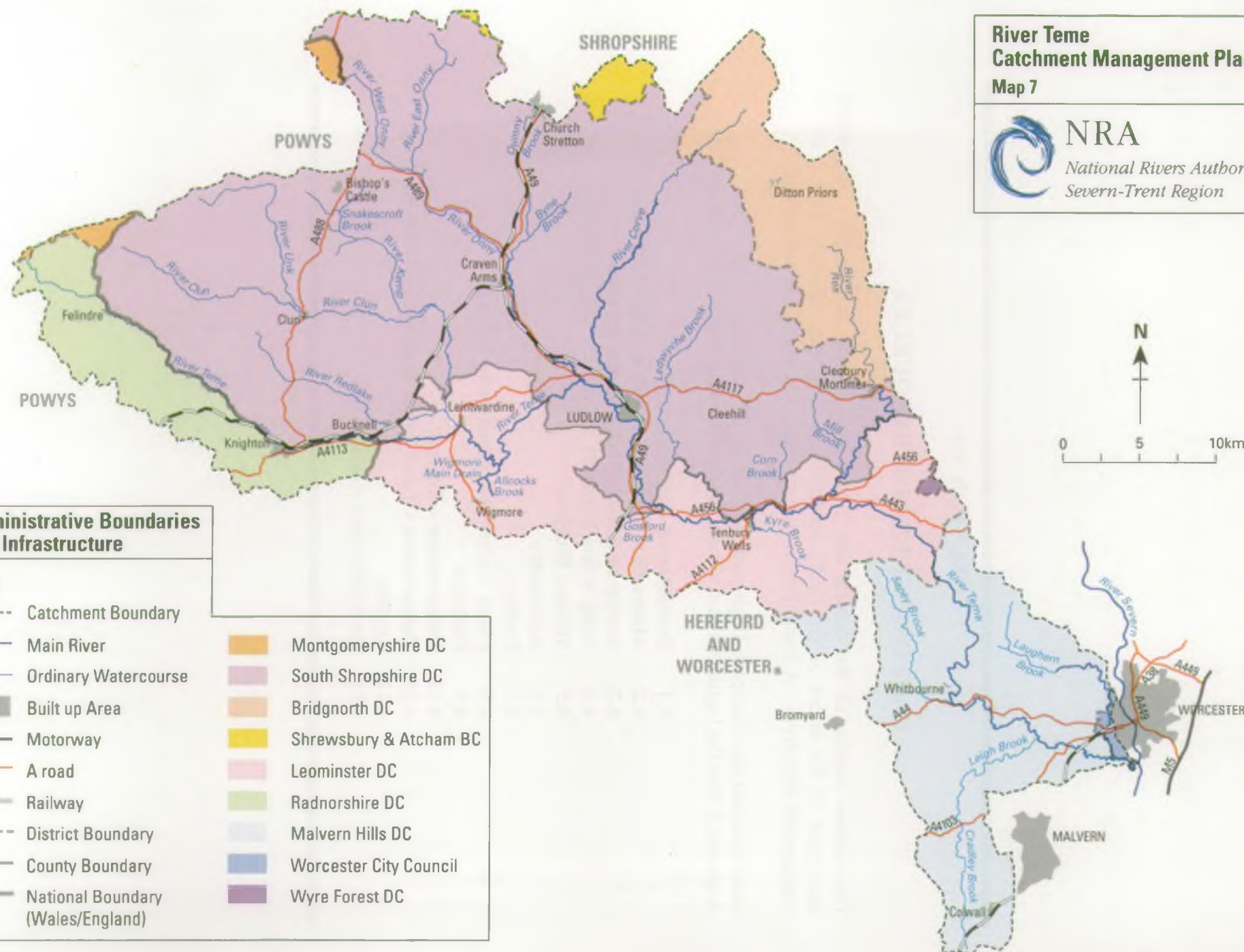
**River Teme
Catchment Management Plan
Map 7**



**Administrative Boundaries
and Infrastructure**

KEY

- | | |
|-------------------------------------|------------------------|
| ----- Catchment Boundary | Montgomeryshire DC |
| — Main River | South Shropshire DC |
| — Ordinary Watercourse | Bridgnorth DC |
| ■ Built up Area | Shrewsbury & Atcham BC |
| — Motorway | Leominster DC |
| — A road | Radnorshire DC |
| — Railway | Malvern Hills DC |
| - - - District Boundary | Worcester City Council |
| — County Boundary | Wyre Forest DC |
| — National Boundary (Wales/England) | |



4.1 DEVELOPMENT AND INFRASTRUCTURE

General

New building works, changes in land use, development of communications and the construction of new roads, sewers and other services can have a major impact on a catchment and uses of the water environment. Whilst the NRA has a responsibility to protect the water environment, to achieve this aim it must work closely with Local Planning Authorities (LPAs).

The NRA is a statutory consultee under planning legislation and advises Local Authorities on development proposals that can have an impact on matters relevant to the NRA. To facilitate this process, the NRA has produced a series of Guidance notes for LPAs (*Guidance Notes for Local Planning Authorities On The Methods of Protecting The Water Environment Through Development Plans : NRA 1994*) which outline methods of protecting the water environment. Copies of this document are available from any NRA office. The NRA proposes that these should be incorporated into the LPAs' own Development Plans, whenever possible.

The NRA also seeks to pursue its aims and policies regarding development through the planning consultation process for individual proposals. Although the final decision on planning matters rests with the LPA, government guidelines advise on the need to consider the NRA's concerns when determining proposals.

A major objective of this Catchment Management Plan is to provide the LPAs with a clear picture of the NRA's responsibilities and policies towards development of this catchment. The plan identifies all legitimate uses of the catchment so that those interests can be taken fully into account by LPAs in Development Plans.

The strategic objective for this category is:

- * To ensure that development does not adversely impact on the water environment, and wherever possible, to ensure that it proceeds in a way that is sustainable.

Local Perspective

Development Plans

The catchment falls within 3 counties, Powys (6.7% of area), Hereford and Worcester (32.1% of area) and Shropshire (61.2% of area).

Within Wales, National Planning Guidance has yet to be issued by the Welsh Office, however, Development Plans are progressing with the Deposit version of the Powys County Structure Plan (Draft Replacement) - April 1994 and Consultation Drafts of the Montgomeryshire Local Plan - October 1993 and Radnorshire Local Plan - May 1994.

CATCHMENT USES AND RESOURCES

Publication of Regional Planning Guidance for the West Midlands is imminent, the Draft version being available since September 1994. Current reviews of the Hereford and Worcester and Shropshire Structure Plans will reflect this Guidance. Table 2 shows the progress of Development Plans covering the catchment area. The recognition of NRA issues (ie the inclusion of land use policies to protect the water environment) by the current versions of these plans is generally good, with the exception of one or two covering small areas on the periphery of the catchment.

The catchment is a predominantly rural area of significant landscape and conservation value. In recognition of this, in Shropshire, the majority of the catchment is designated an Area of Outstanding Natural Beauty with a small area in the east designated an Area of Special Landscape Character. In the county of Hereford and Worcester the designated Areas of Great Landscape Value cover large portions of the east and west of the catchment, and the western slope of the Malvern Hills is designated an Area of Outstanding Natural Beauty. There are no similar designations as a result of development plans within the Powys portion of the catchment. Other conservation designations, such as Site of Special Scientific Interest, Site of Prime Importance for Nature Conservation or Special Wildlife Site also impact on land use decisions. The catchment also contains three Environmentally Sensitive Areas (ESAs) - the Shropshire Hills ESA, Clun ESA and Radnor ESA - administered by MAFF and WOAD in which farming practices compatible with the landscape are promoted.

Only a moderate rate of development is envisaged within the catchment up to 2001. Current Development Plans indicate an approximate total of 2,050 new dwellings from April 1995 to March 2001, equating to a build rate of approximately 340 dwellings per year. The majority of new housing will occur in South Shropshire District (62%) followed by Leominster District (15%), Radnorshire District (9%), Malvern Hills District (6%), Worcester City (4%), Bridgnorth District (3%) and areas within Montgomeryshire, Shrewsbury & Atcham and Wyre Forest Districts (1%).

Additional industrial/employment developments of about 55 hectares to 2001 are envisaged, much of which will occur on undeveloped areas of sites allocated for employment uses. By the turn of the century industrial/employment areas will exist to varying degrees in Bishop's Castle, Bucknell, Burford, Church Stretton, Cleobury Mortimer, Clun, Craven Arms, Ditton Priors, Eardiston, Knighton, Knucklas, Leintwardine, Ludlow, Martley, Tenbury Wells, Wigmore and Worcester.

Commercial redevelopment of the old cattle market site and redundant railway land is occurring in Ludlow and an edge of town food shopping site is proposed at Worcester.

Existing and proposed minerals extractions and waste disposal sites are covered in Sections 4.4 and 4.5.

CATCHMENT USES AND RESOURCES

There is a need to sustain rural communities from decline due to the economic and employment changes in agriculture. PPG (Planning Policy Guidance) 7: "The Countryside and the Rural Economy" outlines the land use considerations of diversification schemes, with favourable consideration being given to appropriate alternative employment uses. To initiate economic activity most of the catchment within England falls within a Rural Development Area and the western section of the catchment (approximately 80% of the total area) benefits from Eurofund Objective 5b status.

Development Control

In addition to being a statutory consultee on Development Plan proposals, the Authority is a statutory consultee on a number of categories of planning Applications. PPGs and DoE/Welsh Office circulars also recommend consultation with regard to further types of application. The number of such consultations handled by the NRA in the catchment during 1994 was 759.

Infrastructure

Whilst the catchment contains no motorways or major dual carriageway highways, it is traversed from Ashton/Orleton to Church Stretton by an important inter-regional transport corridor containing the A49(T) Ross-on-Wye to Warrington trunk road and the Cardiff to Crewe railway, (currently being considered for European status). Both the road and rail routes transport a considerable freight tonnage whilst passenger train frequency has increased to an hourly service in each direction. The Onibury-Stokesay A49(T) road improvement scheme has recently been completed. Other schemes programmed include the Wooferton Bypass, Craven Arms Bypass and Strefford Bridge to Upper Affcot improvements. The Authority has also been involved in preliminary consultations for an Ashton Bypass and Marshbrook improvement.

Another important road route is the A44 from Worcester to east and west. An extension of the Worcester Southern Bypass to join the A44 at Rushwick is proposed. Due to a change of emphasis regarding Government road transport policy and financial restraints the timing of all these road schemes is uncertain.

Other primary roads crossing the catchment include the A449/A422 at Powick, A4103 Worcester/Leigh Sinton & Storrige/Ridgeway Cross and A456 Clows Top/Wooferton. Passenger rail services also exist on the Worcester/Malvern/Hereford route and the Central Wales Line, linking Shrewsbury with Swansea.

The Elan Aqueduct, transferring water from Central Wales to Birmingham, passes through, but no longer supplies the catchment. This route is also used by a trunk water main conveying water from Trimpley Water Treatment Works (abstracting from the River Severn) towards Ludlow. Beyond this system the settlements within the catchment are served mainly by groundwater abstractions with large areas reliant on private systems.

CATCHMENT USES AND RESOURCES

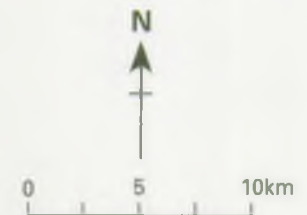
Beyond the market towns and major villages there is little public sewerage provision or strategic water supply mains. This, together with the capacity limitations in existing sewerage systems, restrains sustainable development. Issue 4 discusses this further.

CATCHMENT USES AND RESOURCES

TABLE 2 LOCAL PLANNING AUTHORITIES AND DEVELOPMENT PLANS

Local Authority	Percentage of Catchment Area	Population Estimated in Catchment	Development Plan and Current Status
Shropshire County Council	61.2%	36,500	Shropshire County Structure Plan 1989 - 2006 operative 1 Jan 1993. Work on review commencing 1995. Shropshire Minerals Local Plan - Deposit version Spring 1996. Shropshire Waste Local Plan - Consultation Draft due July 1996.
South Shropshire District Council	53.2%	33,100	South Shropshire Local Plan adopted October 1994.
Bridgnorth District Council	7.3%	3,300	Bridgnorth District Local Plan adopted September 1994.
Shrewsbury & Atcham Borough Council	0.7%	100	Shrewsbury & Atcham Rural Area Local Plan adopted June 1992. Shrewsbury & Atcham Borough Local Plan Consultation Draft February 1995. Deposit Plan due early 1996.
Hereford & Worcester County Council	32.1%	35,150	Hereford & Worcester County Structure Plan 1986 - 2001 - 2nd Alteration operative from 11 March 1993. Draft review expected Summer 1995. County Minerals Local Plan - Deposit version September 1991, public inquiry into modifications, following Inspectors report, Nov 1995. Waste Local Plan Consultation Draft due September 1996.
Leominster District Council	16.5%	9,300	Leominster District Local Plan - Consultation Draft May 1994. Deposit version due December 1995.
Malvern Hills District Council	15.3%	14,300	Malvern Hills District Local Plan - Deposit Draft June 1994. Public Inquiry June 1995.
Worcester City Council	0.2%	11,500	Worcester City Local Plan - Deposit Version September 1994. Public Inquiry October 1995.
Wyre Forest District Council	0.1%	50	Wyre Forest District Local Plan - Deposit version July 1993, Inspector's Report April 1995.
Powys County Council	6.7%	3,800	Powys County Structure Plan - operative from January 1993. Deposit version of Draft Replacement (1991-2006) April 1994. Powys Minerals Local Plan - adopted March 1995.
Radnorshire District Council	6.1%	3,650	Radnorshire Local Plan - Consultation Draft May 1994. Deposit version due December 1995.
Montgomeryshire District Council	0.6%	150	Montgomeryshire Local Plan - Consultation Draft October 1993. Deposit version due late Summer 1995.
Government Office for the West Midlands	93.3%	71,650	Regional Planning Guidance for the West Midlands - Draft September 1994, final version late Summer 1995.
Welsh Office	6.7%	3,800	Strategic Planning Guidance for Wales - submission made to Welsh Office by Assn of Welsh Planning Authorities - date of final version not known.

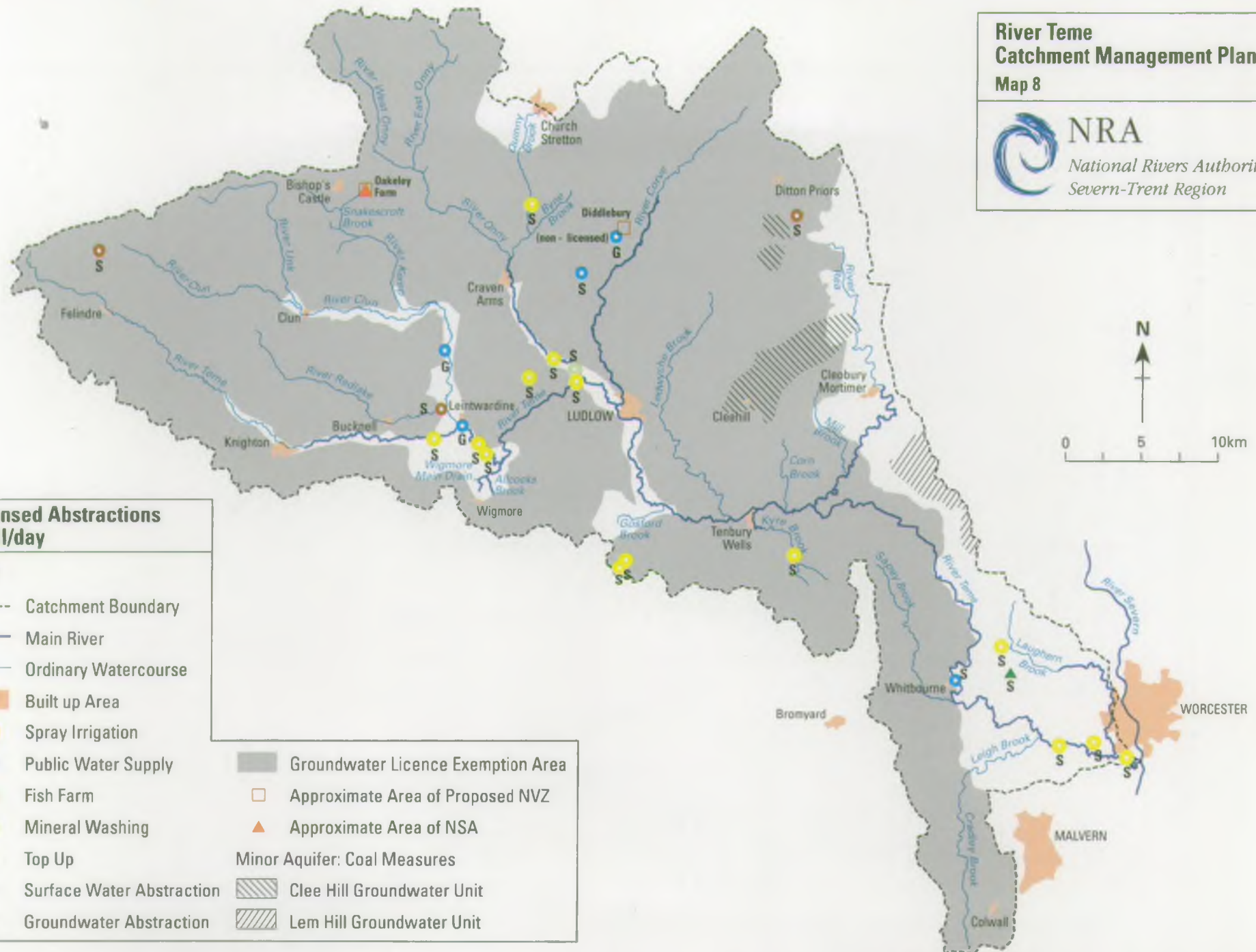
**River Teme
Catchment Management Plan
Map 8**



**Licensed Abstractions
>1Ml/day**

KEY

- Catchment Boundary
- Main River
- Ordinary Watercourse
- Built up Area
- Spray Irrigation
- Public Water Supply
- Fish Farm
- Mineral Washing
- ▲ Top Up
- S Surface Water Abstraction
- G Groundwater Abstraction
- Groundwater Licence Exemption Area
- Approximate Area of Proposed NVZ
- ▲ Approximate Area of NSA
- Minor Aquifer: Coal Measures
- ▨ Clee Hill Groundwater Unit
- ▨ Lem Hill Groundwater Unit



4.2 ABSTRACTION - SURFACE WATER AND GROUNDWATER

General

The removal of water from streams, rivers or groundwater by man is termed **abstraction**. Abstractions are controlled by licences which ensure that the right balance is struck between the needs of abstractors and the environment.

All abstraction licences specify maximum volumes that the licence holder may take, and many contain conditions to protect the environment and other abstractors. All licensed sites are visited on a regular basis to enforce the conditions on the licence.

In considering applications for new licences, the NRA must ensure that there is no derogation of existing abstractors without their agreement, and that the aquatic environment and associated habitats are properly safeguarded. The quality and quantity of water abstracted is not guaranteed. However, the NRA has a duty to protect water quality generally and will specify protection zones around groundwater sources that aim to control certain potentially polluting activities. The 'Policy and Practice for the Protection of Groundwater' forms the basis for the NRA's activities in this area.

The strategic objectives for this category are:

- * To manage abstraction to long term sustainable levels.
- * To encourage efficient water use including leakage reduction, efficient irrigation and winter storage for summer use, and to optimise re-use.
- * To safeguard public supply abstraction sources with respect to water quality and quantity.
- * To ensure where possible that groundwater resources are not over licensed or over abstracted.
- * To actively enforce the conditions of abstraction licences to protect the rights of other abstractors and the aquatic environment.
- * To further develop and implement appropriate licensing policy for abstractions in the catchment.
- * To ensure that the discharge arising from fish farms and hydropower abstractions is returned as close as possible to the point of abstraction.
- * To encourage abstractions to be made as far down a river or stream as is practical to minimise the effect of the abstraction on river flows.

Local Perspective

The majority of the Teme catchment comes within the area covered by "The Severn River Authority (Exceptions from Control) Order 1967" which exempts abstractions from **groundwater**, for whatever purpose, from licensing requirements (see Map 8). The Order may well be reviewed by the NRA in the near future (see Issue 8.2). In the meantime all abstractions from surface water sources within the catchment are controlled under the Water Resources Act 1991. Abstractions greater than 1 megalitre per day (1 ML/d) in this catchment are also shown on Map 8.

Table 3 summarises the number of abstraction licences and their different uses in the catchment under the "surface water" and "groundwater" headings.

The abstraction uses are considered in the following sub-sections:

Drinking Water (Private and Public Water Supply).
 Industry
 Agriculture
 Other abstractions

Table 3 - A Summary of Abstraction Licences in the Teme Catchment

Type of Abstraction	Surface Water Abstraction			Groundwater Abstraction		
	No of Licences	Licensed Abstraction ML/annum	Percent by Volume (%)	No of Licences	Licensed Abstraction ML/annum	Percent by Volume (%)
Private Water Supply	60	184.40	2.04	11	30.28	2.13
Public Water Supply	4	4,285.17	47.58	3	1,260.93	88.61
Agriculture (Other than Spray Irrigation)	21	58.54	0.65	51	97.70	6.87
Spray Irrigation	62	1,203.55	13.36	1	2.73	0.19
Industrial	9	92.18	1.02	2	14.30	1.01
Water Level Maintenance	2	10.55	0.12	1	17.00	1.19
Circulated Cooling Water	2	0.10	0.00			
Mineral Washing	1	317.99	3.53			
Fish Farming	3	2,428.52	26.97			
Transfer	1	25.00	0.28			
Circulation Through Pools	5	399.38	4.45			
TOTALS	170	9,005.38	100	69	1,422.94	100

4.2.1 DRINKING WATER (POTABLE) SUPPLY

General

This use is related to the supply of water from ground and surface sources for public and private supplies. Groundwater abstractions constitute supply from wells and boreholes drilled into underground permeable rocks, termed aquifers; surface water abstraction is direct from rivers, canals, lakes and reservoirs.

The NRA is not responsible for the quality of the raw water nor of the delivered, treated water. However, it does have a duty to protect water resources and is specifying protection zones around groundwater sources that seek to control certain potentially polluting activities. The Groundwater Protection Policy forms the basis for the NRA's activities in this area, on a wider, aquifer, basis by identifying Groundwater vulnerability; at a more localised level specific sources can have Source protection Zones defined around them. Within these zones and areas of groundwater vulnerability, policy statements highlight the risk of certain activities and seek to control them (See Section 5.1 for further details).

Local Perspective

Abstraction for public water supply accounts for the majority of water abstracted in the catchment (53%), comprising about 47% of the surface water total and over 88% of the groundwater total.

Severn Trent Water Ltd and Dŵr Cymru/Welsh Water both hold abstraction licences within the catchment for Public Water Supply. Severn Trent Water Ltd abstract at Clungunford, Stoke St Milborough and Seifton with abstraction licences and at Bishop's Castle, Munslow and Diddlebury without licences (these being within the "exempt area").

Dŵr Cymru/Welsh Water abstract at Leintwardine, Fairwell Springs and Whitbourne with licences and at Easton without a licence (again, "exempt area").

Most of the water abstracted for public and private water supply purposes returns to the catchment, the exception being the water abstracted by Welsh Water at their Whitbourne Works which passes out of the catchment to Bromyard and Ledbury.

Many of the private supply abstractions are unlicensed either because they are within the "exempt area" or because they are for a household's own domestic use and not more than 20 cubic metres (4,400 gallons) are abstracted per day. The legislation exempts the latter from requiring an abstraction licence. A register of all private water sources is kept by the Environmental Health Department of the local District Council. It is estimated that there are over 1300 private water supply sources within the Teme catchment, of these less than 100 are licensed with the NRA.

4.2.2 INDUSTRY

General

All abstractions for any industrial or commercial use must be authorised by a licence granted by the NRA. The only exceptions are those situated in an exempt groundwater area. Industrial licences may be for a variety of uses; either general industrial, mineral washing, cooling water or water bottling.

Local Perspective

The catchment does not contain a great deal of industry - it is in the main a rural catchment. Pockets of industry do exist throughout the catchment and some of these hold abstraction licences. A large licence is held for mineral washing at Brimfield and a licence is held for water bottling at Colwall near Malvern by a well known purveyor of soft drinks.

4.2.3 AGRICULTURE

General

Agricultural abstractions can be for a variety of purposes and this may determine whether a licence is required. Abstractions from surface water sources for less than 20 cubic metres/day do not require a licence. This includes general stock watering, use around the farm and crop spraying. All other abstractions greater than this quantity, from groundwater or for any other use such as spray irrigation or fish farming, do require a licence. However, there are parts of the catchment where all groundwater licences are exempt from licensing (See Map 8).

Each use is considered according to its impact on water resources. For example spray irrigation is a high impact use as much of the water is lost through evaporation, a problem compounded in summer months when flows are generally low and irrigation is needed most. winter storage reservoirs are therefore encouraged wherever practical.

Local Perspective

Within the River Teme catchment there are 72 licences for general agricultural purposes, 63 for spray irrigation and 3 for fish farming.

Many of the more recently issued spray irrigation licences contain a condition limiting their use to when the flow in the river is above a certain value. Table 8 (in Section 5.2) shows the different flows on the different streams and the number of licences tied to each flow threshold. The result is that the NRA may prohibit abstraction on these later licences when flows are getting critical and the aquatic environment is at risk.

CATCHMENT USES AND RESOURCES

Abstraction from smaller watercourses can also be controlled by the setting of a local prescribed flow. In this instance the abstractor is responsible for the construction and monitoring of a small weir on the watercourse to ensure downstream flows are above the prescribed value. Periodic visits by the Authority's officers are made to licence holders to ensure the licence conditions are being adhered to.

4.2.4 OTHER ABSTRACTIONS

General

There are a variety of other uses for abstracted water. These include topping up of pools, transfer of water, cooling water, industrial processing and hydropower.

Some are licensed and others are exempt from licensing. When an abstraction licence is received, its use must be considered together with all existing abstractors. This can prove quite difficult when there is no information on existing unlicensed users and the catchment is reaching its resource limit.

Local Perspective

There are no notable hydropower abstractions in the Teme catchment. Such schemes could become economically viable as technology advances, however the restraints of the proposed River Teme SSSI status and conservation issues would need to be considered. Proposals are normally accompanied by an Environmental Statement.

Dewatering of quarries, mines and engineering works is also exempt from the requirement for an abstraction licence. This may apply to the quarries found in the catchment. If such dewatering would cause problems then these must be highlighted during the Town and Country Planning process for new proposals.

4.2.5 IMPOUNDING

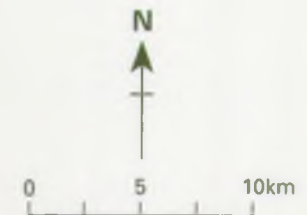
Whenever a stream is dammed up to form a reservoir or pond an Impounding licence is required from the NRA. The issue of the licence protects downstream users of the watercourse to ensure they are not deprived of their rightful supply of water. The licence does not approve the structure of the retaining dam. This is entirely the responsibility of the developer/occupier. An NRA Land Drainage Consent may also be required.

If an on-stream pool has a capacity greater than 25,000 cubic metres above the lowest surrounding ground level then its design, construction, supervision and subsequent maintenance inspections are covered by the Reservoirs Act 1975. It is the County Councils who administer this Act rather than the NRA.

Local Perspective

Within the Teme catchment a total of 62 Impounding Licences have been issued for on-stream pools varying in size from small ponds to large reservoirs.

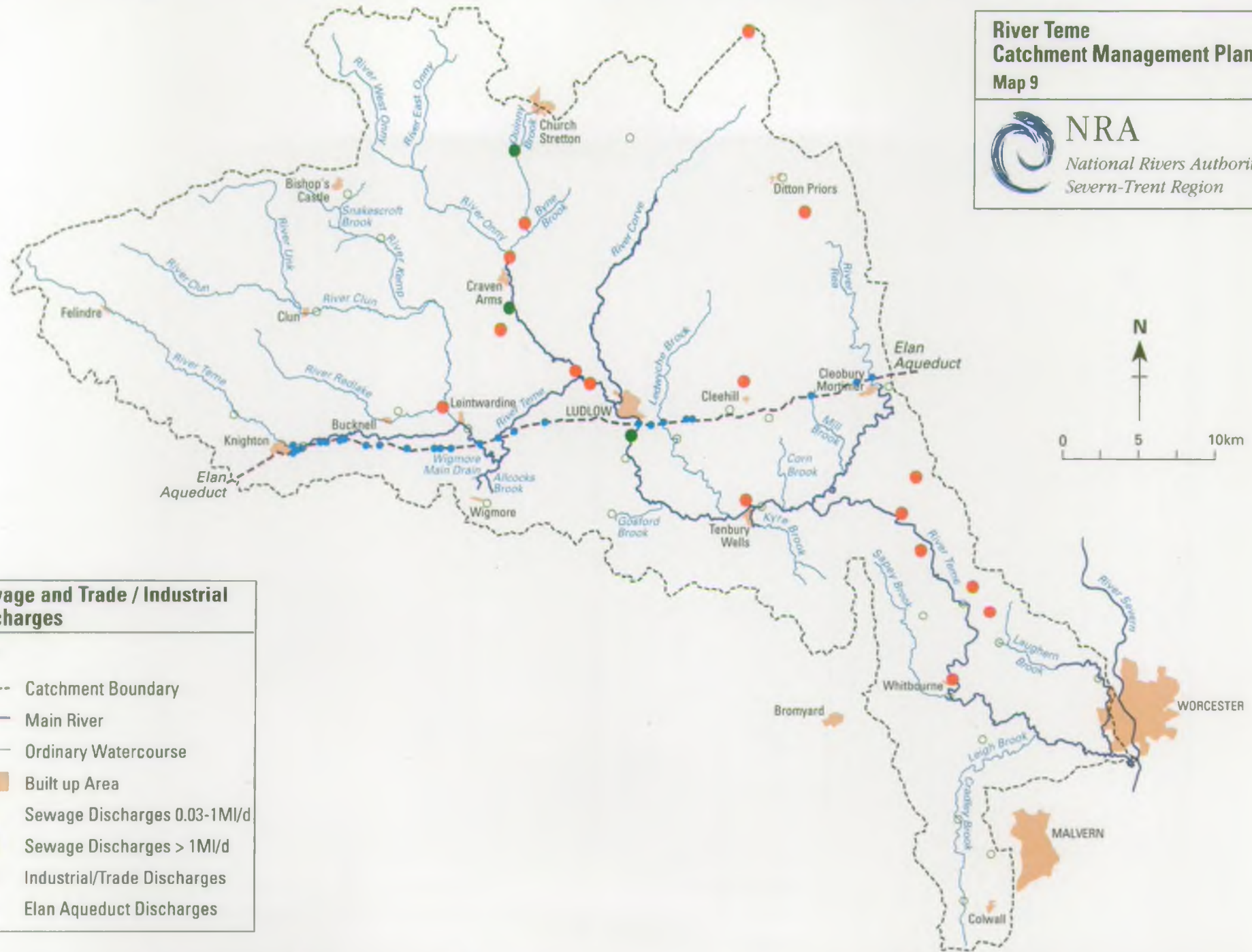
**River Teme
Catchment Management Plan
Map 9**



**Sewage and Trade / Industrial
Discharges**

KEY

- Catchment Boundary
- Main River
- Ordinary Watercourse
- Built up Area
- Sewage Discharges 0.03-1MI/d
- Sewage Discharges > 1MI/d
- Industrial/Trade Discharges
- Elan Aqueduct Discharges



4.3 SEWAGE AND INDUSTRIAL EFFLUENT DISPOSAL

General

Most sewage discharges and all trade effluent discharges require a Discharge Consent from the NRA except on sites monitored by Her Majesty's Inspectorate of Pollution. The consent specifies the volume that may be discharged, along with the parameters and concentrations with which it must comply. These conditions are determined by taking account of the River Quality Objectives and EC Directives to ensure that downstream water quality remains acceptable for all of its uses.

The strategic objective for this category is:

- * To allow the discharge of effluents to surface and groundwaters, whilst maintaining downstream water quality standards so that other uses and the conservation value of water can be maintained.

Local Perspective

Sewage

There is a total of 277 consented discharges within the River Teme catchment. Of these, 103 are sewage discharges or sewerage system overflows owned and controlled by Severn Trent Water Ltd and 150 are discharges from privately owned sewage treatment plants. The remaining 24 discharges are of trade effluent arising from a variety of industries within the catchment.

The largest sewage discharges are from the main population centres in the catchment - Ludlow (2.3 Megalitres/day), Church Stretton (2.3 Ml/d), Craven Arms (1.0 Ml/d) and Tenbury (0.9 Ml/d). The total volume of sewage effluent discharged is approximately 11.5 Ml/d which constitutes almost 5% of the dry weather flow of the River Teme at the confluence with the River Severn.

Most of the public sewerage systems have storm water overflows which operate either prior to or at the works. Most operate without causing nuisance, although those located in areas of easy public access do on occasion give rise to complaints.

The 150 privately-owned works are generally smaller plants serving populations from single dwellings to schools, and small Council or Housing Association-owned housing developments. The types of plant vary from traditional septic tank and filter beds to modern package treatment plants. At Burwarton, a novel system of sewage disposal via a system of waste stabilisation ponds has recently been installed. In some areas where there is poor permeability for septic tanks coupled with no public foul sewer the proliferation of privately-owned and managed package plants can be difficult to avoid.

Trade Effluent

The location of the 24 consented trade effluent discharges are shown on Map 9. The most significant discharges in terms of volume and potential impact arise from the quarries where large quantities of settled site drainage are discharged, and from a fish farm near Burwarton where over 1.8 Ml/d are abstracted and discharged daily.

Two trade effluent discharges are made to soakaway rather than a watercourse; these are small volume discharges from Hop Developments Ltd, Eardiston and a landfill site.

In addition to monitoring industrial premises with known discharges, periodic visits are made to other selected sites to ensure appropriate preventative measures are taken to minimise the risk to the water environment from site operations and storage facilities, in particular those related to fuels and chemicals.

Due to the rural nature of the catchment a large proportion of properties are not connected to public or private sewage treatment works but dispose of foul sewage by means of septic tanks and soakaways. Volumes of discharge are generally very small, invariably below 5m³/d. Such discharges are not normally formally controlled by the NRA. However, larger discharges and those in particularly sensitive locations in relation to groundwater quality may be controlled by use of a Prohibition Notice under the Water Resources Act 1991.

Map 9 indicates the location of the significant effluent discharges.

Elan Aqueduct Discharges

The largest discharges to the River Teme originate from either planned or emergency discharges from the stretch of the Elan Aqueduct which passes through the Teme catchment from Knighton to Cleobury Mortimer. Discharges only occur from the siphons via series of overflows and washout valves.

These discharges can be made without consent under Section 88 of the Water Resources Act 1991 Part III Control of Pollution which allows exemption from consents for such discharges. Small volume discharges occur monthly as a result of valve maintenance. Large discharges over 24-36 hours occur from washouts at Deepwood near Ludlow in April and September when the aqueduct is emptied for internal inspection. The discharges are of high quality water with low/negligible chlorine residuals since chlorination occurs at Elan only and is not boosted at any stage prior to Birmingham. Potential impacts of the discharges have been investigated by the NRA and the discharges were found to have no impact apart from slight discolouration caused by scouring.

The route of the pipeline and location of discharge points are shown on Map 9.

4.4 SOLID WASTE DISPOSAL

General

Land can become contaminated through waste disposal. Polluting waste can adversely affect surface and groundwater quality through run-off and percolation to underlying aquifers. Since 1976, waste disposal sites have required an operational licence from the local Waste Regulation Authority - the County Council in England or District Council in Wales. The NRA is consulted on each application for a licence. A Waste Management Licence details how the site is to be constructed and operated. Before a licence can be issued, planning permission is required. This contains conditions which control the way the site is restored and monitored, to prevent future damage to the environment.

Landfill sites can cause water pollution. This is because rain falling on the site can become contaminated and produce leachate which drains from the site into groundwater or streams. If the site is properly managed, long term harm to the environment can be avoided. This can be achieved by either collecting the leachate for disposal elsewhere, treating it, or allowing it to be diluted in the groundwater where it may naturally break down. Detailed studies are being carried out to help decide on the best way to deal with leachate. Badly managed sites can lead to serious pollution problems.

The NRA has published the 'Policy and Practice for the Protection of Groundwater' to advise planning authorities and others of the dangers of allowing certain types of development in areas where groundwater could be affected. It is designed to protect groundwater abstractions and resources in general from activities which could lead to contamination such as waste disposal, sludge spreading and chemical storage and manufacture.

The strategic objective for this category is:

- * To ensure that waste disposal, storage and transfer activities do not compromise water quality or water resources and they are undertaken in accordance with advice given by the NRA.

Local Perspective

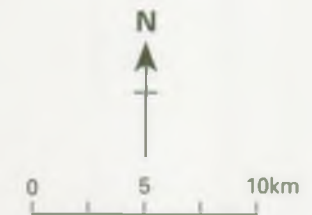
There are 18 sites recorded in the catchment, including current landfills, waste transfer stations and licensed scrapyards. Map 10 shows the location of known sites including 25 closed landfill sites. Licensing was not required until 1976 but records of sites prior to this are available from the Local Authorities.

Currently there are two domestic landfill sites in operation within the catchment - at Martley near Worcester and Aldon near Ludlow. Both sites are nearing completion and there currently appear to be no plans for replacement sites within the catchment. Problems are experienced at both sites with the generation of leachate (see Issue 5).

**River Teme
Catchment Management Plan
Map 10**



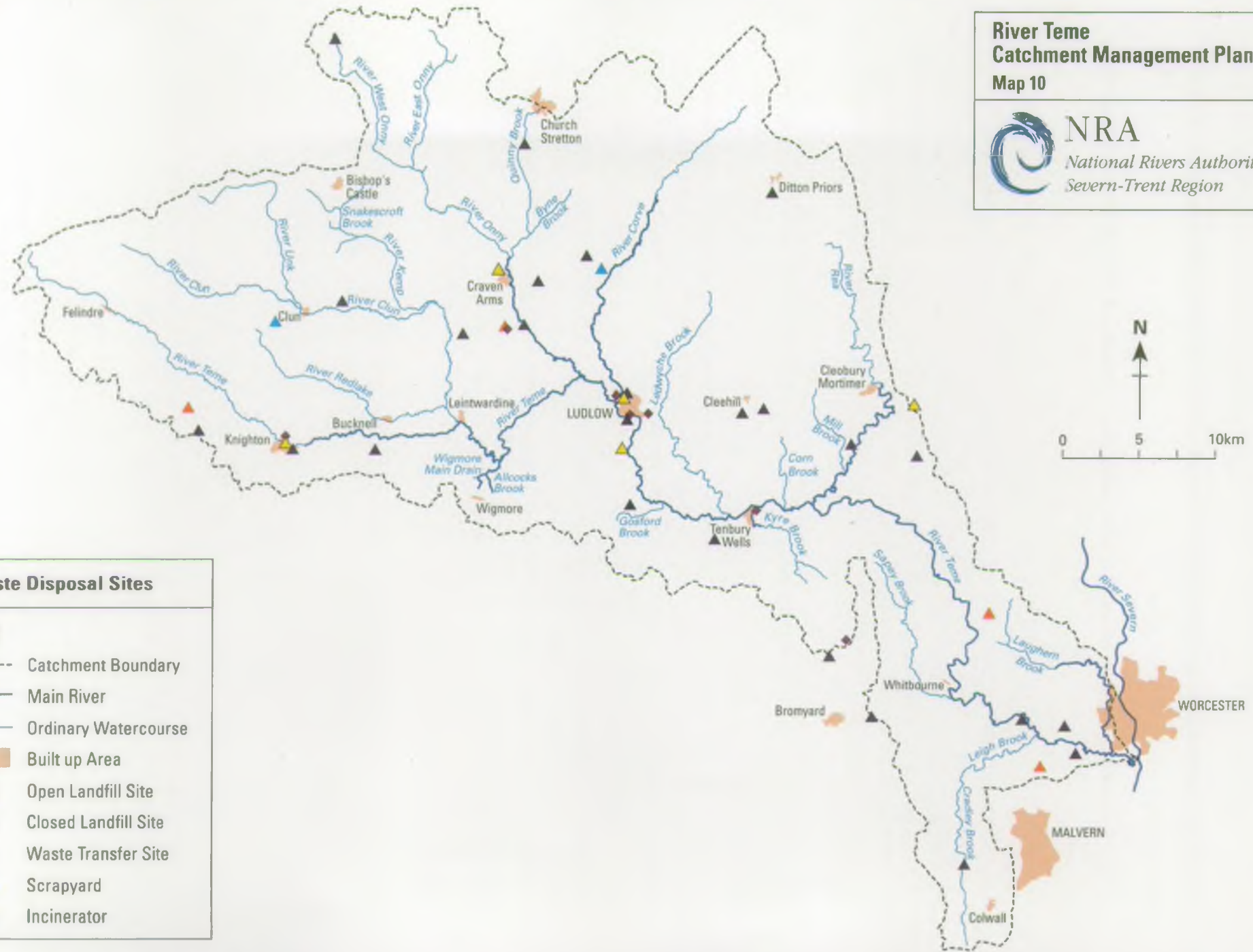
NRA
National Rivers Authority
Severn-Trent Region



Waste Disposal Sites

KEY

- Catchment Boundary
- Main River
- Ordinary Watercourse
- Built up Area
- ▲ Open Landfill Site
- ▲ Closed Landfill Site
- ◆ Waste Transfer Site
- ▲ Scrapyard
- ▲ Incinerator



CATCHMENT USES AND RESOURCES

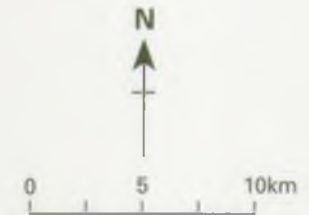
A landfill site for the disposal of tyres exists at Heyope near Knighton. Tipping has now ceased but the site has yet to be restored. Part of the site has been burning underground for over 5 years, and this, together with the problem of leachate arising from another part of the site, is further discussed in Issue 6.

There are a number of waste transfer stations licensed within the catchment. At these sites, waste is generally collected and bulked prior to disposal at landfill sites or other specialised disposal sites outside the catchment. With the imminent closure of Aldon tip a site for a new waste transfer station will be sought to collect the waste and transport it to its final destination at another landfill.

Four licensed scrapyards exist within the catchment. Although none currently give cause for concern one is located immediately adjacent to and on the banks of the River Corve. On occasion vehicle parts and bodies have fallen into the watercourse, necessitating their removal not only for aesthetic reasons but to prevent blockages and flooding downstream.

A number of disposal sites for inert wastes from construction and road building exist. Most of these are restored back to agricultural land once tipping has ceased and do not give rise to problems if properly managed. More sites are likely to be needed in the future in association with projects such as the A49 road improvement schemes.

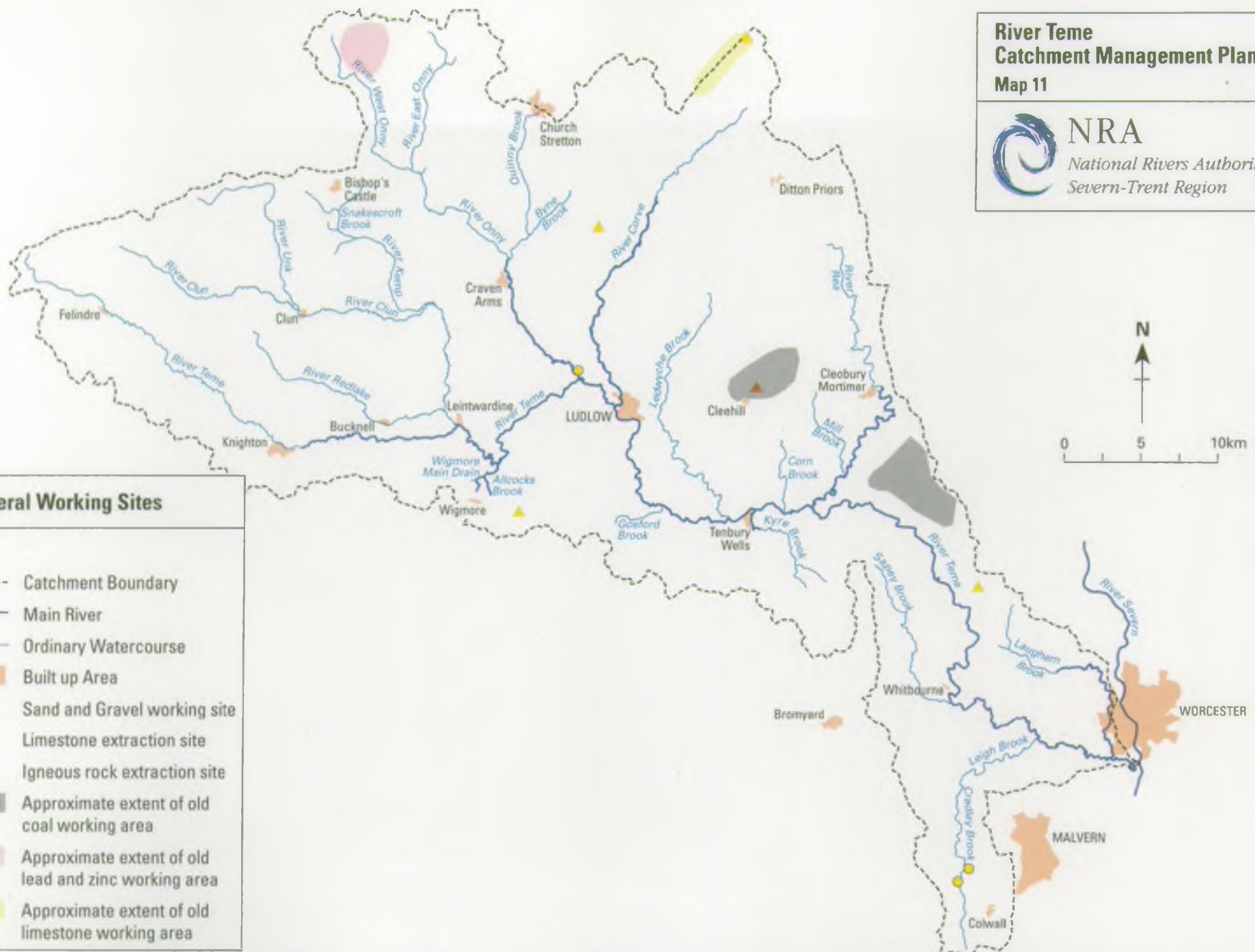
**River Teme
Catchment Management Plan
Map 11**



Mineral Working Sites

KEY

- Catchment Boundary
- Main River
- Ordinary Watercourse
- Built up Area
- Sand and Gravel working site
- ▲ Limestone extraction site
- ▲ Igneous rock extraction site
- Approximate extent of old coal working area
- Approximate extent of old lead and zinc working area
- Approximate extent of old limestone working area



4.5 MINERAL WORKING

General

Areas of current or former mineral workings can pose a threat to ground and surface waters by exposing, at times, toxic spoil or veins of potentially toxic minerals to the weathering process. As a result, run-off and discharges from quarries and mines can contain toxic and suspended material that is harmful to aquatic life. Discharges from active sites are subject to normal discharge consent procedures. However, discharges from abandoned mines are not adequately controlled by the law and may cause locally severe problems.

The exploitation of minerals can have a major impact on water resources by altering groundwater flows and hence streamflows. The removal of material from above the water table reduces the opportunity for natural filtering and attenuation of pollutants, which will consequently enter the groundwater more readily. Summer spring flows can be reduced as a result of the loss of water storage capacity of the mineral that has been removed. Reclamation with impermeable material will increase run off and reduce the recharge of groundwaters, whilst the use of mineral extraction sites for landfill waste disposal also poses a significant threat to groundwater quality.

Gravel extraction may take place from the river channel or flood plain and is controlled by planning law. It may also require a land drainage consent from the NRA. If extraction works are not properly managed, the river channel can be seriously damaged. There can also be serious implications for salmon and trout spawning sites.

Contaminated land reclamation schemes for mineral working sites may cause renewed, or even exacerbate existing, problems as unweathered toxic materials are exposed or fine solids run off into watercourses. Consequently such schemes require consultation with the NRA, and any discharges consented and monitored.

All mineral workings are subject to general planning controls. The NRA is a consultee on such applications, and the final planning consent should contain conditions which control the operations in order to satisfy the NRA's requirements.

The strategic objective for this category is:

- * To ensure mineral workings and any associated activity, including land reclamation, do not adversely affect the water environment.

Local Perspective

A considerable amount of mining for both metals and coal has occurred historically within the catchment, however, there are now no active mines.

In the western parts of the catchment, in the headwaters of the River West Onny, lead and zinc were mined from Roman times until the 1870s. Approximately 20 abandoned shafts and spoil heaps exist in the area within the Teme catchment. A small tributary flows through an old spoil heap in the Whitegrit area and problems with leaching and scouring of heavy metals have been experienced (see Issue 5).

The Clee Hill area has always been important for mineral workings. Coal has been mined over the centuries and ceased in the 1920s. Evidence of this past activity exists in the numerous spoil heaps and shafts spread over a wide area of the hill. Part of the old shaft system drains to the Corn Brook via an adit and causes an ochrous deposition on the streambed for a short distance. Short term iron-staining of streams in the area is not uncommon, and is thought to be the result of collapses within the old shaft system resulting in the release of mine water.

The settlement lagoon (an old quarry) at ARC Quarry is located above an abandoned shaft, and pollution problems in Corn Brook via the adit have occurred in the past. The lagoon was lined to prevent this and the adit is now regularly monitored by both quarry staff and the NRA.

Disused coal mines also exist in the Clows Top area. Tentative proposals to resume mining have occurred from time to time but none have come to fruition.

A sand and gravel quarry exists at Bromfield near Ludlow where gravels are extracted from the flood plain of the River Onny. The workings are immediately adjacent to the river. Water is abstracted from the river for washing the sands and gravels and all site drainage is settled prior to discharge to the watercourse. In the future the quarry is to expand into a 32 hectare site to the west of the Onny. A new conveyor and river gantry will be required to transport material over the river to the existing process plant.

The quarry at Clee Hill is located at 470m AOD (>1500 ft) in a high rainfall area at the headwaters of the Corn Brook and Benson Brook. Pollution problems have occurred in the past but have been resolved by capital expenditure, restoration works and improved maintenance by the company. Improvements are being carried out at Johnstone Hardstone near Leinthall Earls to improve the quality of effluent during wet weather conditions.

There are eight permitted minerals sites in the catchment (see map 11). All those which discharge settled site drainage to adjacent watercourses have a consent, and are regularly monitored by the NRA.

4.6 AGRICULTURE

General

With more than 80% of the land in England and Wales used for agriculture, it can have a significant impact on the water environment. In some areas, intensive agriculture has caused water pollution, low river flows, and increased the risk of flooding and damage to fisheries and areas of important conservation value.

The trend in agriculture is now changing and environmental issues are becoming more important. There are various grants, schemes and advice available on such matters, and agricultural food surpluses are also being reduced through government intervention. This should reduce the impact of agriculture on the water environment.

The NRA enforces the Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) Regulations 1991, which set down minimum standards for the design and construction of storage systems. The NRA also has a duty to regulate the abstraction of water for agricultural use.

The NRA uses other initiatives which include:

- * promoting the Codes of Good Agricultural Practice for the Protection of Water and Soil
- * promoting free pollution prevention advice from ADAS on behalf of MAFF and WOAD
- * developing best practice to prevent pollution
- * carrying out farm visit programmes
- * working in collaboration with farming groups and organisations

The strategic objectives for this category are:

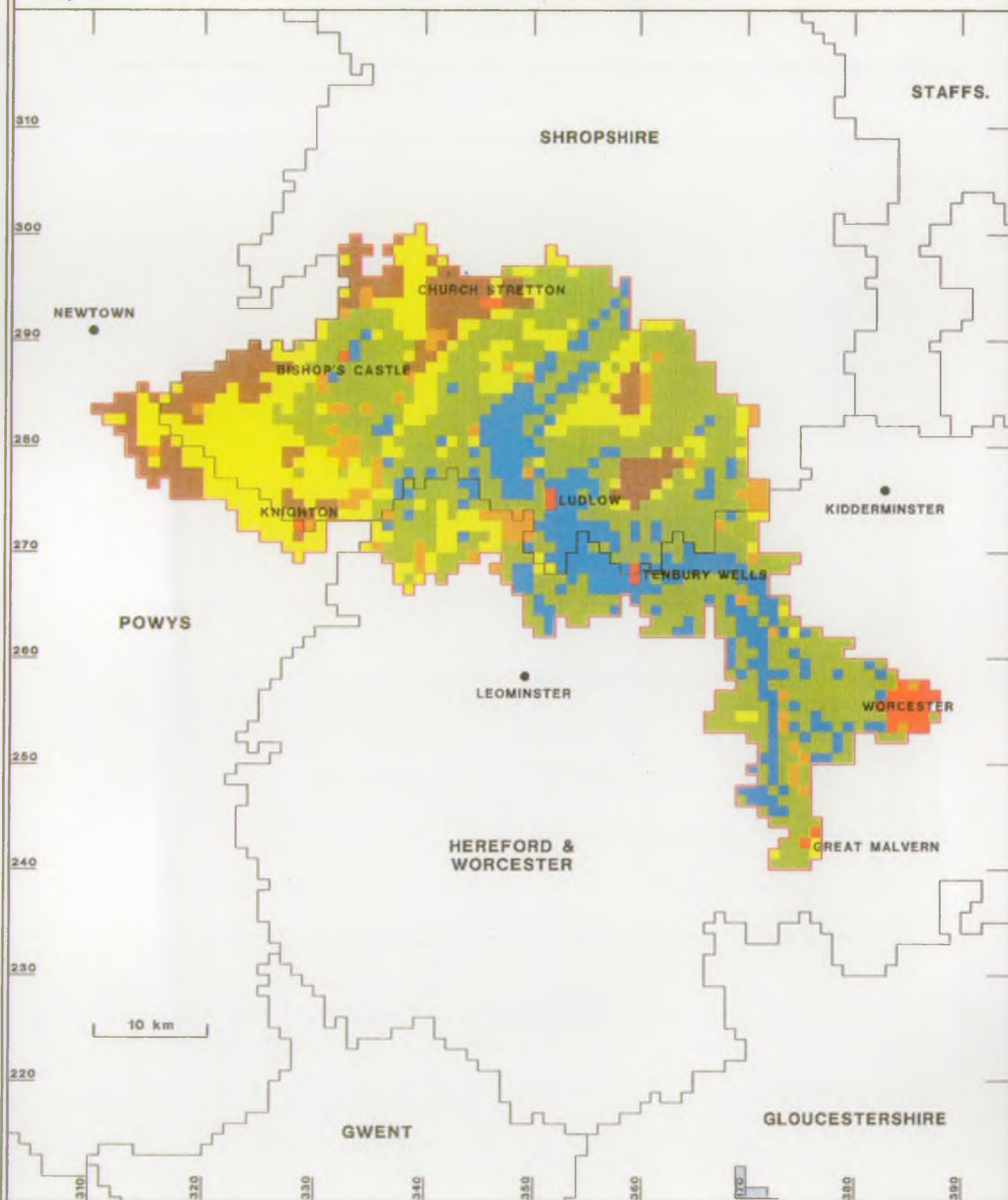
- * To ensure that farming practices do not compromise the use of surface and groundwater.
- * To ensure that farming practices do not threaten the sustainability of the river corridor ecosystem.
- * To prevent and control the pollution of surface and groundwater from agricultural activity and to encourage agricultural practices that improve the aquatic environment.

Local Perspective

The Teme catchment is predominantly rural, with over 93% of the area being agricultural. Of this agricultural land around 95% is laid down to arable and grassland. There are over 2,400 farms in the catchment.

AGRICULTURAL LAND CLASSIFICATION RIVER TEME CATCHMENT

Map 12



Agricultural Land

- Grade 1
- Grade 2
- Grade 3
- Grade 4
- Grade 5

Non-Agricultural Land

- Land predominantly in urban use
- Other land primarily in non-agricultural use

Map produced by
Resource Planning Team, ADAS
Leeds Statutory Centre, 1996
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MAFF Ministry of
Agriculture
Fisheries
and Food

CATCHMENT USES AND RESOURCES

The landscape varies from hill land in the west, to the lower land of the river valleys in the east. Land quality also varies greatly over the catchment area. This variation can be seen from Table 4 under MAFF's Agricultural Land Classification survey (ALC - refer Appendix 3). Agricultural useage relates closely to the grade of the land, which in turn is closely linked to topography. Agricultural land classification is shown on the adjacent map (courtesy of MAFF).

Table 4 - Agricultural Land Classification in the Teme Catchment

<u>Agricultural Land Classification</u>	<u>% for Catchment</u>	<u>% for England</u>
Grades 1 & 2 Excellent/v good quality agricultural land	17.5%	16.1%
Grade 3 Good to moderate quality agricultural land	47.3%	43.6%
Grade 4 Poor quality agricultural land	19.5%	12.7%
Grade 5 Very poor quality agricultural land	9.0%	8.3%
Non-Ag	4.9%	10.1%
Urban	1.7%	9.2%
<hr/>		
Total	100.0%	100.0%

Sheep farming is widespread, and increasing numbers of sheep are being raised predominantly on higher areas of land and often in conjunction with beef farming. MAFF/WOAD agricultural census data shows that sheep numbers have increased by almost 20% between 1983 and 1993, whilst total cattle numbers fell by over 16% in the same period. The fall in cattle numbers is attributable to the reduction in dairy cattle. Numbers of beef cattle, however, have risen in recent years.

Large tracts of hill land have been designated as Environmentally Sensitive Areas (ESAs) by MAFF and WOAD. Most of the Shropshire Hills and Clun ESAs and part of the Radnor ESA come within the catchment. Under this voluntary scheme, financial rewards are provided for maintaining the habitats and features of the landscape, and controls are exerted on the production and disposal of organic wastes. There is generally little, if any, slurry production associated with farming in these areas. However, sheep dip chemicals and silage effluent are commonplace, extremely polluting effluents that require careful storage and disposal.

Dairy farming is dominant on the lower land of higher quality, but there has been a decline in dairy farming, with a reduction in the number of dairy farms of over 31% between 1983 and 1993.

A small number of sizeable pig farms also exists. In addition, the intensive raising of poultry is prevalent throughout the catchment. Two hatcheries exist to supply chicks for this industry. Large quantities of organic wastes are produced by such activities. Consequently careful siting and operation of storage facilities is

CATCHMENT USES AND RESOURCES

required, together with carefully planned disposal. In the future it is possible that a large proportion (up to 200,000 tonnes per annum) from within the catchment could be used to power an electricity generating station which has been granted planning permission at Leominster. In addition, Shropshire County Council are investigating the feasibility of a community based anaerobic digester to treat agricultural wastes. As referred to in Section 5.1.2, NVZs have been designated at Oakeley Farm, near Bishop's Castle and at Diddlebury, with the aim of limiting nitrate losses from land by means of an action plan which covers matters such as quantity and timing of applications of manure and fertilisers.

A large acreage of cereals is grown, together with a wide range of other crops. An increasing acreage of beans, peas, oilseed rape and linseed has been planted in recent years, but fruit production, once dominant in some parts, has declined. The Teme Valley downstream of Tenbury has traditionally been used for hop-growing. Hops are still grown on fields close to the river, but in declining numbers - a reduction of 47% in acreage was recorded between 1983 and 1993.

Full-time agricultural holdings have fallen by over 8% in the last ten years, although these in effect have transferred to being part-time holdings, resulting in an overall increase of 3%. Generally the movement has been towards increased beef cattle and sheep farming, cropping and part time holdings, with a reduction in both numbers of dairy farms and dairy cattle.

Over the past decades, there have been changes in land use in parts of the catchment, including improvements in drainage in the upland areas. Records show that changes in the types of agricultural land use within the catchment have also been quite marked over the past ten years. Historical land use changes are alleged to have had impacts on base flows and low flows in summer, and on peak flows at times of flood. Rainfall may run off more quickly than previously, making streams more "flashy" and causing lower baseflows, with river levels falling more quickly after rainfall has finished.

Agricultural employment census data for the catchment shows the consistent trend of a reduction in the full-time agricultural workforce. Agriculture and the rural economy in general within the Marches area (which includes most of the catchment) has experienced a decline over the past decade. Around 80% of the catchment now benefits from recent designation by the European Union as eligible for Objective 5b funding assistance. Farm development schemes and diversification into new opportunities eg. food processing enterprises, farm-related tourism etc, may therefore increase during the next five years.

4.7 FORESTRY

General

Well managed forestry does not harm the water environment and will often bring benefits. However, in certain circumstances forestry development and management can cause problems. Areas of concern to the NRA include acidification, soil erosion, pollution, water yield, increased flooding risks and damage to wildlife habitats.

Regulation of forestry is the responsibility of the Forestry Authority. To minimise any adverse effects the Forestry Authority has published a series of Guidelines in respect of Water, Nature Conservation, Landscape Design and Recreation against which all forest operations are assessed. These Guidelines encourage environmentally sympathetic planting through grant aid using the Woodland Grant Scheme.

The NRA has duties and powers to deal with pollution incidents and regulate some forestry works using land drainage legislation.

The NRA intends to improve and develop the existing ad-hoc arrangements which exist with forest owners and managers, in particular Forest Enterprise, to discuss at local level management of forests and promote the whole forest design concept currently being used by Forest Enterprise.

The strategic objectives for this category are:

- * To ensure that forest activities do not cause pollution of surface and groundwaters, increase acidification or affect existing users and uses of water below forested areas.
- * To secure improved NRA links with Local Authorities on Structure and Local Plans, particularly in relation to Indicative Forest Strategies.
- * To secure improved links with the Forest Authority and forest owners and managers to recommend that forest management complies with Forest Authority Guidelines and that liaison with the NRA takes place wherever necessary.
- * To protect and enhance the conservation value of the water environment and associated land in connection with all forestry developments.
- * To ensure that forest activities do not create or exacerbate flooding problems.

Local Perspective

There are several large forested areas within the catchment, particularly on the upland region around Ludlow and Clun, and at the headwaters of the catchment. Satellite images show that 5.4% (88 km²) of the catchment is wooded.

CATCHMENT USES AND RESOURCES

Soil erosion due to forestry activities can result in siltation of surface waters. However, forestry in this area does not cause watercourse acidification due to the nature of the soils in the catchment.

Felling of mature plantations, followed by replanting is expected to increase over the next few years. There are no plans for major forestry expansion; farm woodland is the only growth area - MAFF statistics show this as having increased by 33% to 4,300 hectares within the Teme catchment over the last decade.

4.8 FLOOD WATER CONVEYANCE AND STORAGE

General

The river network acts as a conveyor of surplus water from the land to the sea as part of the hydrological cycle. Naturally cut watercourses have limited capacity; when this is exceeded flooding occurs. Normally flooding is a result of prolonged heavy rainfall or rapid snowmelt. The severity of a flood is generally described in terms of its frequency of occurrence. This is often expressed as a return period in years for example, 1 in 50 years (ie. a flood of this severity would, on average, be expected to occur once in a 50 year period).

Floods flow onto the flood plain, which is as much a part of the river as the channel which carries normal flows. These natural flood plains provide 'on-line' storage of flood water. If significant areas of flood plain are embanked, tipped or built upon, the lost storage volume leads to higher river levels elsewhere. For this reason it is not possible to alleviate flooding in all areas. The NRA normally objects to new development in flood risk areas.

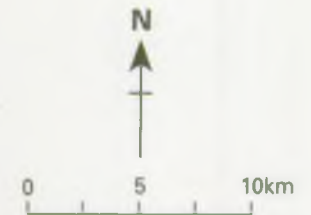
Flood defences are designed to protect an area against a flood of a particular return period. Different types of land use (for example urban and rural areas) are protected against different sizes of flood, with the target 'Standard of Service' detailed in Section 5.3 (Table 9).

Whilst the responsibility for the maintenance of any watercourse normally rests with the riparian owner (ie: the owner of the river bank and bed), certain reaches of the river are formally designated as "Main River". On main river, the NRA has permissive powers to construct and maintain defences and to control the actions of others through byelaws and the issue of Consents. District and County Councils have permissive powers to carry out works on Ordinary Watercourse (i.e: those not designated as main river), and to make Byelaws, although even their work requires NRA consent.

In respect of Flood Defence the NRA has a supervisory role over all matters relating to water courses. It has direct powers of control over the construction or alteration of structures in, over, under or within 8 metres of those watercourses classed as main river, and over the construction or alteration of culverts, mill dams, weirs or other like obstructions in any watercourse.

Wider control over the river system in relation to development is achieved through the Town and Country Planning Acts (Section 4.1) and the NRA's role as a statutory consultee.

**River Teme
Catchment Management Plan
Map 13**



**Flood Warning Reaches
and Flooding Problems**

KEY

- Catchment Boundary
- Main River
- Ordinary Watercourse
- Built up Area
- End of Flood Warning Reach
- Flood Warning Reach
- Location of known flooding problem (1990), see Table 10



CATCHMENTS USES AND RESOURCES

The strategic objectives for this category are:

- * To ensure that the effectiveness of the flood plain to store and convey flood waters is not impaired.
- * To ensure that any works in rivers do not create undue restrictions to flood flows.
- * To provide effective flood defences on main rivers for the protection of people and property to a standard appropriate to the land use.
- * To provide an adequate flood forecasting and flood warning service and to respond to flood events.

Local Perspective

Flood water in the River Teme travels from the Welsh and South Shropshire hills to the River Severn below Worcester in about 24 hours, about 48 hours before water falling on the other side of the watershed on the same hills reaches the same place via the River Severn.

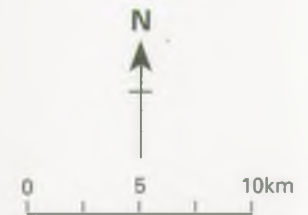
The Teme and its tributaries have extensive lengths of flood plain, although there are a few places (Leintwardine to Wigmore and some locations approaching the confluence with the Severn) where the flood plain width exceeds a kilometre. It nonetheless plays a vital role in attenuating flood flows and minimising flood levels, and needs vigilant safeguarding from encroachment by development.

Upstream of the Downton gorge the river channel is relatively shallow and starts spreading into its flood plain at least once or twice a year, but downstream of Ludlow the channel becomes very deep (over 4 metres) and the frequency with which it uses the flood plain drops dramatically.

Instances of significant urban development in the flood plain are limited to Knighton, some low-lying parts of Ludlow, and Tenbury Wells. No flood defence schemes have been implemented, although proposals were made for Tenbury Wells but were rejected by the residents during consultation in the early 1980s.

The Teme from Ludlow to the Severn confluence is covered by a flood warning scheme to enable the impact of flooding to be minimised. Map 13 shows the flood warning reaches and flooding problem areas - more details are given in Section 5.3.4.

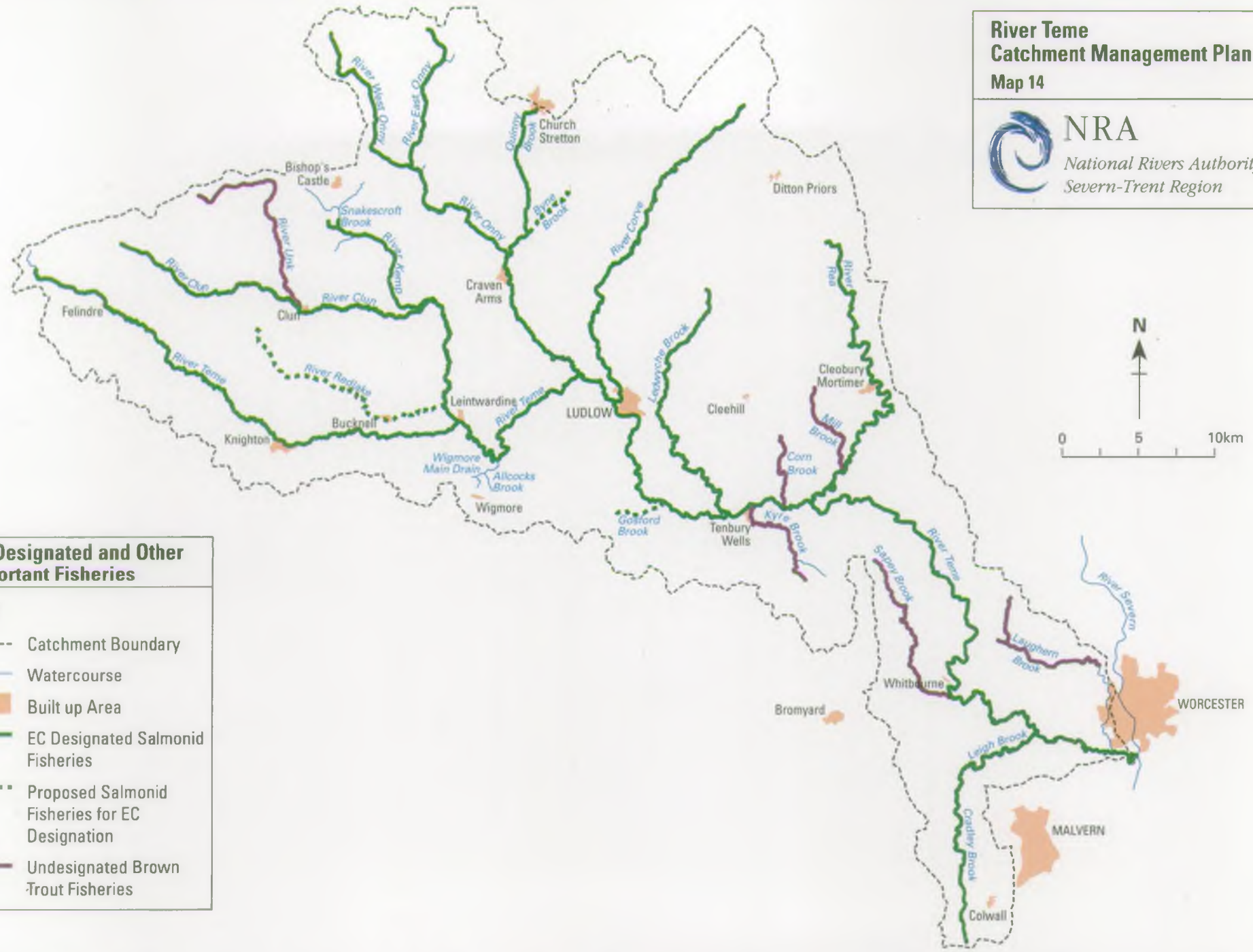
**River Teme
Catchment Management Plan
Map 14**



**EC Designated and Other
Important Fisheries**

KEY

- Catchment Boundary
- Watercourse
- Built up Area
- EC Designated Salmonid Fisheries
- Proposed Salmonid Fisheries for EC Designation
- Undesignated Brown Trout Fisheries



4.9 FISHERIES

General

The NRA has duties to maintain, improve and develop fisheries. Fish populations are affected by quality and quantity of water as well as by the availability of suitable physical habitat features. Fish are therefore important indicators of the overall health of the river.

The NRA is committed to the maintenance of breeding populations of salmonid and cyprinid fish, including the safeguarding of migration between the river and sea.

The NRA Severn-Trent Region has documented its Fisheries Strategies for all appropriate river reaches. It will use its legislative powers to ensure that the objectives for individual river reaches are achieved.

The strategic objectives for this category are:

- * To maintain, improve and develop fisheries.
- * To sustain a natural fish population appropriate to the catchment.
- * To safeguard the quality and quantity of water sufficient for this resource.
- * To safeguard habitats suitable for thriving fish populations.

Local Perspective

Most of the rivers in the catchment are designated as salmonid fisheries under EC Directive (78/659/EEC). Map 14 shows the location of these and other important fisheries.

Salmon Significant runs of salmon enter the Teme catchment, with major spawning and nursery areas in the main river from Eastham upstream to Buckton weir near Leintwardine, the present upper limit for salmon migration. Spawning also occurs in those tributaries which are accessible to salmon, such as the River Clun and the lower reaches of the Rivers Onny and Rea, Ledwyche, Gosford, Corn and Leigh Brooks.

In common with other rivers throughout England and Wales, runs of salmon have declined in recent years. In particular there have been decreasing numbers of multi-sea-winter spring-run fish and an increasing trend towards late running grilse.

CATCHMENT USES AND RESOURCES

Many of the factors affecting the size of salmon runs occur at sea, those which may be of significance in freshwater include illegal fishing, changes in land use resulting in habitat deterioration and barriers to upstream migration to spawning grounds.

The provision of fish passes at weirs on the River Teme and River Rea in recent years has opened up many kilometres of potential salmon spawning areas in previously inaccessible parts of the river system (see Section 5.3.2).

Trout

Much of the River Teme (especially the upper reaches) and most of its tributaries contain good stocks of native brown trout. Some stretches of river, most notably the Teme at Leintwardine and parts of the River Onny, are also stocked with hatchery reared brown trout of diverse origin. Such practices could dilute the genetic integrity of native stocks and result in decreased numbers of wild fish.

Many small stillwater trout fisheries exist within the catchment, stocked with both rainbow and brown trout.

Grayling

Grayling occur throughout the river, but most particularly from Leintwardine downstream to Tenbury and in tributary streams such as the Rivers Onny and Clun. Historically the River Teme was considered to be one of the best grayling rivers in the region, but stocks declined dramatically in the mid 1970s and are only now starting to recover.

Coarse fish

The middle and lower reaches of the Teme support some of the best coarse fisheries in the country, with barbel and chub thriving particularly well in the river. Barbel are not native to the Teme but spread into the river following their introduction into the River Severn during the 1950s. Most other riverine species of coarse fish are also present, including roach, dace, bream, pike, perch and gudgeon.

Eels

Eels are present throughout the catchment, but in common with rivers in most of Europe their numbers have declined in recent years.

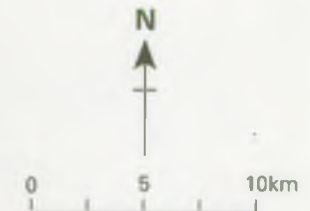
Shad

Twaite and Allis Shad enter the River Teme during Spring to spawn, although Allis Shad are now believed to be extremely rare. At the present time these migratory fish are only known to go as far upstream as Powick Weir. It is possible that shad could gain access to the river above this point via the Laughern Brook, a tributary which links with the weir bypass channel, but their occurrence upstream of Powick has not been detected to date.

**River Teme
Catchment Management Plan
Map 15**



NRA
National Rivers Authority
Severn-Trent Region



Conservation - Ecology

KEY

- Catchment Boundary
- Watercourse
- Built up Area
- SSSIs with river/
wetland Interest
- Other SSSIs
- ▲ Prime Sites with river/
wetland Interest
- ★ National Nature Reserves
- Proposed River Teme SSSI
- Rivers as Prime Sites



4.10 CONSERVATION - ECOLOGY

General

The NRA, whilst carrying out its functions or dealing with proposals by others, has a duty to promote and further the conservation of flora and fauna.

This use deals with:

- * the protection and, where appropriate, enhancement of flora and fauna which may be entirely or only partially dependent on the water environment.
- * the protection of areas formally designated as being of particularly high conservation value, including National Nature Reserves and Sites of Special Scientific Interest (SSSIs).
- * the protection of sites which, although valuable in ecological terms, are not formally protected, eg other nature reserves and Prime Sites for Nature Conservation.

The NRA Severn-Trent Region has produced a Conservation Strategy for all the principal rivers within the catchment and will use its legislative powers to ensure that the objectives for individual river reaches are achieved.

The strategic objectives for this category are:

- * To promote and further the conservation interests of the water environment, and to safeguard the conservation interests of designated sites.
- * To seek to maintain river corridors in as natural a state as possible in order to maintain ecological diversity.
- * To assess the environmental impact of all NRA activities and ensure that any adverse impacts are mitigated.
- * To safeguard the quality and quantity of water sufficient for this use.

Local Perspective

The principal nature conservation sites in the catchment are shown on Map 15.

CATCHMENT USES AND RESOURCES

Topography

The Teme and many of its tributaries demonstrate the classic pattern of a river's geomorphological development. Starting from open moorland, the rivers drop through steep sided, often wooded gorges such as Downton Gorge, then meander across the valley before flowing into a larger river where the flood plain becomes wider. Many of the watercourses have excellent tree cover, especially alders in the upper reaches and willow species further down the catchment. The tree and scrub cover along the Teme is well maintained until it reaches its open flood plain at the Severn Confluence.

The notification of the River Teme from its source to the Severn confluence as an SSSI, for its botanical and migratory fish interests, highlights the relatively natural state of the river. Many of the tributaries are also of a similarly high ecological quality.

Land Use

Although the ecological value of the water environment within the catchment is generally high, some degradation has occurred through post war land drainage and agricultural improvements, grazing, and urban development.

Habitat Types

There are 59 designated SSSIs, including Downton Gorge National Nature Reserve within the catchment. Of these, 27 are associated with watercourses or are water dependent and include wet woodland, lakes, ponds and damp pastures. There are also 154 water related Prime Sites for Nature Conservation within the area. Practical work such as fencing, tree planting and wetland creation has been, and is undertaken to protect and improve these habitats.

Mammals

Despite a national decline of the otter population in the 1960s and 1970s the upper reaches of the Teme catchment remained a stronghold for otters which are now extending their range to and beyond the Severn confluence. Mink are also widespread within the catchment and are often regarded as a pest species. Attempts to control mink by hunting may adversely affect otters which are particularly susceptible to disturbance. Although the distribution and presence of bats along watercourses in the catchment is not well known, it is likely, because of high water quality and excellent tree cover, that species such as Daubenton bat are present.

Birds

A number of locally and nationally important bird species associated with wetlands exist within the catchment, most notably kingfisher and dipper. Eroding cliffs on river meanders support many sand martin colonies, and grey wagtails are also common. Wading birds, such as lapwing, curlew and snipe, have shown dramatic declines through loss of wetland habitats primarily because of changes in farming practices. Such losses are particularly evident in the upland areas of the catchment. Towards the Severn confluence, the flood plain provides valuable roosting and feeding

CATCHMENT USES AND RESOURCES

areas for wintering wildfowl and waders.

Goosanders are continuing to expand their breeding range into many of the tributaries of the Teme including the Onny and the Clun, and their presence, together with cormorants, has led to anglers and fishery owners expressing concern over their possible impact on fish stocks.

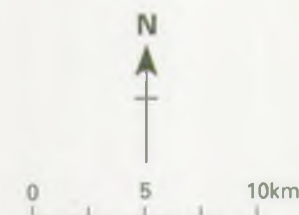
Flora

The Teme catchment is an area with a wide range of 'natural', man-influenced and man-made habitats that have provided niches for some plant species to colonise or in which others only 'hang-on'. There are at least 18 nationally scarce species present within the catchment of which 10 are associated with water or wetlands. In the upper reaches of the Teme catchment the vegetation cover and diversity is low due to the unstable nature of the river. Lower down, where Old Red Sandstone predominates, the flora is exceptionally species rich and is the most diverse for its type in England. Native populations of *Aconitum napellus* (Monk's hood) which grow on wooded stream sides are associated with the catchment area. This native population is in decline probably due to clearance as it is poisonous to animals. *Gentiana pneumonanthe* (Marsh Gentian) is found at the only remaining site in the Midlands.

Invertebrates

Most rivers in the catchment support a diverse and abundant invertebrate fauna. Records include 18 species of stonefly (Plecoptera), 21 species of mayfly (Ephemeroptera) including the rarely recorded *Ephemerella notata*, and 28 species of Caddis fly (Trichoptera), including the nationally scarce *Ylodes conspersus*. The Teme supports populations of many rare aquatic Coleoptera (including *Oulimnius major* and *Macronychus quadituberculatus*), and may be one of the most important conservation sites for riverine water beetles in Britain. The club-tailed dragonfly (*Gomphus vulgatissimus*) and the pearl mussel (*Margaritifera margaritifera*) have also been recorded in the catchment. Native crayfish (*Austropotamobius pallipes*) are also present but are under threat from "crayfish plague" introduced via commercially reared alien crayfish species. A serious outbreak of the disease occurred on the River Clun in 1992, and more recently in 1995.

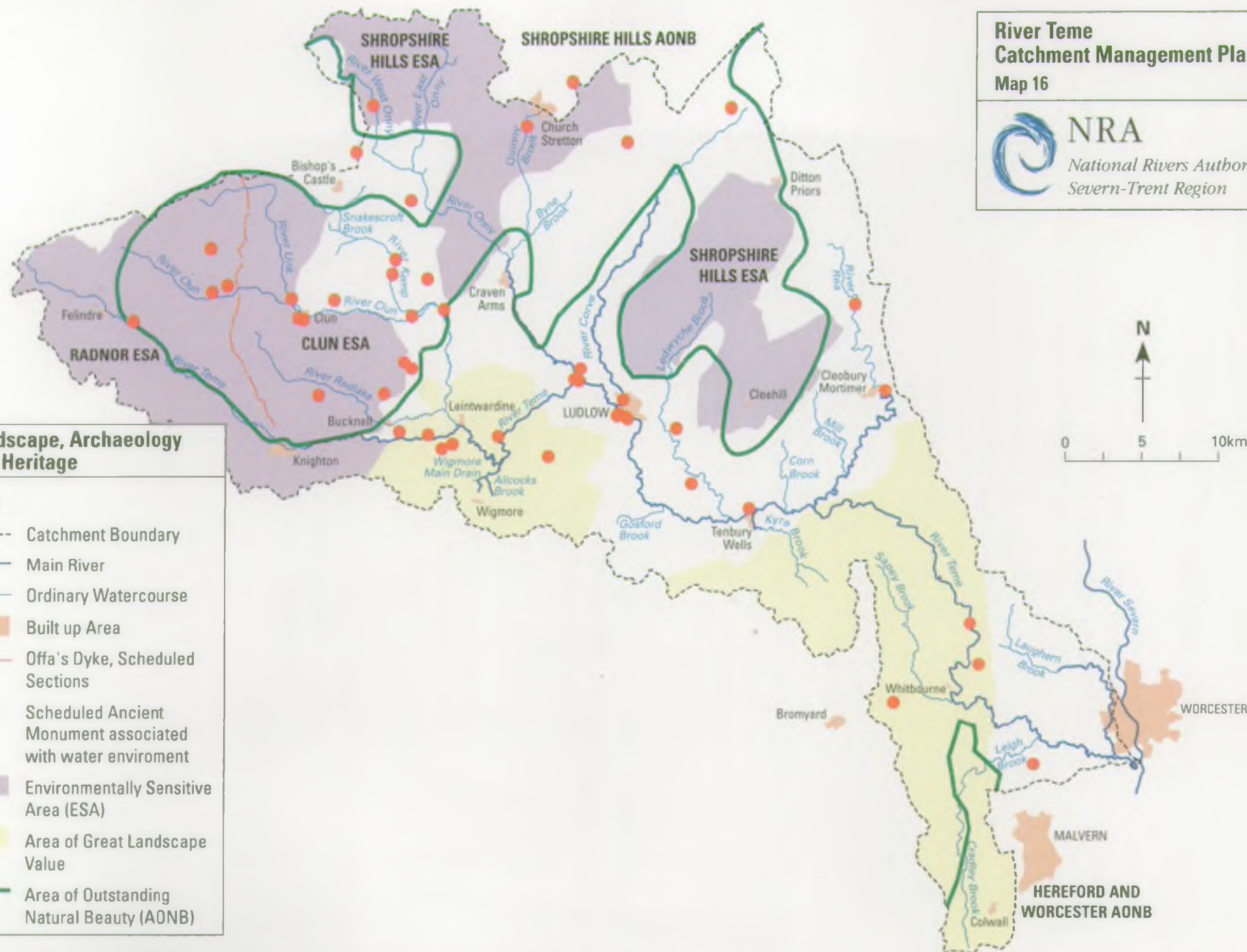
**River Teme
Catchment Management Plan
Map 16**



**Landscape, Archaeology
and Heritage**

KEY

- Catchment Boundary
- Main River
- Ordinary Watercourse
- Built up Area
- Offa's Dyke, Scheduled Sections
- Scheduled Ancient Monument associated with water environment
- Environmentally Sensitive Area (ESA)
- Area of Great Landscape Value
- Area of Outstanding Natural Beauty (AONB)



4.11 CONSERVATION - LANDSCAPE , ARCHAEOLOGY AND HERITAGE

General

The NRA has a duty to conserve and enhance landscape, archaeological, architectural and historic features which are affected by the operations it consents and licences, or by its own operations.

This use deals with the protection of areas:

- * formally designated as being of value, eg National Parks, Areas of Outstanding Natural Beauty (AONBs), Scheduled Ancient Monuments, Listed Buildings, Conservation Areas and Environmentally Sensitive Areas (ESAs)
- * which, although valuable in landscape, archaeological or historical terms are not formally protected, eg sites identified on County Sites and Monuments Records

The strategic objectives for this category are:

- * To protect the landscape, archaeological, architectural and historical features associated with rivers in the catchment.
- * To safeguard designated sites and, where appropriate, access to these sites.
- * To assess the environmental impact of all NRA activities and ensure that any adverse impacts are mitigated.
- * To safeguard the quality and quantity of water sufficient for this use.

Local Perspective

Topography The River Teme rises in the Kerry Hills from an area of open boggy moorland, passing through steep sided gorges before becoming wide and meandering in its lower reaches. It follows close to the southern boundary of the catchment where it is joined by the Corve, Onny and Clun. These tributaries originate on the Clun and Shropshire Hills where a complex geology results in a varied landscape ranging from the ancient ridge of the Long Mynd to the fine limestone escarpment of Wenlock Edge and the highest point in Shropshire, the Clee.

River valleys vary from broad dales to incised valleys. The Teme itself is a mobile river flowing mostly through a wide flat gravelly valley with good examples of features such as meanders and ox bows. In contrast, at Downton, the Teme has cut through the limestones, siltstones and sandstones of the late Silurian period to create a dramatic gorge.

CATCHMENT USES AND RESOURCES

Below Tenbury, the river is wide and retains its meandering course, the surrounding hills become rounder and softer, and woods and orchards line the slopes. Here the river is joined by small fast-flowing tributaries, some of which drain the western flank of the Malverns. These hills, with the Abberley and Suckley Hills, form a rolling landscape which separates the Teme catchment from the wide flat plains of the Severn and lower Avon beyond.

Landscape

The high quality of the landscape is reflected by the large number of statutory and non-statutory designations. These are illustrated on Map 16 and include parts of the Shropshire Hills AONB, the Hereford and Worcester AONB, the Radnor, Clun and Shropshire Hills ESAs, and non-statutory Areas of Great Landscape Value. Part of the Teme corridor is covered by 'Protection of Valley Landscape' policies in Leominster District Local Plan. The Countryside Commission is currently producing a Countryside Character programme, which will provide a consistent framework for landscape assessment and management, and will eventually be integrated with English Nature's Natural Areas programme.

There is a wide variety of landscape types which are mostly well preserved. Many of the undesignated areas in the catchment are as important as the protected landscapes and may be more at risk. Much of the diversity and interest exists in orchards with their mistletoe, in hop fields, oast houses, black poplars and common land, and in a wide range of historic buildings, parks and gardens. Local Authority groups are starting to draw up landscape guidelines for the area to protect these features.

The effects of man's past activities throughout history are also reflected in the composition of the landscape. Some areas have provisionally been designated by Local Authorities as archaeological and historical landscapes and further designations are likely to follow. In addition, ESA designation offers protection and encouragement for maintaining landscapes by various means including the continuation of traditional farming methods.

Detailed landscape assessments are available for most of the designated areas, but there are gaps to be filled.

Downton Gorge

The Downton Gorge woodlands are a relict fragment of the ancient Royal Chase of Bringewood with historical records being available of their structure and species composition. Downton was landscaped by Richard Payne Knight using the existing natural components, and has survived largely intact as a rare example of a Picturesque Landscape.

CATCHMENT USES AND RESOURCES

Brampton Bryan

The Brampton Bryan Estate has been in the same family since 1309, making it one of the longest continuous land ownerships in England. Close to the site lie the ruins of Brampton Bryan Castle which dates from the early 14th century and it is probable that the deer park was established at this time.

Archaeology

Archaeological sites could potentially be under threat from NRA operations, such as river engineering works. County Archaeologists need to be consulted on such works and appropriate action taken to protect the sites.

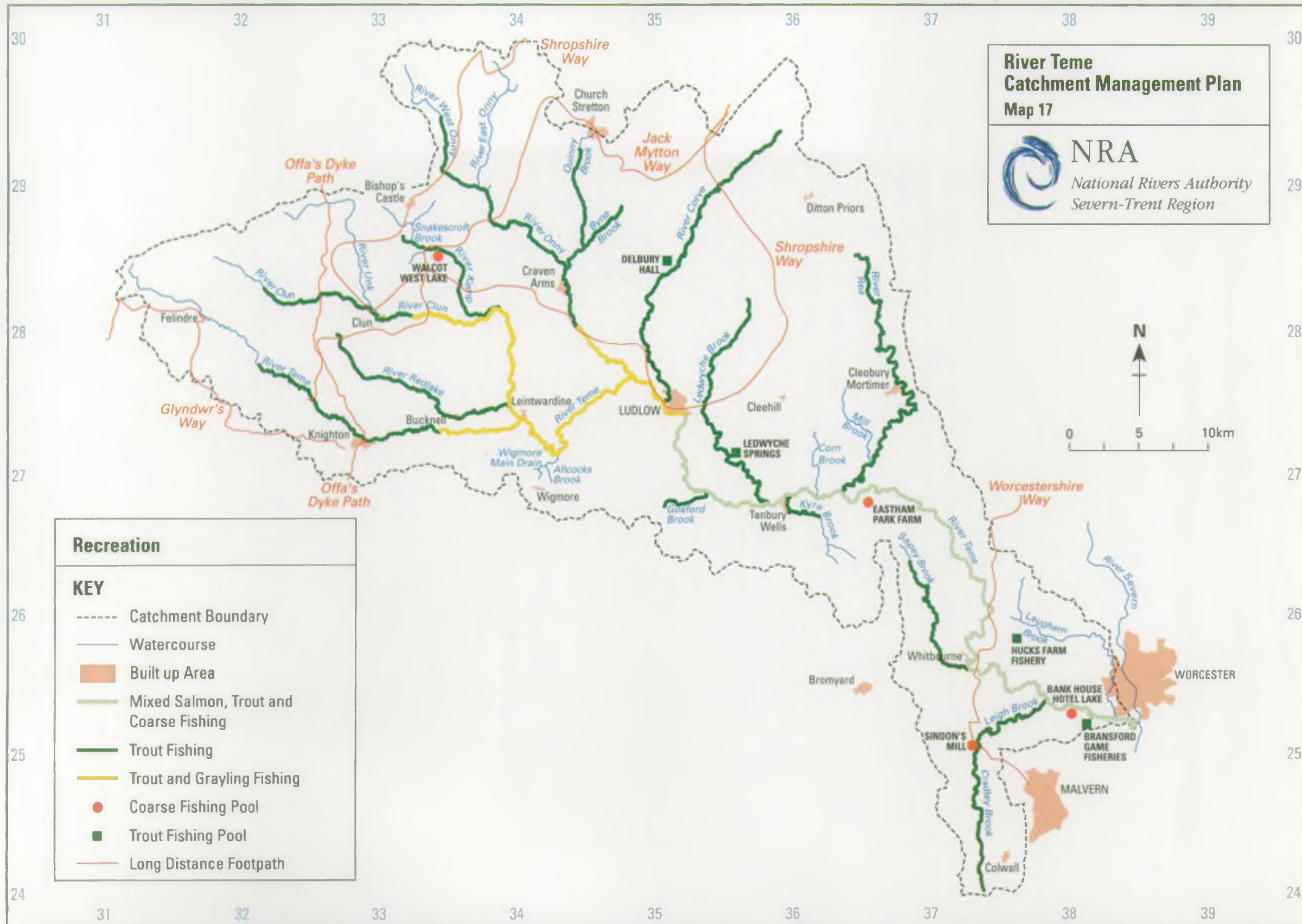
Throughout history the river has been exploited for industry and commerce. The bridgeheads at Leintwardine and Tenbury demonstrate how the control of such structures, together with the use of the river for industry and commerce, led to the development of important settlements. The Teme valley formed a major access corridor and thoroughfare for traded goods into the heartland of mid Wales. The upland rim and valley bottom have attracted settlement since at least 5000 BC, and earthworks and burial mounds are situated adjacent to the river in its upper reaches.

The use of the river and its tributaries as a power source is well illustrated by the large number of mills. What is claimed to be the World's first large scale hydro-electric power station, built in 1894, is located at Powick Mill. Numerous remains of ancient fish ponds and fish weirs also exist in the catchment.

The political importance of controlling the river is demonstrated by Iron Age hill forts, eg Woodbury Hill; Roman forts and roads, eg Buckton; Norman castles eg Clun; medieval castles, eg Wigmore, Ludlow and Richards Castle. These sites were strategically positioned to control the river for defensive and economic reasons. This strategic control of the river is also demonstrated by the Civil War Battlefield at Powick, and at Bransford and Powick where bridges were fought over in the struggle for the control of Worcester.

Offa's Dyke, the extensive territorial boundary constructed by the Mercian king in the 8th century is an important feature running across the western edge of the catchment. It crosses several of the rivers and is particularly well preserved as it crosses the Clun.

Of the 200 Scheduled Ancient Monuments (see Map 16) and listed structures within the catchment, only a small number may be affected by river activities. However, there are some situated close to watercourses, eg Ludlow Castle and several important historical bridges.



4.12 ANGLING

General

This section deals with the recreational activity of fishing with rod and line, rather than the protection of fish stocks. The latter are dealt with in the Fisheries Section 4.9.

The NRA has formal responsibility towards angling and issues rod licences that are a legal requirement for fishing for any freshwater fish.

The strategic objectives for this category are:

- * To provide suitable conditions for successful angling.
- * To improve angling by implementing measures to increase fish stocks where possible without adversely affecting water quality or nature conservation interests.
- * To safeguard the quality and quantity of water sufficient for this use.

Local Perspective

The River Teme upstream from Ludlow, and most of the tributary streams, are almost exclusively fished for trout and grayling. Wild brown trout provide good fishing in most areas, particularly in the smaller watercourses, but stocking with hatchery-reared brown trout supplements native stocks in some fisheries. Trout fishing waters of particular note are the Leintwardine Fishery on the River Teme and the Plowden Fishery on the River Onny. Nearly all of these waters are controlled by private estates, syndicates and clubs with very little day-ticket fishing available. The Leintwardine Fishing Club, established in 1870 has its waters named on Ordnance Survey Maps. Excellent trout fisheries also occur through the Downton Gorge area and the Plymouth Estates. Further down the river, the Tenbury and Tedney areas are also noted fishing waters, the latter stocked with brown trout on a regular basis. The Tenbury Anglers Association, again a very old club, was founded in 1843. Notable tributaries for trout fishing are the River Clun, River Onny, River Corve, Ledwyche Brook, River Rea and the Leigh Brook. Trout fishing also takes place in numerous, mostly small, stillwaters in the catchment which comprise a mixture of club, syndicate and day-ticket fisheries (e.g. Delbury Hall, Craven Arms and Ledwyche Springs, Ludlow).

Salmon fishing takes place principally from the Severn confluence upstream to Ashford Carbonell Weir. The lower reaches of the river, downstream of Powick, usually produce the best catches, but there are also many good holding pools throughout the middle reaches of the river. Catches have been at a low ebb in recent years, in common with rivers throughout the country, with multi-sea-winter

CATCHMENT USES AND RESOURCES

spring-run fish being particularly scarce (also see Section 5.3). Some stretches in the middle reaches of the river are maintained specifically as game fisheries, with coarse fishing actively discouraged. Examples include the Newnham Estate waters and syndicate fisheries between Little Hereford and Tenbury.

Other parts of the middle and lower reaches of the River Teme are fished primarily for coarse fish, with specimen sized barbel a particular attraction for anglers from all over the country. Most of the waters are controlled by clubs, but with good availability of day ticket opportunities. The Worcester Angling Society is believed to be the oldest angling club in England, having been founded in 1838. Numerous stillwater coarse fisheries exist in the catchment, many having been purpose built during recent years (e.g. Brockamin Pools near Worcester). Most of these pools are relatively small (< 1 hectare), but with a few larger waters such as Walcot Lakes near Lydbury North. Anglers fish for a wide variety of coarse fish in these pools, with carp a particular attraction in recent years.

Map 17 shows the main angling waters in the catchment.

4.13 RECREATION AND AMENITY

General

The NRA has a duty generally to promote the use of waters and land associated with such waters for the purposes of recreation, to the extent that is desirable.

This section includes watersports such as canoeing, but excludes angling which is dealt with separately in Section 4.12. Also included are recreational activities that are principally land based but occur within the proximity of the river corridor or wetlands, such as walking and birdwatching. The main areas of concern are access, public safety and the general aesthetic acceptability of the water environment.

The NRA ensures that land under its control is made available for recreational purposes, and that the needs of the disabled are taken into account.

The NRA does not encourage swimming in rivers and lakes because of the risk of drowning and the possibility of swimmers catching water borne diseases.

The strategic objectives for this category are:

- * To ensure that works on river channels do not prejudice recreational activities as far as is practicable and, where appropriate, take opportunities to enhance recreational facilities.
- * To promote the use of water and associated land for recreational purposes commensurate with the interests of other users and subject to the NRA's conservation duties.
- * To protect and promote public access to watercourses, including facilities for the disabled, within the framework of existing local authority and National Trust policies for visitor management, and without unreasonably constraining other users.
- * To safeguard the quality and quantity of water so it is sufficient for its recreational use.

Local Perspective

The area is used for a range of recreational and amenity activities. Much of the Shropshire Hills AONB and the western side of the Malvern Hills AONB lie within the catchment. Both are very popular with visitors, and provide numerous recreational opportunities including walking, horse riding, cycling and gliding. The Elgar and Teme Valley Leisure Drives also promote usage of sections of the catchment with informal stops being made at riverside locations. A geological trail is situated in the Ludlow area.

CATCHMENT USES AND RESOURCES

There are a limited number of camping and caravan sites within the catchment and very few at riverside locations where more informal use of the rivers take place.

The majority of riparian landholdings within the catchment are private, therefore the number of riverside locations available for public amenity are few but include Leintwardine, Clun, Ludlow, Lulsey, Knightwick and Whitcliffe, which is also popular for birdwatching. There are a small number of local nature reserves within the catchment eg Kyre Park and Horsham.

The catchment is widely used, both formally and informally, for walking. Formal use ranges from club outings by local and national groups, eg Shrewsbury Rambling and Hill Walking Club and the Ramblers Association, to Wales Rail Guided Walks. This latter scheme, promoted by the Regional Railways and Powys County Council, utilises the fact that part of the catchment is served by the Heart of Wales Railway.

Offa's Dyke long-distance footpath runs along the western edge of the catchment crossing the rivers Teme, Redlake, Clun and Unk. Glyndwr's Way follows the Teme Valley from Felindre upwards. The Shropshire Way and Worcestershire Way, paths of county importance, also pass through the catchment. A popular circular walk links up the River Teme at Powick and the River Severn at Worcester. Map 17 shows the major paths of county importance.

Horse-riding on both roads and bridleways is particularly evident in the catchment and increasing in popularity. Over-use is limited to a minority of sites, eg Long Mynd, with riverside and wetland habitats not under threat at the present time.

Although there is no legal right of navigation on the Teme, it has been canoed since at least 1936 when information on canoeing the river was included in the BCU Guide to the Waterways of the British Isles. Other rivers known to be canoed on an informal basis within the catchment include the Rea, Clun and Onny. The Teme and its tributaries provide novices from the West Midlands with their nearest "easy" white water and as such there is increasing demand for canoeing in the catchment. Rowing also takes place on the River Teme upstream of Dinham weir during the summer months. An annual coracle regatta is held at Leintwardine.

Recent conflicts have developed between canoeists, anglers and landowners, highlighted by the blocking off of an established 'informal' access point at Little Hereford and a ban on the use of the river by canoes in the Ashford Carbonell to Tenbury area (see issue 15.1).

Considerable concern has recently been expressed locally concerning the state of disrepair of many of the weirs on the River Teme through Ludlow, and the consequent loss of their amenity value should they collapse. Any renovation of the weirs is likely to be very expensive (see issue 15.3).

SECTION 5.0 TARGETS AND STATE OF THE CATCHMENT

This section explains the catchment targets and assesses the current state of the catchment for compliance. This process identifies shortfalls, which is how some of the issues, described in Part I, Section 3, were identified.

5.1 Water Quality

5.2 Water Quantity

5.3 Physical Features

5.1 WATER QUALITY

5.1.1 SURFACE WATER

General

River Quality Objectives

The NRA has strategic targets known as River Quality Objectives (RQOs) for all rivers. RQOs provide a basis for water quality management decisions and are based on a classification scheme known as River Ecosystem. The River Ecosystem scheme comprises five quality classes which reflect the chemical water quality requirement of different types of river ecosystems.

Table 5 describes the Water Quality criteria of the River Ecosystem Classification.

For each designated stretch short and long term RQOs will be proposed. They will be target River Ecosystem (RE) classes. Short term RQOs will include a date by which the target water quality should be achieved. They should be realistic, achievable and linked to planned expenditure and works within the catchment to maintain or improve water quality. Short term RQOs will be the basis of Statutory Water Quality Objectives (SWQOs) set by the Secretary of State. Long term RQOs are set for planning maintenance and improvement of water quality. There are five classes within the RE scheme, one of which will be applicable to almost every stretch of classified river. The term 'Ecosystem' is used in recognition of the need to protect the ecosystem that is sustained in a healthy river.

RQOs are established for lengths of river (river stretches) defined according to their upstream and downstream limits. Physical features such as tributaries, weirs, or significant discharges often mark the ends of river stretches owing to their potential significant effects on water quality.

Details of the RQOs assigned to river stretches and compliance with RQOs including the monitoring data upon which compliance assessment is based is included on the Public Register (information on which can be obtained from the Area Office).

Some Consents for water company sewage treatment plants are based on historical performance rather than target river quality and the targets can only be met by improvements in effluent quality. The NRA has negotiated a programme of improvements with the DoE and water companies under the terms of Asset Management Plans (AMP). The second stage of these plans (AMP2) was agreed in July 1994 with the industry regulator OFWAT. The plans will govern priorities for investment for the period covered by this plan.

TARGETS AND STATE OF THE CATCHMENT

Water Quality within each River Ecosystem class can be described as:-

Class RE 1: Water of very good quality (suitable for all fish species).

Class RE 2: Water of good quality (suitable for all fish species).

Class RE 3: Water of fair quality (suitable for high class coarse fish populations).

Class RE 4: Water of fair quality (suitable for coarse fish populations).

Class RE 5: Water of poor quality (which is likely to limit coarse fish populations).

Unclassified: Water of bad quality (in which fish are unlikely to be present), or insufficient data available by which to classify water quality.

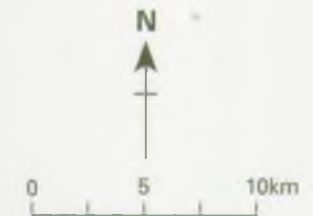
Table 5 - River Ecosystem Classification : Water Quality Criteria

Class	Dissolved Oxygen % saturation	BOD (ATU) mg/l	Total Ammonia mg N/l	Un-ionised Ammonia mg N/l	pH lower limit as 5 percentile; upper limit as 95 percentile	Hardness mg/l Ca CO ₃	Dissolved Copper µg/l	Total Zinc µg/l
	10 percentile	90 percentile	90 percentile	95 percentile			95 percentile	95 percentile
RE1	80	2.5	0.25	0.021	6.0 - 9.0	≤10 >10 and ≤50 >50 and ≤100 >100	5 22 40 112	30 200 300 500
RE2	70	4.0	0.6	0.021	6.0 - 9.0	≤10 >10 and ≤50 >50 and ≤100 >100	5 22 40 112	30 200 300 500
RE3	60	6.0	1.3	0.021	6.0 - 9.0	≤10 >10 and ≤50 >50 and ≤100 >100	5 22 40 112	300 700 1000 2000
RE4	50	8.0	2.5	-	6.0 - 9.0	≤10 >10 and ≤50 >50 and ≤100 >100	5 22 40 112	300 700 1000 2000
RE5	20	15.0	9.0	-	-	-	-	-

EC Directive Reporting

EC Directives apply to the quality of surface water for potable (drinking water) abstraction, to support fish life and to control the discharges of dangerous substances. Relevant directives are summarised in Appendix 2.

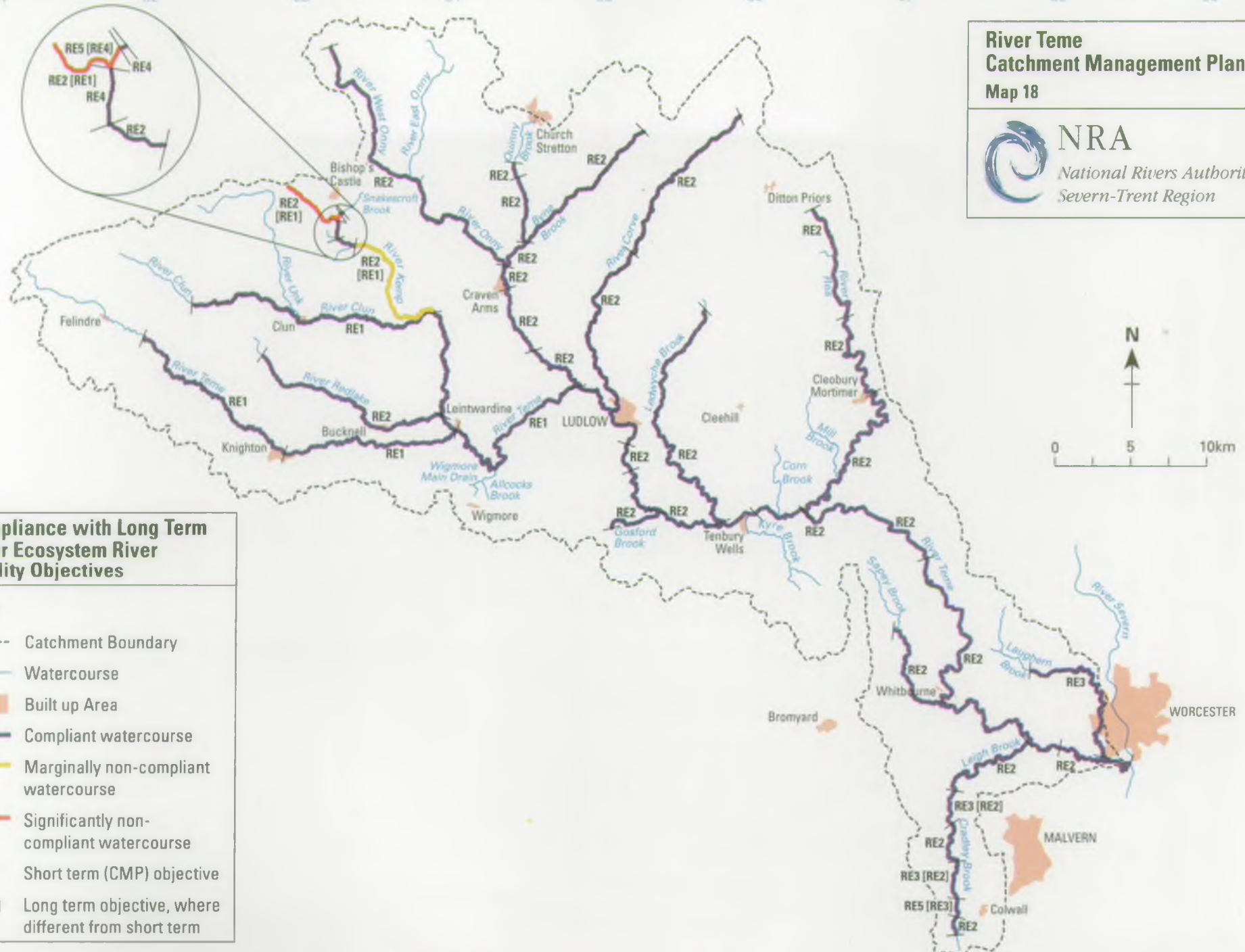
**River Teme
Catchment Management Plan
Map 18**



**Compliance with Long Term
River Ecosystem River
Quality Objectives**

KEY

- Catchment Boundary
- Watercourse
- Built up Area
- Compliant watercourse
- Marginally non-compliant watercourse
- Significantly non-compliant watercourse
- RE* Short term (CMP) objective
- [RE*] Long term objective, where different from short term



TARGETS AND STATE OF THE CATCHMENT

Local

Table 6 identifies the river stretches covered by this catchment management plan together with the River Ecosystem classes assigned to them.

The column headed Current Quality describes actual quality of the river over the last three years (1991-1993) in terms of an RE Class.

The next column, Short Term Objectives, shows the RE class assuming that all the consented discharges within each stretch of river discharge up to their consent limit in terms of quality and quantity. The objective should be met within the plan period ie. the next five years and will take account of any improvements planned by Severn Trent Water Limited under the water industry's agreed capital investment programme (AMP2).

The final column, entitled Long Term Objective, is the objective beyond the plan period and is a translation of the river quality objective from the former NWC classification scheme.

In developing its proposals for Short Term RQO, the NRA has taken account of restrictions on further investment by the water industry, as agreed by Government during recent negotiations on water charges. In some cases, these restrictions mean that effluent discharge Consents are not adequate to achieve Long Term RQOs.

Where this is the case, the NRA is obliged to propose a Short Term RQO that is less stringent than the Long Term RQO and in some cases worse than present quality. In these cases the NRA will strongly encourage Severn Trent Water Ltd to explore all cases where it will be feasible to operate their sewage works at a standard that will protect current quality and uses of the river.

Where a Short Term RQO is of poorer quality than the Long Term RQO, it indicates that the needs of the river are not adequately met by current investment, and that the uses to which the river is put are therefore in jeopardy. This highlights priorities for future investment by the water industry.

State of Catchment

River Quality Objectives

Map 18 is a representation of the state of the catchment in terms of how the current quality compares with the long term River Ecosystem Targets. Three categories are shown, based on statistical analysis of how compliant current quality is with Long Term Objectives. The categories are Compliant, Marginal Failure and Significant Failure. This categorisation allows problems to be identified and quantified. The Long Term Objectives are shown in brackets where they are different from the Short Term (CMP) Objectives.

TARGETS AND STATE OF THE CATCHMENT

Stretches indicated with an asterisk (*) in Table 6 require work to be undertaken or completed in order to achieve class objectives within the plan period (12.9 km in total). Those stretches that significantly fail their River Ecosystem Target Class are shown as Issues in Section 3 (Issue 2).

Over 95% of the river stretches meet their RE objectives. Only 4.4 km of river significantly fails to reach its target objective (River Kemp 4.0 km, Snakescroft Brook 0.4 km). There is one marginal failure - a 8.5 km stretch of the River Kemp.

EC Directive Reporting

One monitoring point fails to meet the Environmental Quality Standard (EQS) for the abstraction of drinking water. Details are shown below:

<u>River</u>	<u>Site</u>	<u>Parameter</u>	<u>Date</u>	<u>Result</u>	<u>Limit</u>
R Teme	Whitbourne	Hydrocarbons	21.12.94	0.4 mg/l	A1 0.05 mg/l A2 0.20 mg/l

Pollution Incidents

During 1994, 155 pollution incidents were reported and investigated in this catchment. No major (Category 1) pollution incidents occurred, although there were 28 'significant' incidents. The largest number of Category 2 pollution incidents were of agricultural origin. A significant proportion also resulted from oil spillages from a variety of premises. Table 7 summarises information available on pollution incidents by cause and type.

TARGETS AND STATE OF THE CATCHMENT

Table 6 - River Ecosystem River Quality Class Objectives

RIVER	UPSTREAM BOUNDARY	DOWNSTREAM BOUNDARY	REACH LENGTH (km)	CURRENT QUALITY	SHORT TERM (CMP) CLASS OBJECTIVE	LONG TERM CLASS OBJECTIVE
Teme	Ford below Beguildy	Knighton STP	15.3	RE1	RE1	RE1
	Knighon STP	A4113 bridge Leintwardine	12.5	RE1	RE1	RE1
	Leintwardine	Ludlow STP	21	RE1	RE1	RE1
	Ludlow STP	Ashford Carbonell Bridge	2.2	RE1	RE2	RE2
	Ashford Carbonell Bridge	Tenbury STP	11.6	RE2	RE2	RE2
	Tenbury ST	Confluence River Rea	4.2	RE2	RE2	RE2
	Confluence River Rea	Stanford Bridge	11.8	RE2	RE2	RE2
	Stanford Bridge	A4103 Bridge Rushwick	36.8	RE2	RE2	RE2
	Rushwick	River Severn Confluence	7.0	RE2	RE2	RE2
Clun	Moor Hall Tributary	River Teme Confluence	28.0	RE1	RE1	RE1
Kemp	Bishops Moat	Snakescroft Brook *	4.0	RE2	RE2	RE1
	Snakescroft Brook	Acton Bank Brook	1.5	RE4	RE4	RE4
	Acton Bank Brook	Acton Pool Brook	1.5	RE1	RE2	RE2
	Acton Pool Brook	River Clun Confluence *	8.5	RE2	RE2	RE1
Snakescroft	Footbridge - The Villa	Bishops Castle STP	0.1	RE4	RE4	RE4
	Bishops Castle STP	River Kemp Confluence *	0.4	RE5	RE5	RE4
Redlake	Foot Bridge Upper Trevor Ward	River Clun Confluence	15.0	RE2	RE2	RE2
Onny	The Marsh	Quinny Brook	23.5	RE2	RE2	RE2
	Quinny Brook	B4385 Craven Arms	2.0	RE2	RE2	RE2
	B4385 Craven Arms	A49 Onibury	5.8	RE2	RE2	RE2
	A49 Onibury	River Teme Confluence	4.5	RE2	RE2	RE2
Quinny	Little Stretton	Church Stretton STP	0.1	RE1	RE2	RE2
	Church Stretton STP	B4370 Marshbrook	1.0	RE2	RE2	RE2
	B4370 Marshbrook	River Onny Confluence	7.0	RE2	RE2	RE2
Byae Brook	Upstream of Coats	Quinny Brook	12.5	RE1	RE2	RE2
Corve	Footbridge Corve Barn	Corve Bridge, Diddlebury	13.8	RE2	RE2	RE2
	Corve Bridge, Diddlebury	River Teme Confluence	18.6	RE2	RE2	RE2
Brimfield Brook	Orleton/Wooferton	River Teme Confluence	4.0	RE2	RE2	RE2
Ledwyche Brook	Bank House Bridge	River Teme Confluence	22.0	RE2	RE2	RE2
River Rea	B4364 Neenton	Farlow Brook	12.0	RE2	RE2	RE2
	Farlow Brook	A4117 Cleobury Mortimer	5.0	RE2	RE2	RE2
	A4117 Cleobury Mortimer	River Teme Confluence	18.0	RE2	RE2	RE2
Sapey Brook	Harpley	River Teme Confluence	8.0	RE2	RE2	RE2
Leigh/ Cradley Brook	Cummins Farm	Colwall	1.5	RE2	RE2	RE2
	Colwall	Mathon	1.0	RE3	RE5	RE3
	Mathon	Hoe Court	1.5	RE2	RE3	RE2
	Hoe Court	Cradley STP	3.0	RE1	RE2	RE2
	Cradley STP	Longley Green	2.5	RE2	RE3	RE2
	Longley Green	River Teme Confluence	7.5	RE2	RE2	RE2
Laughern Brook	Woodhalls Farm	River Teme Confluence	14.1	RE2	RE3	RE3

* Stretches which require work to achieve CMP objective

TARGETS AND STATE OF THE CATCHMENT

Table 7 - Pollution Incidents 1994

Type	Category 1	Category 2	Category 3	Total
Industrial & Commercial	0	7	3	10
Water Utility Companies	0	0	10	10
Agricultural	0	13	15	28
Other	0	8	55	63
Non-Pollution	/	/	44	44
TOTALS		28	127	155

Cause	Category 1	Category 2	Category 3	Total
Chemical	0	3	2	5
Oil	0	8	16	24
Sewage	0	1	32	33
Agricultural	0	13	14	27
Other	0	3	19	22
Non-Pollution	/	/	44	44
TOTALS		28	127	155

Category 1: A major incident involving one or more of the following:

- * Potential or actual persistent effect on water quality or aquatic life.
- * Closure of potable water, industrial or agricultural abstraction necessary.
- * Extensive fish kill.
- * Excessive breaches of consent conditions.
- * Extensive remedial measures necessary.
- * Major effect on amenity value.

TARGETS AND STATE OF THE CATCHMENT

Category 2: A significant pollution which involves one or more of the following:

- * Notification to abstractors necessary.
- * Significant fish kill.
- * Measurable effect on invertebrate life.
- * Water unfit for stock.
- * Bed of watercourse contaminated.
- * Amenity value to the public, owners or users reduced by odour or appearance.

Category 3: Minor

- * Suspected or potable pollution which on investigation proves unlikely to be capable of substantiation or to have no notable effect.

The largest total number of pollutions was caused by discharges of sewage, mostly originating from septic tanks and causing localised pollution problems. Some of these problems were dealt with in liaison with the District Councils' Environmental Health Departments.

5.1.2 GROUNDWATER

General

The NRA's 'Policy and Practice for the Protection of Groundwater' (PPPG) provides advice on the management and protection of groundwater on a sustainable basis. This policy deals with the concepts of vulnerability and risk to groundwater from a range of human activities. It considers both source and resource protection, i.e. protection for the area which drains to the abstraction point (source) and protection for the total area of the aquifer irrespective of abstractions (resource).

It deals in particular with:

- * control of groundwater abstractions
- * physical disturbance of aquifers and groundwater flow
- * discharges to underground strata
- * waste disposal to land
- * disposal of slurries and sludge to land
- * contaminated land
- * diffuse pollution

TARGETS AND STATE OF THE CATCHMENT

- * unacceptable activities in high risk areas

The implementation of the policy relies in part on the construction of a series of 53 maps covering England and Wales. The maps being produced are to reflect the groundwater vulnerability (resource protection) using a combination of soil characteristics and geology. This information is used to indicate areas of high, medium and low groundwater vulnerability on Major, Minor and Non Aquifers respectively (refer Section 5.2.2). They are being published by the NRA and produced by the Soil Survey and Land Research Centre with the British Geological Survey.

The policy recognises three groundwater source protection zones, which are currently being defined. These are:-

Zone I (Inner Source Protection): Immediately adjacent to the source area defined by a 50 day travel time from any point below the water table to the source (based on biological contaminant decay).

Zone II (Outer Source Protection): Area defined by 400 day travel time (based on the delay and attenuation of slowly degrading pollutants).

Zone III (Source Catchment): The complete catchment area of groundwater source.

The controls to be exerted on a given activity will be more stringent the more vulnerable the resource and the nearer the source. The source protection zones apply to abstractions, but are only predefined and modelled for major potable sources.

Work is underway to develop a national groundwater quality monitoring scheme, to provide a more comprehensive set of data than is currently being collected.

Groundwater quantity targets are discussed in Section 5.2.2.

State of Catchment

The national framework policy for the protection of groundwater is designed to manage groundwater protection effectively in the catchment. Groundwater resources are generally very limited throughout the catchment due to the geology, but they are locally important where abstracted.

The NRA is producing a series of detailed groundwater vulnerability maps over the next 5 years. The maps covering most of this catchment (Sheets 21 and 29) are available from H.M.S.O. Some information on the groundwater vulnerability and also the source protection zones modelled is available from the Regional NRA office in Solihull.

TARGETS AND STATE OF THE CATCHMENT

These vulnerability maps and source protection zones, and sometimes older information, are used in the consideration of proposals that could pose a risk to a particular source. Refinement of a source protection zone would be undertaken if more detailed hydrogeological information became available. Developers in connection with specific proposals may submit appropriate data which will be considered by the NRA for the modification of the existing zone.

The NRA has examined all groundwater sources used for public supply, and any at which the nitrate levels exceed 50 mg/l (as NO₃) or are likely to exceed 50 mg/l by 2010 have been put forward as candidate zones for designation under the EC Nitrate Directive 91/676/EEC. This aims to limit nitrate losses from agricultural land by means of measures to be put out for consultation during 1995 as an "action plan". The draft action plan includes restrictions on the application of both inorganic and organic fertilizers as well as on agricultural practice. The measures are likely to be in line with good agricultural practice. Candidate Nitrate Vulnerable Zones (NVZs) have been defined for the Oakeley Farm (near Bishop's Castle) and Diddlebury sources and these are currently undergoing the specified consultation process.

The NVZ around Oakeley Farm has also been designated as a Nitrate Sensitive Area (NSA). This is a voluntary scheme whereby farmers can agree to more restrictive practices under a number of options and in return receive compensation in line with the perceived reduction in yield. Farms can join this from 1995 and will sign up for 5 years.

Disused boreholes exist at Newcastle-on-Clun and at Soudley near Church Stretton. It is possible that in the future these sources could be brought back into use to meet future demand needs. The catchments of these boreholes are therefore still designated as aquifer protection zones in order to safeguard groundwater quality.

5.2 WATER QUANTITY

5.2.1 SURFACE WATER

General

There are four main use types which can affect the natural flow regime of a river. These are:-

- * Abstractions
- * Discharges
- * Reservoirs and Impoundments
- * Land Use Changes

Abstractions can reduce the quantity of water in rivers and streams. Discharges generally increase the flow. Reservoirs and impoundments affect flow and levels in a more complex manner. Where an impoundment is used for water power, for example, a head may be built up to generate electricity over a short period. This has the effect of cutting down the flow in the river while the reservoir fills, then increasing flow during generation.

Abstraction licences have been issued since 1965. Initially, 'licences of right' were issued to anyone who had been abstracting during the previous five years. Special conditions related to river flows could not be imposed on those licences, but since then, applications to abstract have been determined on an individual basis and conditions imposed to protect the environment and other abstractors' rights.

It is the practice in Severn-Trent Region to restrict surface water licences to different flow rates. The more recent the licence, then the earlier in the season is the likelihood of a licence restriction being imposed. These restrictions help to ensure that adequate flows are maintained in the summer months.

Surface water flows to watercourse are affected by increased development in the catchment. Urban development increases the quantity of run-off and decreases the amount of rainwater which is absorbed into the ground and possibly recharges the aquifers. The time taken for the rain to reach watercourses is reduced, particularly where the developed area is sewered direct to the watercourse system. These aspects affect the flow regime in a catchment, often leading to increased flood peak flows and reduced base flows.

Through liaison with Planning Authorities, the NRA seeks to ensure that the effects of development on the flow regime of the catchment's watercourses are minimised.

The NRA has analysed information on water use and has prepared a Regional Water Resources Strategy. Forecasts of future demands will be reviewed to try and anticipate needs for water resources and to consider ways of meeting those future demands.

TARGETS AND STATE OF THE CATCHMENT

State of Catchment:

The River Teme is a very natural catchment in that flows are not regulated in any way from reservoirs in the upper reaches. The natural flow is affected along its length only by the discharges into the watercourses and the abstractions from the watercourses.

Licences for abstraction from the streams and rivers are issued with special conditions relating to flows in the watercourses as measured by the NRA's gauging stations or by a measuring structure constructed by the abstractors themselves. The conditions are set to ensure that the river users downstream are protected (See Issue 8.1).

The NRA has a team of enforcement officers who regularly visit the holders of abstraction licences to ensure the conditions of their licences are being observed. Failure to observe licence conditions can result in legal action being taken, although the NRA is sometimes reluctant to take this final step, preferring instead to persuade or encourage the abstractor into adhering to the licence conditions.

Table 8 shows the number of licences on each stream which are controlled by the NRA's gauging station at Tenbury Wells or at Onibury. It also shows the effect of the restriction i.e. whether abstraction is to reduce or cease completely. It can be seen from the table that some licences are restricted at a higher threshold than others. These are the licences which have been issued in the more recent years.

5.2.2 GROUNDWATER

General

Water quality targets are covered by the NRA's 'Policy and Practice for the Protection of Groundwater' (Section 5.1.2).

Geological strata which contain groundwater in exploitable quantities are called aquifers whereas rocks which do not readily transmit water are called non-aquifers.

Major Aquifers are highly permeable formations usually with a known or probable presence of significant fracturing. They may be highly productive and able to support large abstractions for public supply and other purposes.

Minor Aquifers can be fractured or potentially fractured rocks which do not have a high primary permeability, or other formations of variable permeability. Although these aquifers will seldom produce large quantities of water for abstractions, they are important for local supplies and in supplying base flows for rivers.

TARGETS AND STATE OF THE CATCHMENT

Non-Aquifers are formations with negligible permeability that are generally regarded as not containing groundwater in exploitable quantities.

Water quantity targets are related to resource capacity and the environmental needs of watercourses reliant on groundwater to sustain baseflows during periods of dry weather.

The NRA's Severn-Trent Region categorises areas of groundwater (aquifers) on the basis of policy towards further development of groundwater resources. The policy is based on present intensity of use and an understanding of environmental problems related to existing levels of abstraction. The classification is:-

Category A: No resources available.

Category B: Special study needed and presumption against large licences

Category C: Special study - no presumption

Category D: Resources available

In groundwater units where resources are available further licensing of new abstractions is possible, but the objective is to ensure this is not beyond the sustainable limit.

State of Catchment

Much of the catchment is underlain by Non-Aquifer and Minor Aquifer, and groundwater resources throughout the area, particularly in the west, are generally very limited.

The Non-Aquifer consists mainly of pre-Devonian sediments, and Triassic Mercia Mudstones downstream of Whitbourne. The Minor Aquifer largely comprises Devonian Old Red Sandstones, with small areas of Coal Measures.

Parts of two minor groundwater management units fall within the plan area, representing the Minor Aquifers of the Coal Measures. These are the Lelm Hill (D.8.3) and Clee Hill (D.8.4) units, and are shown on Map 8 (Section 4.2). Both are in resource capacity Category D. Most of the catchment is currently exempt from licensing for groundwater abstraction, with the exception of an area alongside the eastern boundary, gravels adjacent to the watercourses, and a small area round Church Stretton (see Map 8 and Issue 8.2).

TARGETS AND STATE OF THE CATCHMENT

Table 8 - Abstraction Restrictions Dependent on Prescribed Flows in Surface Watercourses at NRA Gauging Stations

Source of Abstracted Water	No of Licences	Watercourse used for PF	NRA Gauging Station	Flow Threshold Ml/d	Type of Restriction
River Teme	1	River Teme	Tenbury	190	reduce
River Teme & Trib	11 + 2	River Teme	Tenbury	159	cease
River Teme & Trib	1 + 1	River Teme	Tenbury	190	cease
River Teme	3	River Teme	Tenbury	159	reduce
River Corve	2	River Teme	Tenbury	159	cease
River Corve	1	River Teme	Tenbury	190	reduce
Brimfield Brook	1	River Teme	Tenbury	159	cease
Ledwyche Brook	2	River Teme	Tenbury	159	cease
Ledwyche Brook	1	River Teme	Tenbury	190	cease
Kyre Brook	1	River Teme	Tenbury	159	cease
River Rea	1	River Teme	Tenbury	159	cease
Leigh Brook & Trib	1 + 1	River Teme	Tenbury	159	cease
Laughern Brook & pond	8 + 1	River Teme	Tenbury	159	cease
Field drainage system unnamed trib of River Onny	1	River Onny	Onibury	25	cease

PF = Prescribed Flow

Trib = Tributary

5.3 PHYSICAL FEATURES

General

This section considers targets for physical features on rivers and river corridors in the catchment and includes fishery, conservation and recreational matters and flood defence works. The term conservation includes flora, fauna, features of archaeological, architectural, historic and physiological interests.

Physical features targets and an evaluation of the state of the catchment, particularly for conservation and fisheries, are subjective. Data from many sources including routine fish surveys, biological and habitat surveys are used to identify key characteristics of the catchment and areas that are apparently deficient in certain essential or desirable features such as spawning gravels, riparian tree cover or in-river habitats. The habitat requirements of the wildlife associated with rivers are too complex to allow simple targets to be set, even if such habitats could be effectively measured. Consequently, until such time as quantitative physical targets can be set, Catchment Management Plans will adopt the general theme that the abundance and diversity of physical features, typical of the type of river, should be maintained and where possible, improved.

The physical features requirements for the recreational use of water cannot be quantified in order to set firm targets, although lack of provision can be assessed and targets for provision made.

For flood defence, the current state of the catchment has been assessed by looking at flood histories and areas known to flood. Flood Defence standards are set according to land use.

Water Level Management Plans (WLMPs) are to be prepared for all water dependent SSSIs, over the next few years. The preparation of these plans (to protect water dependent habitats) will be undertaken by the Responsible Authority. The NRA is the Responsible Authority in some cases and where a WLMP is required in the short term it will appear in the CMP as an issue. English Nature (EN) has identified Burrington Meadow SSSI (low priority) and the proposed River Teme SSSI (see Issue 10) as sites in the Teme catchment which in their view require WLMPs. The NRA is not the operating authority on the Burrington Meadows site, but will be discussing plan requirements for the River Teme proposed SSSI with EN in due course.

5.3.1 CONSERVATION (including wildlife, landscape and archaeological interest)

Targets

It is difficult to apply conservation targets in that there are no statutory objectives. In the absence of such specific targets, at a minimum the aims and objectives of the NRA

TARGETS AND STATE OF THE CATCHMENT

Conservation Strategy should be met in relation to all work carried out within the function.

Targets are to:

- * Ensure that future development does not reduce the conservation value of the river corridor and where possible improves it.
- * Undertake environmental assessment of all NRA works and identify opportunities for increasing the conservation value of rivers and wetlands and for improving the quality of the water-related landscape in association with these works.
- * Carry out NRA consenting practices and respond to development proposals in a manner that ensures that natural features such as emergent vegetation, meanders, pools and the landscape are preserved and enhanced where appropriate, and features of archaeological, architectural and historic interest are preserved.
- * Seek opportunities for the NRA to carry out capital and revenue projects to protect or improve the physical character of the water environment
- * Liaise with other bodies to promote and support initiatives for the maintenance of wetland, wet meadows, in-stream and bankside habitats.
- * Seek opportunities, where appropriate, to control livestock access to river banks, thus minimising bank damage and allowing regeneration of bankside vegetation in order to maintain habitat, shade cover and natural vegetation for the benefit of wildlife in the river corridor.
- * Take special account of the requirements to protect the proposed SSSI status of the River Teme and agree NRA protocols and PDO lists with English Nature.
- * Safeguard rare and protected species within the catchment and obtain additional information on the distribution and abundance of such species.

State of Catchment

Rivers in the catchment support an abundant and diverse flora and fauna, with nationally and internationally rare and protected species present (see Section 4.10).

The high conservation value of the River Teme is reflected in its proposed SSSI status (Issue 10). AONB and ESA designations similarly endorse the importance of the landscape within the catchment (Section 4.11), and the area is also of high archaeological interest (Section 4.11).

Some damage has occurred to river habitats and species diversity through unauthorised river works (Issue 17) and changes in land use and agricultural practices have reduced the scale and diversity of wetland habitats in the catchment (Section 4.10).

TARGETS AND STATE OF THE CATCHMENT

Loss of wetland habitats has led to a severe reduction in wading birds (Section 4.10) and the use of alien crayfish for farming purposes has decimated native crayfish species in some rivers through the introduction of disease (Issue 14.2). Invasive weeds, such as Japanese Knotweed, Himalayan Balsam and Giant Hogweed could threaten native riparian vegetation if they spread further (Issue 9.3).

Positive management of conservation sites and other high quality habitats are required to protect, enhance and restore the ecological value of the catchment. This could be further benefitted by the promotion of Countryside Stewardship, Habitat Improvement Schemes and other similar incentive schemes.

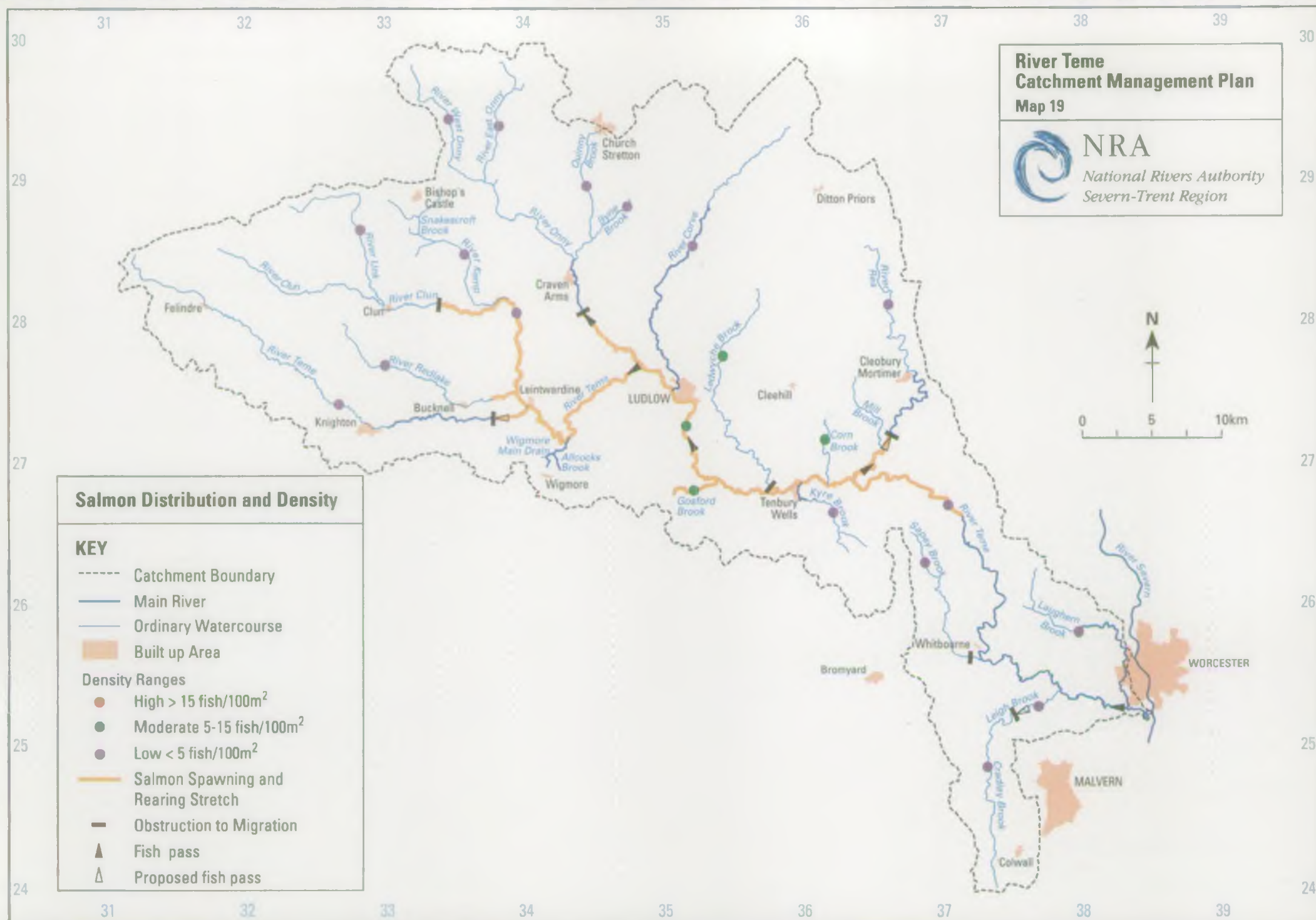
5.3.2 FISHERIES

Targets

The general aim for all fisheries is a sustainable level of exploitation by the rod fishery whilst conserving the natural history of the stock. Trends in fish stock abundance can be identified and comparisons made with 'expected' abundances based upon habitat characteristics. A methodology to determine specific salmon spawning targets is presently being developed.

Targets are to:

- * Maintain existing high quality fishery habitats in the catchment and where appropriate restore damaged fishery habitats.
- * Maintain an abundance of salmon, trout, coarse fish, eels and shad which is related where possible to the carrying capacity of the catchment based upon habitat characteristics.
- * Maintain a monitoring programme which accurately quantifies stock abundance.
- * Provide access, where appropriate, for migratory fish to all suitable spawning and nursery areas.
- * Control illegal fishing by use of a bailiff force in anti-poaching patrols, by targeting the market in illegally caught fish and by refining fisheries byelaws to address local problems.

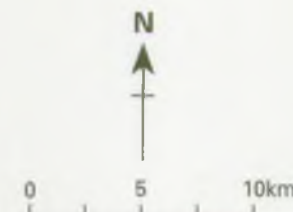


**River Teme
Catchment Management Plan
Map 20**



NRA

*National Rivers Authority
Severn-Trent Region*



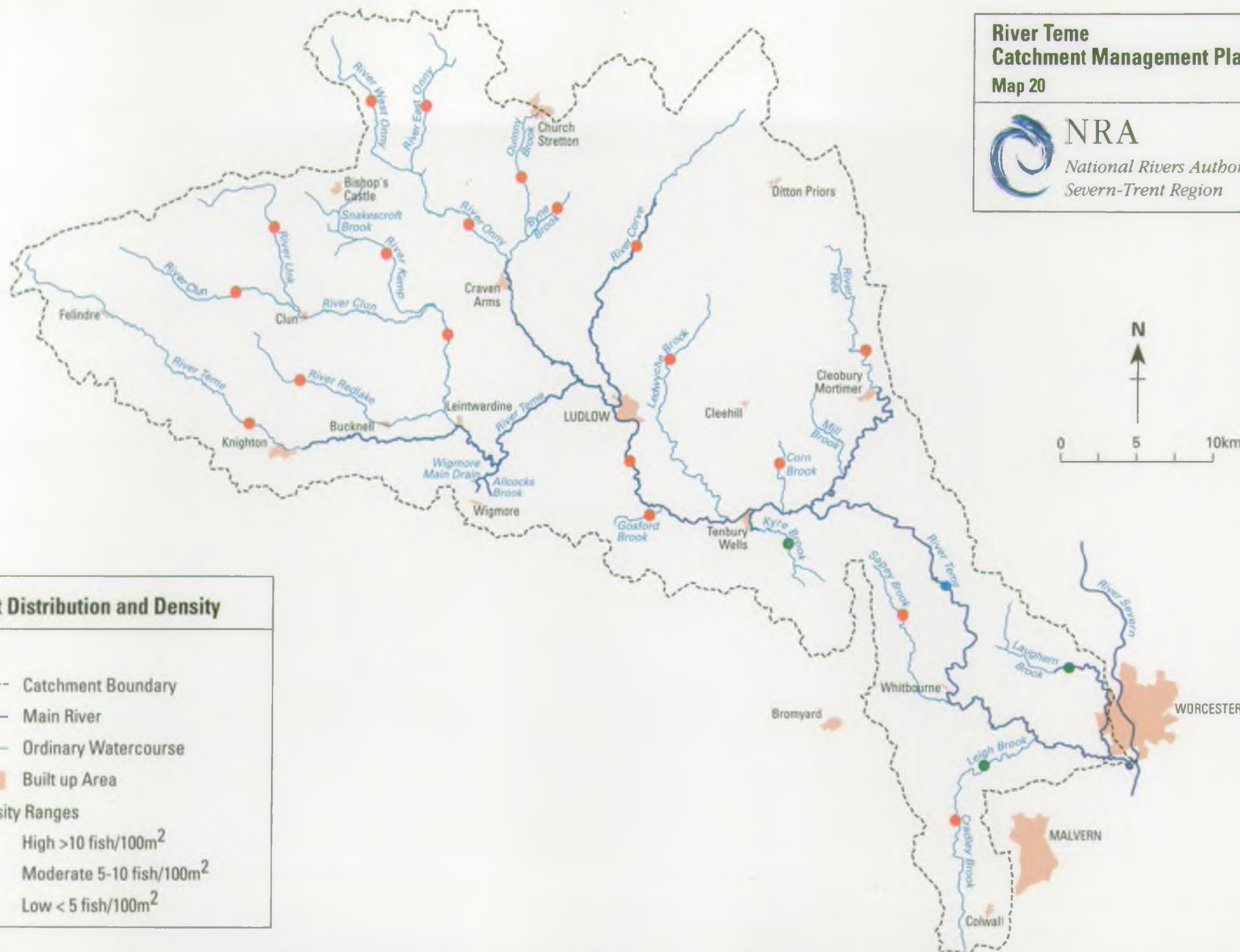
Trout Distribution and Density

KEY

- Catchment Boundary
- Main River
- Ordinary Watercourse
- Built up Area

Density Ranges

- High >10 fish/100m²
- Moderate 5-10 fish/100m²
- Low < 5 fish/100m²



TARGETS AND STATE OF THE CATCHMENT

State of Catchment

Habitat Quality Most fisheries habitats are of high quality, but some unauthorised river works have taken place in recent years resulting in local damage to salmonid spawning grounds and to instream habitat diversity. Examples include removal of gravel shoals in the Upper Teme in 1992 and river straightening on the River Clun in 1994 (see Issue 17). Excessive riparian tree maintenance operations can reduce overhanging bankside cover to the detriment of fish species such as chub, barbel and trout.

Water Quality Nearly all of the rivers in the catchment are of high water quality with only a relatively small number of localised problems (see Issue 2). Stream acidification is not an issue, even in afforested areas, because of the underlying geology. Watercourses are, however, potentially vulnerable to pollution from intensive livestock production (see Issue 3) and serious fish mortalities have occurred in several of the Teme tributaries (eg Byne Brook and Gosford Brook).

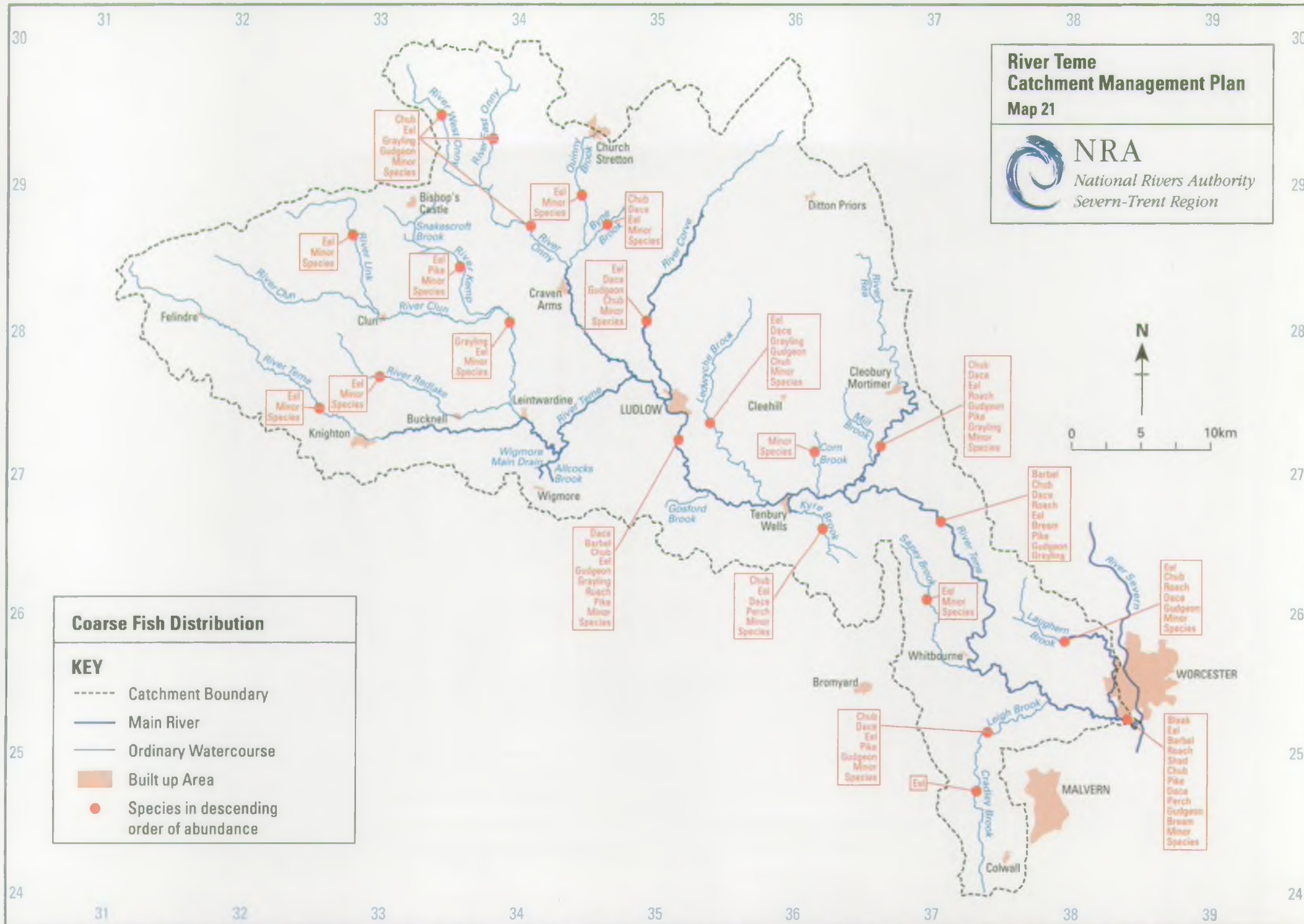
Stock Levels Stock levels of fish are monitored by electrofishing surveys carried out at 95 sites in the catchment (see Overview Section 2.2), with future survey work planned for 1995, 1998 and 1999.

Salmon distribution and abundance in the Teme catchment is shown in Map 19. Because of numerous obstructions to migration, salmon are restricted to the middle and lower reaches of the Teme and many of its tributaries. Consequently, many stretches of river have very low densities of salmon. Where access is possible, densities of juvenile salmon are low/moderate rather than high, probably because the stretches of river available are not prime habitat for these fish.

The Teme catchment supports excellent stocks of brown trout. Low densities were found in only one stretch of river with the rest of the main river and all tributaries containing high or moderate trout densities (Map 20). The abundance of trout in the catchment reflects the very high quality of spawning, juvenile and adult habitat for trout as well as the generally good water quality. Trout populations in specific stretches of the Teme experience problems because of the amount of water, however, especially those areas where summer flow is exceptionally low or sub-gravel (see Issue 11.4).

Coarse fish species are present throughout the Teme catchment and are generally abundant. In the upper reaches of the main river and in the smaller tributaries coarse fish are represented by the species typical of predominantly salmonid habitat, namely bullheads, stoneloach, minnows, brook lampreys and eels. As distance downstream increases other species are found but the obstructions to salmon migration do also limit

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Severn-Trent Region



TARGETS AND STATE OF THE CATCHMENT

the occurrence of some coarse fish species. Chub and grayling are probably the most widespread 'angled-for' coarse fish in the Teme, occurring in some of the smaller tributaries as well as at Leintwardine on the main river. Most of the noted coarse fisheries are downstream of Ludlow, where chub and barbel predominate, with dace, roach, perch, bream, gudgeon and bleak also present. Pike are present in the coarse fisheries of the Teme, often to specimen size but are not fully exploited by the anglers. At the most downstream section of the river, downstream of Powick Weir, Twaite Shad are a seasonal migrant. Map 21 shows the distribution and relative abundance of coarse fish in the Teme catchment.

Coarse fish, such as barbel, chub and dace are regarded as nuisance species in game fisheries by some fishery owners and periodic culling takes place on several tributaries (eg Rea, Onny, Ledwyche) and on parts of the main River Teme (eg upstream of Tenbury). NRA assists with such culling where appropriate, the removed fish then being used to stock other rivers where they are wanted to make up for pollution losses and to boost stocks generally.

Catches

Annual salmon catch data are compiled for the River Teme from anglers' statutory catch returns. In common with many other rivers in the country, catches have declined in recent years, particularly of large multi-sea-winter fish.

Declared salmon rod catches during the 1980s averaged 130 per year (range 63-314). Catch data have been collected and collated nationally since the introduction of a national rod licence and may not be directly comparable to earlier statistics. Nevertheless a substantial reduction in catches can be demonstrated, with less than 50 salmon per year reported in the early 1990s.

Obstructions

Obstructions to salmon migration, together with existing and proposed salmon passes are shown on Map 19, and are also referred to in Issue 11.1. The current upstream limit of salmon migration is Buckton Weir near Brampton Bryan. A fish pass at this obstacle would open up a further 25 km of potentially high quality spawning and nursery grounds upstream which could support at least 200 pairs of spawning salmon. Completion of fish passage facilities at Stokesay and Halford Weirs on the River Onny would open up a similar length of river. Passes would also be of benefit at weirs on the River Rea and Laughern Brook, but are unlikely to be cost effective on the Ledwyche Brook because of the large number and size of the weirs present. Some smaller water courses, such as the lower reaches of the Corn, Sapey and Leigh Brooks are also partly blocked by fallen trees and other debris.

TARGETS AND STATE OF THE CATCHMENT

Powick Weir near Worcester also appears to be an obstacle to the migration of shad, none of these species having been observed upstream of this point, and most of the weirs on the Teme and its tributaries are likely to impact adversely on the upstream passage of elvers. Suitable fish passes should be investigated and where appropriate implemented for these species. (Also see issues 12.3 and 14.3).

Illegal Fishing

Significant levels of salmon poaching have been detected on the River Teme, mostly using tethered gill nets, at times of year when salmon are actively migrating. Fresh run fish, of high market value, are particularly targeted. Some salmon are also taken from the spawning grounds using gaffs and spears, but this is less of a problem than in the Upper Severn spawning areas. Regular bailiff patrols are used to combat poaching, together with checks on hotels, fish markets and other outlets for illegally taken fish (also see Issue 11.1).

Thefts of rod caught barbel, especially large specimens, have been suspected in recent years, with illegally removed fish then allegedly being sold to other fisheries. This is believed to occur mostly in the lower reaches of the Teme, and barbel angling groups are particularly concerned about the resulting impact on fish stocks, fishing and fishery values. Trout anglers have similar concerns on both rivers and stillwaters, with stealing of fish by unauthorised fishermen becoming increasingly commonplace, for example on the River Onny. Theft of fish in these circumstances is presently a matter for fishery owners rather than the NRA, but a change in Fisheries Byelaws to prohibit the removal of more than a specific number of fish could help to deter such practices. (Also see Issue 12.1).

5.3.3 RECREATION/AMENITY

Targets

Setting realistic targets for recreation poses problems in that there are no recognised standards for the amount or nature of recreational use of rivers. Targets are likely to be based on the demand for facilities, although it has to be recognised that some recreational uses may be antagonistic to other river users or damaging to the environment. Any set targets must therefore take account of these factors and also fulfill the objectives laid down in the NRA Conservation Strategy.

The control over the provision of recreational facilities rarely rests with the NRA, and the achievement of objectives will therefore depend on obtaining the agreement of landowners and other interested parties.

TARGETS AND STATE OF THE CATCHMENT

Targets are to:

- * Promote suitable access and associated facilities appropriate for identified recreational uses where there is no conflict with conservation matters.
- * Attempt to resolve existing conflicts between water-based recreation interests within the catchment, for example canoeing and angling interests.
- * Ensure that future development does not reduce the recreational value of the river.

State of Catchment

Angling, for both coarse and game fish, is the major water based recreational activity in the catchment, and is generally of a very high quality. Walking, rambling and horse riding are also popular activities within the area.

Riverside access for the general public is very restricted and considerable scope exists to enhance this, subject to compatibility with other interests, especially conservation (Issue 15.2).

Conflict has arisen recently between canoeists, fishery owners and anglers, with canoes banned from some parts of the River Teme (Issue 15.1). Resolution of this conflict may be difficult to achieve.

Angling and other recreational activities associated with watercourses in the catchment are shown on Map 17.

5.3.4 FLOOD DEFENCE

Targets

Standards of Service

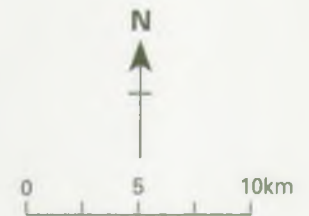
The NRA uses a system of land use identification for flood defence purposes which is based on the concept of House Equivalents (HE). This takes each type of land use in the flood plain for example housing, commercial, retail, manufacturing, agriculture, and using the potential losses due to flooding equates them to HE figures. The HE figure also takes into account the flooding of transport routes and the resultant costs to the community of alternative transport arrangements.

The land use bands are related to Standards of Service (SOS) which define an 'acceptable' level of protection in terms of frequency of flooding of land or property. This frequency is expressed as a return period for example, 1 in 50 years. This is a measure of the likelihood of a flood, where a 1 in 50 year flood has a 2% chance of occurring in any year.

**River Teme
Catchment Management Plan
Map 22**



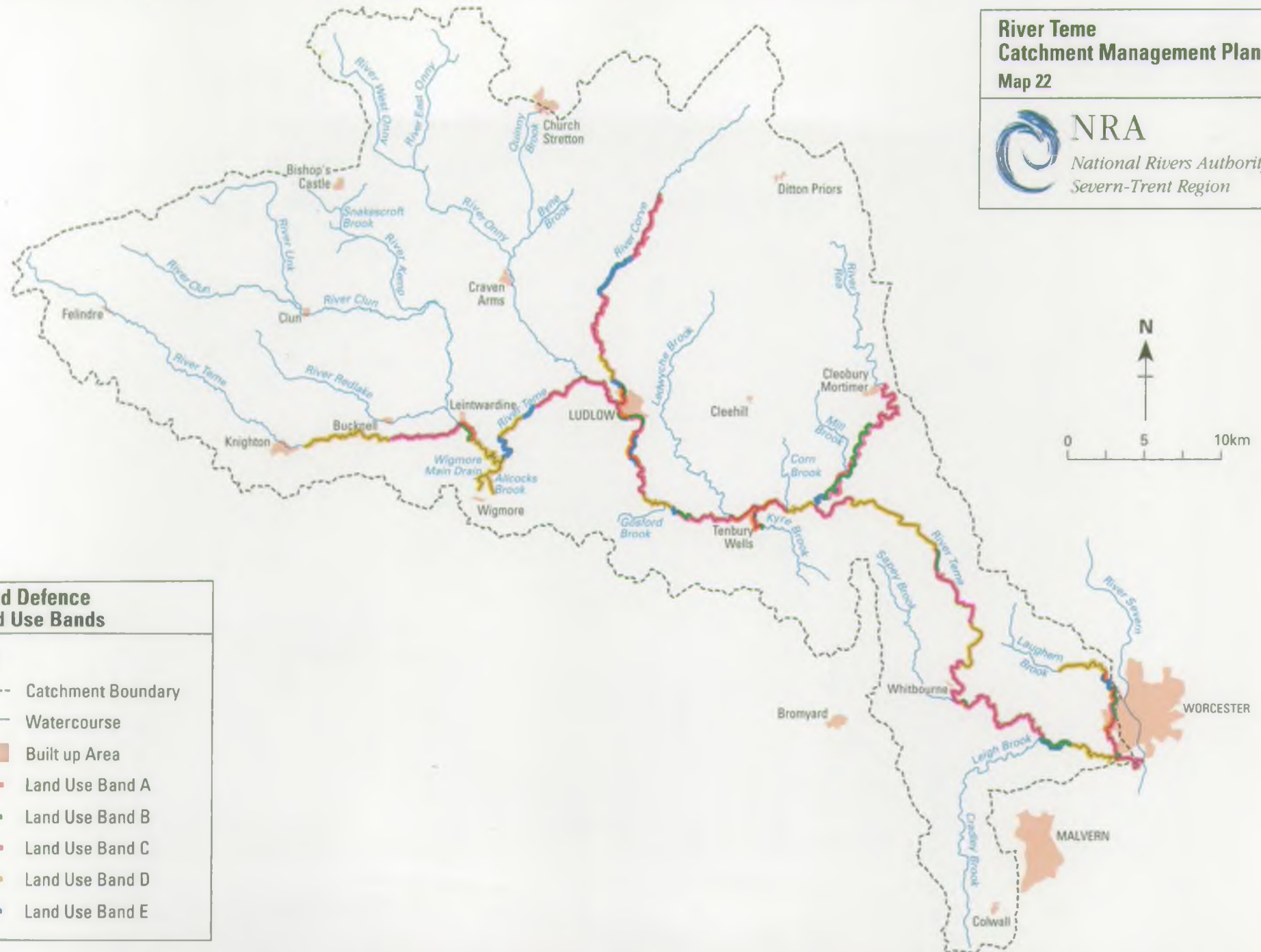
NRA
National Rivers Authority
Severn-Trent Region



**Flood Defence
Land Use Bands**

KEY

- Catchment Boundary
- Watercourse
- Built up Area
- Land Use Band A
- Land Use Band B
- Land Use Band C
- Land Use Band D
- Land Use Band E



TARGETS AND STATE OF THE CATCHMENT

Map 22 shows the land use bands for main river in this catchment, and full definitions are given in Table 9.

Improvement and maintenance works are targeted towards those watercourses which are under serviced (i.e. do not meet their SOS), particularly where the higher land use bands (A to C) are involved.

Preservation of Flood Plain and Flood Risk Management

The NRA seeks to ensure that flood risks are not increased by development, thereby resulting in unnecessary measures. It does this by close liaison with local planning authorities. The following targets are used:-

- * No loss of flood plain flow or storage capacity.
- * No increase in flood risk as a result of development.
- * No new development in an area where the existing level of service is considered below the standard required for the type of development proposed.
- * Provision of suitable access for maintenance of the river channel.

Flood Warning

The NRA target is to provide a minimum of 2 hours warning of the commencement of flooding.

State of Catchment

Standards of Service

A comparison between the land use bands map (Map 22) and the Standards of Service map (Map 23) indicates that main river on the Teme and its tributaries meets the SOS required for its flood plain land uses throughout most of its length. Downstream of Downton the river has cut itself into a deep channel whose capacity is exceeded less frequently than many similar rivers.

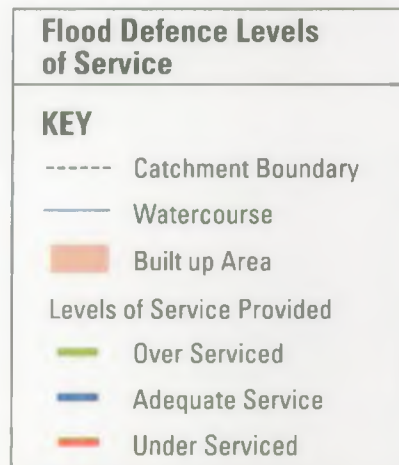
The comparison pinpoints Tenbury Wells as the principal development area where the SOS is under-provided, indicating the need to reassess the feasibility and local support for measures to rectify this (see Issue 19).

A detailed description of flooding problems covering the whole catchment and including all ordinary watercourses was first undertaken in 1980 to satisfy Section 24(5) of the Water Act 1973. This has now been updated several times with the most recent update in 1990 (now under Section 105 of the Water Resources Act 1991). The flooding problem areas are shown on Map 13, and the breakdown by council is shown in Table

*National Rivers Authority
Severn-Trent Region*



0 5 10km



TARGETS AND STATE OF THE CATCHMENT

10. A further update is due to be carried out and will include those problems identified subsequent to 1990.

On ordinary watercourses, although the Section 105 Survey indicates 64 flooding problem sites, it must be borne in mind that these are only likely to be resolved in instances where the benefits exceed the costs. This reduces the number where work is likely to be undertaken.

Preservation of Flood Plain and Flood Risk Management

Pressure for development in flood plain is usually associated with urban areas. The Teme and its tributaries are no exception, with pressure for flood plain encroachment arising in Knighton, Leintwardine, Ludlow, Tenbury Wells, Clun, Bishop's Castle, Craven Arms and Worcester (see Issues 18 and 19).

Flood Warning

Only the River Teme between Powick and Ludlow is covered by a flood warning service, and within that the minimum 2 hour warning time is normally met (see Issue 20). Flood warning reaches are shown on Map 13 (Section 4.8).

TABLE 9 - Flood Defence Standards of Service Land Use Bands and Targets

Standards of Service Land Use Bands and Targets						
Land Use Band	Target Standard of Protection (Return Period)					
	Fluvial			Saline		
A	1:50	-	1:100	1:100	-	1:200
B	1:25	-	1:100	1:50	-	1:200
C	1:5	-	1:50	1:10	-	1:100
D	1:1.25	-	1:10	1:2.5	-	1:20
E	<1:2.5			<1:5		

Land Use Bands

- A A reach containing the urban elements of residential and non-residential property distributed over a significant proportion of its length, or densely populated area 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 flood plain's proximity to areas of population density.

TARGETS AND STATE OF THE CATCHMENT

- 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.
- C Limited numbers of isolated rural communities or urban fringe at risk from flooding, including both residential and commercial interests. Intensive agriculture use could also be included.
- D Isolated, but limited number of residential and commercial properties at risk from flooding. Agriculture use will probably be the main customer interest with arable farming being a feature. In developed pockets of largely urban use, amenity interests may be prominent.
- 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 flood plain 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.

TARGETS AND STATE OF THE CATCHMENT

Table 10 - Flooding Problems (1990 Survey)

District/Borough Council	Total	Main River	Ordinary Watercourse
South Shropshire	28	5	23
Leominster	13	5	8
Malvern Hills	12	2	10
Radnor	7	1	6
Bridgnorth	3	-	3
Worcester City	1	1	-

Code No	Watercourse	Location	Code No	Watercourse	Location
SOUTH SHROPSHIRE DISTRICT COUNCIL					
2-83-410-1	Brockton Brook	SO 327 858	2-83-410-19	Pye Brook	SO 537 847
2-83-410-2	River Clun	SO 396 758	2-83-410-20	Clee Brook	SO 560 843
2-83-410-3	* River Corve	SO 494 790	2-83-410-22	* River Teme	SO 523 693
2-83-410-4	Town & Marsh Brooks	SO 454 933	2-83-410-23	River Teme	SO 245 760
2-83-410-7	Tributary of Brockton Brook	SO 319 873	2-83-410-24	Gosford, Orleton, Brimfield Brooks	SO 486 669
2-83-410-10	Town & Marsh Brooks	inc with 2-83-410-4	2-83-410-25	* River Teme	SO 592 683
2-83-410-11	River Kemp	SO 335 857	2-83-410-26	Corn Brook	SO 617 685
2-83-410-12	River Redlake	SO 373 743	2-83-410-27	River Redlake	SO 302 767
2-83-410-13	River Redlake	SO 315 765	2-83-410-28	Ledwyche Brook	SO 567 700
2-83-410-14	* River Teme	SO 300 724	2-83-410-29	Tributary of Brockton Brook	SO 321 870
2-83-410-15	River Clun	inc with 2-83-410-2	2-83-410-30	Tributary of Brockton Brook	SO 324 885
2-83-410-16	Ledwyche Brook	SO 540 764	2-83-410-31	Tributary of Brockton Brook	inc with 2-83-410-30
2-83-410-17	Tributary of Mill Brook	SO 635 767	2-83-410-32	Colly Brook	SO 580 730
2-83-410-18	* River Corve	SO 555 907	2-83-410-33	River Clun	SO 304 807
LEOMINSTER DISTRICT COUNCIL			MALVERN HILLS DISTRICT COUNCIL		
2-87-110-1	Gosford, Orleton, Brimfield Brooks	inc with 2-83-410-24	2-87-310-4	Tributary of Laughem Brook	SO 833 527
2-87-110-2	* River Teme	SO 547 682	2-87-310-15	Tributary of Cradley Brook	SO 752 423
2-87-110-3	* Kyre Brook	SO 631 633	2-87-310-24	* River Teme & minor tributaries	SO 761 551
2-87-110-4	* River Teme	inc with 2-83-410-25	2-87-310-26	Leigh Brook	SO 738 515
2-87-110-5	Corn Brook	inc with 2-83-410-26	2-87-310-27	Leigh Brook	SO 781 535
2-87-110-6	Tributary of River Teme	SO 714 669	2-87-310-28	Un-named	SO 775 516
2-87-110-7	* River Teme	inc with 2-83-410-14	2-87-310-31	Cradley Brook	SO 732 472
2-87-110-8	Walford Stream & Trib	SO 376 722	2-87-310-39	Leigh Brook	SO 759 523
2-87-110-9	* River Teme	inc with 2-83-410-14	2-87-310-40	Leigh Brook	SO 751 521
2-87-110-10	Paytoe Brook	SO 400 728	2-87-310-41	Leigh Brook & minor watercourses	SO 735 505
2-87-110-15	River Clun	SO 400 740	2-87-310-42	* Laughem Brook	SO 772 591
2-87-110-16	Ledwyche Brook	inc with 2-83-410-16	2-87-310-52	Tributary of Cradley Brook	SO 746 426
2-87-110-17	Ledwyche Brook	inc with 2-83-410-28			
RADNOR DISTRICT COUNCIL			BRIDGNORTH DISTRICT COUNCIL		
2-86-310-1	River Teme	SO 288 726	2-83-110-1	River Corve	SO 547 901
2-86-310-2	River Teme	inc with 2-83-410-23	2-83-110-2	River Rea	SO 662 804
2-86-310-3	Ffrwdwen Brook	SO 225 745	2-83-110-3	Un-named	SO 604 888
2-86-310-4	Warren Brook	SO 199 793			
2-86-310-5	Wylcwm Brook	SO 278 718			
2-86-310-6	* River Teme	inc with 2-83-410-14			
2-86-310-7	Cil Owen Brook	SO 167 810			
WORCESTER CITY COUNCIL					
2-87-710-3	* Laughem Brook	SO 827 543			

* Main River

APPENDICES

APPENDIX 1 - FLOOD DEFENCE ROLES

1.1 DURING FLOOD EVENTS

1.1.1 National Rivers Authority

The NRA forecast likely flood levels, issue warnings to the Police and give advice to the Public. We also patrol main river and remove any blockages, inspect formal flood defences and carry out any necessary remedial works.

The flood warning system is operated on the River Teme downstream from Ludlow to the River Severn confluence at Powick near Worcester.

Warnings are issued for three phases (Yellow, Amber and Red) each of which is associated with increasing flood risk. Details can be obtained from the Upper Severn Area office at Shrewsbury.

1.1.2 Emergency Services

Police

The Police receive flood warnings from the NRA and disseminate them via a flood warden scheme to those directly at risk and also to the emergency services and Local Authorities. They can also advise on which roads are closed due to flooding.

Fire Service

The fire service provide help in flood emergencies if they are able to do so. The local station will be able to advise the public on what help is, or is likely to be available and whether or not a charge will be made.

RSPCA

This organisation can provide assistance with rescuing animals in danger from floods.

1.1.3 Local Authorities

District Councils

These have permissive powers to offer assistance (eg. sandbags, moving possessions, evacuation, welfare, drying out etc) during floods. Each Council has a different policy on the amount and type of help they give. Details are available direct from each Council. Some District Councils are involved in dissemination of flood warnings, generally via flood wardens. These systems have been set up by the councils in consultation with the NRA. Flood Wardens are local residents who each contact several other residents to pass on flood warnings.

County Councils

County Councils are the Authorities responsible for Public Highways and any flooding problems associated with road drainage should be referred to them. All County Councils have Emergency Planning Officers who are in some cases involved in running the flood warden system for disseminating warnings and may become involved in more serious flood events. The Councils' Social Services Departments can become involved in providing assistance in the event of evacuation of people from flooded areas.

Water Companies

Public surface water sewerage systems are the responsibility of Water Companies, who sometimes use District Councils as their Agents. Any problems relating to flooding, other than from watercourses, should be directed to the local Water Company.

1.2 GENERAL MATTERS

1.2.1 National Rivers Authority

The NRA's Flood Defence powers are contained in the Water Resources Act 1991, the Land Drainage Act 1991 and the Authority's Land Drainage Byelaws.

The Authority has a supervisory role over all matters relating to land drainage and has a duty whilst carrying out this function, so far as may be consistent with any enactments relating to its other functions, to:

"further the conservation and enhancement of natural beauty and the conservation of flora, fauna and geological or physiographical features of special interest". It must also "have regard to the desirability of protecting and conserving buildings, sites and objects of archaeological, architectural or historic interest"

Any work in, over, under or within 8 metres of main river requires the consent of the NRA, as does the construction or alteration of a culvert, mill dam, weir or like obstruction on any watercourse.

The Authority is a statutory consultee of the Local Planning Authorities for statutory plans and planning applications. The Planning Authorities are not obliged to incorporate NRA requirements or comments in their planning decisions but must consider them. It should be noted that control over development in the flood plain, even main river, is through the Planning Act not under Flood Defence legislation.

The NRA has powers to maintain and improve main river watercourses and construct flood defences. Any such work must be both financially viable and environmentally acceptable. The NRA does not carry out erosion protection unless a formal flood defence is likely to be affected.

1.2.2 Local Authorities

Both County and District Councils have powers which relate to and affect the river system.

As stated above they have the power to control development by use of the Planning Act.

In addition they have direct powers under the Land Drainage Act 1991 to take action against riparian landowners, or others, who cause obstructions to watercourses. They are also empowered to carry out watercourse improvements that will benefit the community but need to obtain the NRA's consent for such work.

1.2.3 Riparian Landowners

Riparian landowners are those people who own land adjacent to watercourses. Generally ownership is taken to be up to the centre line of a watercourse, unless deeds show otherwise.

Riparian landowners are responsible for maintaining their watercourses, and under common law may not diminish the flow in terms of quantity nor "throw water back" on upstream landowners.

The obligations of riparian landowners are accompanied by certain "rights" including "The ordinary use of the water flowing past his land" (for cattle watering and domestic purposes), and to pass onto adjacent downstream owners naturally occurring discharges of water.

Erosion is a natural process which can cause significant loss of land. If the landowner wishes to carry out protection work to the river bank, or indeed any alteration to a watercourse, then the NRA must be consulted as a Land Drainage Consent may be required.

APPENDIX 2 - NATIONAL AND EUROPEAN LEGISLATION

The NRA's ability to act to maintain and, where necessary, improve the water environment is dictated by National and European Community (EC) Legislation. The legislation imposes duties on the NRA that it must carry out. Other provisions take the form of powers that the NRA uses to fulfil its duties and meet its aims. This combination of duties and powers determines the broad allocation of effort and resource.

2.1 National Legislation

The NRA was formed as a result of the Water Act 1989. Those aspects of the 1989 Water Act which concern the NRA were later consolidated into the Water Resources Act 1991 and the Land Drainage Act 1991.

2.1.1 Water Resources Act 1991 (WR Act 1991)

Under this Act the NRA has statutory duties and responsibilities relating to the water environment which are both general and specific.

1. The NRA is specifically responsible for water quality in all *controlled waters* which comprise surface freshwaters, underground waters and coastal waters to the three-mile limit in England and Wales. The main duties and powers are:
 - * Once statutory Water Quality Objectives are established, the NRA is under a duty to use its powers to ensure that these objectives are achieved and the extent of pollution is monitored.
 - * The discharge of an effluent without the consent of the NRA or HMIP is an offence. The NRA is required to enforce the provisions and has the power to prosecute.
 - * The NRA may issue consents for discharge to controlled waters.
 - * The NRA must maintain and make available to the public, a register recording applications for consents to discharge; records of consents given; samples of water or effluent; other related information (s.189).
 - * If the Secretary for State issues regulations obliging precautionary measures to prevent pollution, their enforcement is an NRA duty.
2. The NRA has a duty to conserve, redistribute or otherwise augment water resources and to ensure the proper use of those resources having special regard to the requirements for public supply (s.19). It is specifically responsible for licensing abstractions made from water held in natural underground storage and from all surface waters above the tidal low water mark. Other duties and powers are:
 - * The NRA must publish information about the demand for water and available resources.
 - * The NRA may ask the Secretary of State to set minimum acceptable flows, levels or volumes for inland waters.
 - * The NRA may apply to the Secretary of State for drought orders, which enable taking measures to cope with water shortages.
 - * The NRA is responsible for enforcing the legislation that deals with abstraction licensing.
3. The NRA has a duty to exercise a general supervision over all matters relating to flood defence and has been given a duty to carry out surveys of the areas in relation to which it carries out flood defence functions (s.105).
 - * Prior consent must be obtained from the NRA before any structure in, over or under main river is erected (s.109 & 110).
 - * The NRA may undertake maintenance works and improve defence systems on main river and on sea defences to reduce the incidence of flooding to property (s.165).

- * The NRA has powers to provide and operate flood warning systems on all watercourses and tidal/sea defences in England and Wales (s.166).
- 4. The NRA has a general duty to maintain, improve and develop salmon, trout, freshwater fish and eel fisheries under its jurisdiction (s.14). It can regulate fishing by a system of licensing.
 - * The NRA may make bylaws to regulate fishing methods and times.
- 5. Section 16(1) imposes upon the NRA a number of duties which include:
 - * to exercise any power so as to further the conservation and enhancement of natural beauty, in respect of proposals relating to the NRA's functions. The expression 'to further' implies a positive obligation toward conservation;
 - * to take into account the effect any proposals relating to the NRA's functions would have on the beauty and amenity of, and access to, any rural or urban area so affected;
 - * to exercise the rights which the NRA has to use water, or land associated with that water, in such a way that such water or land is made available for recreational purposes.
- 6. Section 16(2) imposes a general duty to promote:
 - * the conservation and enhancement of the natural beauty and amenity of inland and coastal waters and of land associated with such waters;
 - * the use of such waters and land for recreational purposes.

Practical guidance in respect of the NRA's recreational duties is given in a Code of Practice for Conservation, Access and Recreation approved by the Minister under Section 18.

2.1.2 Land Drainage Act 1991

This act brings together legislation relating to Internal Drainage Boards and local authorities, concerning inland and sea defence matters. However, it contains numerous cross-references to the NRA. It contains provisions relating to ordinary watercourses rather than Main River, which are covered under the WR Act 1991. The NRA has weaker control over ordinary watercourses.

2.1.3 Salmon and Freshwater Fisheries Act 1975

The majority of the NRA's powers to regulate and protect fisheries are defined in the Salmon and Freshwater Fisheries Act 1975, supplemented by the Salmon Act 1986. The NRA can issue stocking consents to control the introduction of fish. To assist enforcement, the NRA can appoint 'water bailiffs' who, in addition to having specific powers, are deemed to be constables for the purposes of the Act. Bailiffs, therefore, have many of the powers, liabilities and responsibilities of a police constable as defined in the Police Act 1964 and the Police and Criminal Evidence Act 1984.

2.1.4 Other Legislation

Other legislation gives the NRA an important role as a consultee in relation to waste disposal site licensing, applications for planning permission and the authorisation of industrial processes controlled by Her Majesty's Inspectorate of Pollution (HMIP). This means that the NRA's views and advice on these applications are taken into account by the appropriate authority.

2.2 **European Legislation**

The NRA is responsible for enforcing some EC Directives. A directive is an item of legislation which is legally binding on Member States. A summary of the most relevant directives is given below:

Dangerous Substances Directive (76/464/EEC)

The directive was established to provide information on 'pollution caused by the discharge of dangerous substances onto the aquatic environment'. It identifies substances as either List I or List II. List I includes 20 substances selected on the basis of their toxicity, persistence and bioaccumulation, for example mercury and cadmium. List II includes 17 potentially less dangerous substances such as zinc, copper and lead.

Freshwater Fisheries Directive (78/659/EEC)

This directive sets out the requirements for the 'quality of fresh waters needing protection or improvement in order to support fish life'. The directive provides a list of determinands, requirements for methods of analysis and minimum sampling frequencies. There are two sets of standards, one for salmonid and the other for cyprinid fisheries.

Surface Water Abstraction Directive (75/440/EEC)

This directive concerns the quality of surface water intended for abstraction for use as drinking water.

Urban Waste Water Treatment Directive (91/271/EEC)

This directive seeks to control and reduce pollution of freshwater, estuarial and coastal waters from the discharge from urban waste waters, ie. domestic sewage, industrial waste or rainwater run-off. The Directive has been developed from a concern about inadequately treated sewage in relation to public health and eutrophication. Discharges from Sewage Treatment Plants serving 10,000 people or equivalent are 'qualifying' and should provide at least secondary treatment. Qualifying discharges into 'sensitive waters' will require more stringent consents usually referred to as tertiary treatment. Sensitive waters are those which are found to be or will become eutrophic, are used for drinking water where nitrate levels exceed 50 mg/l, or other areas where more stringent treatment is required to meet other EC Directives.

Nitrate Directive (91/676/EEC)

Control of nitrate in ground and surface waters from agriculture, is the subject of this directive. It covers waters that are used for supply. Those waters that fail the limits set under the directive are classified as polluted waters.

APPENDIX 3 - AGRICULTURAL LAND CLASSIFICATION (ALC) GRADES (MAFF)**Grade 1 - Excellent Quality Agricultural Land**

Land with no or very minor limitations to agricultural use. A very wide range of agricultural and horticultural crops can be grown and commonly includes top fruit, soft fruit, salad crops and winter harvested vegetables. Yields are high and less variable than on land of lower quality.

Grade 2 - Very Good Quality Agricultural Land

Land with minor limitations which affect crop yield, cultivations or harvesting. A wide range of agricultural and horticultural crops can usually be grown but on some land in the grade there may be reduced flexibility due to difficulties with the production of the more demanding crops such as winter harvested vegetables and arable root crops. The level of yield is generally high but may be lower or more variable than Grade 1.

Grade 3 - Good to Moderate Quality Agricultural Land

Land with moderate limitations which affect the choice of crops, timing and type of cultivation, harvesting or the level of yield. Where more demanding crops are grown yields are generally lower or more variable than on land in Grades 1 and 2.

Subgrade 3a - Good Quality Agricultural Land

Land capable of consistently producing moderate to high yields of a narrow range of arable crops, especially cereals, or moderate yields of a wide range of crops including cereals, grass, oilseed rape, potatoes, sugar beet and the less demanding horticultural crops.

Subgrade 3b - Moderate Quality Agricultural Land

Land capable of producing moderate yields of a narrow range of crops, principally cereals and grass or lower yields of a wider range of crops or high yields of grass which can be grazed or harvested over most the year.

Grade 4 - Poor Quality Agricultural Land

Land with severe limitations which significantly restrict the range of crops and/or level of yields. It is mainly suited to grass with occasional arable crops (eg cereals and forage crops) the yields of which are variable. In moist climates, yields of grass may be moderate to high but there may be difficulties in utilisation. The grade also includes very droughty arable land.

Grade 5 - Very Poor Quality Agricultural Land

Land with very severe limitations which restrict use to permanent pasture or rough grazing, except for occasional pioneer forage crops.

APPENDIX 4 - ORGANISATIONS COMMENTING ON THE DRAFT ISSUES**ADAS**

Birmingham Anglers Association Ltd
Bransford Estate
Clwyd & Powys Archaeological Trust
Council for the Protection of Rural England
Countryside Commission
Countryside Council for Wales
Croome Estate Trust
A R G Dorsett
Downton Estate
English Nature
Forestry Authority - England
Forestry Authority - Wales
Hereford & Worcester County Archaeological Service
Hereford & Worcester County Council
Herefordshire Nature Trust
M July (RRAC)
Leominster District Council
Midland Flyfishers
MAFF Land Use Planning Unit
Montgomeryshire District Council
D H Morgan (RFAC)
Newnham Estate
Ramblers' Association (Hereford & Worcester Area)
Ramblers' Association (2 letters, Shropshire Area)
Rural Development Commission
Royal Society for the Protection of Birds
Salopian Flyfishers Association Ltd
Severn Fisheries Consultative Council
Shakenhurst Estate
Shropshire County Council
South Shropshire District Council
Tenbury Fishing Association
Welsh Canoeing Association
Welsh Office Agriculture Department
White Swan Piscatorials

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DoE/WO	1993	Planning Policy Guidance Note on Renewable Energy (PPG22).
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MAFF	1991	Code of Good Agricultural Practice for the Protection of Water.
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NRA	1993	NRA Fisheries Strategy.
NRA	1993	NRA Flood Defence Strategy.
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APPENDIX 6 - GLOSSARY

Abstraction	The removal of water from any source, either permanently or temporarily.
Abstraction Licence	An authorisation granted by the NRA to allow the removal of water from a source of supply.
Acidification	The detrimental effect of acid rain on soils and freshwater.
ADAS	Agricultural Development and Advisory Service.
Algae	Microscopic (sometimes larger) plants, which may be floating or attached. Algae occur in still and flowing water.
Ammonia	A chemical compound found in water often as a result of pollution by sewage effluents. It is widely used to determine water quality. Ammonia detrimentally affects fish.
AMP2	An acronym for the second Asset Management Plan produced by the Water Companies for the Office of Water Services (OFWAT). It sets out the water industry investment programme for the period 1995 to 2000.
AOD (Above Ordnance Datum)	Land levels are measured relative to the average sea level at Newlyn in Cornwall. This average level is referred to as 'Ordnance Datum'. Contours on Ordnance Survey maps of the UK show heights in metres above Ordnance Datum.
AONB	Area of Outstanding Natural Beauty.
Aquifer	A porous water-bearing underground formation of permeable rock, sand or gravel capable of holding significant quantities of water.
Attenuation	Breakdown or dilution of a contaminant in water.
Base Flow	The flow in a river derived from groundwater sources.
BOD (Biochemical Oxygen Demand)	A measure of the amount of oxygen consumed in water (over 5 days), usually by organic pollution. Oxygen is vital for life so the measurement of the BOD tests whether pollution could affect aquatic animals.
CC	County Council.
CLA	Country Landowners Association
CCW	Countryside Council for Wales.
Coarse Fish	Freshwater fish other than salmon and trout.
CoCo	Countryside Commission.
Confluence	The point at which two rivers meet.
Cyprinid Fish	Coarse fish belonging to the carp family, like roach, dace and bream.
Dangerous Substances	Substances defined by the European Commission as in need of special control. This is because they are toxic, accumulate and concentrate in plants and animals, or do not easily break down into less dangerous substances. They are classified as List I or List II.

GLOSSARY

Derogate	To depreciate or diminish - used in abstraction licensing where a proposed new licence would reduce resources to an existing authorised abstraction.
DC	District Council.
DCWW	Dŵr Cymru/Welsh Water.
Demand Management	The management of the total quantity of water abstracted from a source of supply using measures to control waste and consumption.
Discharge Consent	A licence granted by the NRA to discharge effluent of specified quality and volume.
DO (Dissolved Oxygen)	The amount of oxygen dissolved in water. Oxygen is vital for life so this measurement is an important test of the health of a river.
DoE	Department of the Environment.
DoT	Department of Transport.
Dry Weather Flow	For sewage works, this is calculated by adding estimates of the domestic sewage discharge (which is the population multiplied by the per capita consumption) plus any industrial discharges plus infiltration into the sewer. For the river, the Dry Weather Flow is defined as the average of the annual series of the Minimum Weekly (7 consecutive days) flows, which can be thought of as the driest week in the average summer. It equates to between Q90 and Q95 in most natural rivers.
EC Directive	A type of legislation issued by the European Community which is binding on Member States in terms of the results to be achieved but which leaves to Member States the choice of methods.
Ecosystem	A functioning, interacting system composed of one or more living organisms and their effective environment, in biological, chemical and physical sense.
Effluent	Liquid waste from industrial, agricultural or sewage plants.
EN	English Nature.
Environmental Quality Standard (EQS)	That concentration of a substance which must not be exceeded if a specific use of the aquatic environment is to be maintained.
ESA	Environmentally Sensitive Area. Areas of land where farmers are encouraged through grant aid to help safeguard the countryside where the landscape, wildlife or historic interest is of national importance.
Evapotranspiration	Water lost by evaporation and water taken up and lost by plants.
FA	Forestry Authority.
Fauna	Animal life.
Flood Plain	Land adjacent to a watercourse that is subject to flooding.

GLOSSARY

Flora	Plant life.
Freeboard	The difference between water level in the river and surrounding ground level.
Gauging Station	A site where the flow of a river is measured.
GQA	General Quality Assessment. A national water quality assessment scheme.
Grilse	A salmon which has spent one winter at sea and is returning to fresh water to spawn.
Groundwater	Water held in aquifers.
Groundwater Units	Administrative sub-divisions of aquifers, defined on geological and hydrogeological criteria, which form the basis for groundwater resource management and licensing policy decisions.
Habitat	The customary and characteristic dwelling place of a species or community.
HMIP	Her Majesty's Inspectorate of Pollution.
HSE	Health and Safety Executive.
Hydrology	The study of water on and below the earth's surface.
LA	Local Authority.
Landfill	Site used for waste disposal into/onto land.
Leachate	Liquor formed by the act of leaching.
Leaching	Removal of soluble substances by action of water percolating through soil, waste or rock.
LPA	Local Planning Authority.
MAFF	Ministry of Agriculture, Fisheries and Food.
Main River	The watercourses shown on the statutory 'Main River maps' held by NRA and MAFF. The NRA has permissive powers to carry out works of maintenance and improvement on these rivers.
MI/d	Megalitres per day (one Megalitre is equal to 1 million litres or approximately 220,000 gallons).
NRA	National Rivers Authority.
NSA	Nitrate Sensitive Area.
NVZ	Nitrate Vulnerable Zone.
Objective 5b	European funding with the aim to facilitate the development and structural adjustment of rural areas.

GLOSSARY

Ordinary Watercourse	A watercourse that does not form part of a Main River.
Piscivorous	Feeding on fish.
Potable Water	Water of quality suitable for drinking.
Prescribed Flow	A flow set to protect lawful downstream users and the aquatic environment.
Prime Sites	Sites of importance for nature conservation, designated by County Wildlife Trusts and in some cases EN and Local Authorities. Non statutory.
Q95	The flow of a river which is exceeded on average for 95% of the time.
Reach	A length of a river.
Recharge	Water which percolates downward from the surface into groundwater.
Red Data Book Species	The most threatened species in Great Britain.
Renewable Energy	Energy produced from resources which are unlimited or rapidly replenished eg. Wind, water, sunlight, wave power or waste.
Riparian	Of, or on, land contiguous to the river.
River Corridor	A term which describes a stretch of river, its banks, and a varying amount of adjacent land that is affected by the presence of the river.
RSPB	Royal Society for the Protection of Birds.
Salmonid Fish	Game fish of the Salmon family, for example, trout and salmon.
Scheduled Ancient Monument (SAM)	The key sites nationally for archaeology, designated by the Secretary of State for National Heritage, through English Heritage and Cadw. Statutory; designated under the Ancient Monuments and Archaeological Areas Act 1979.
Soakaway	System for allowing water or effluent to soak into ground, commonly used in conjunction with septic tanks.
Spray Irrigation	The watering of crops by spraying. Can have a high impact on water resources.
SSSI	Sites of Special Scientific Interest. The best examples of the national heritage of wildlife habitats, geological features and landforms, designated by English Nature and the Countryside Council for Wales. Statutory; notified under the Wildlife and Countryside Act 1981.
Surface Water	Water which flows or is stored on the ground surface.
Sustainable Development	Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.
STP	Sewage Treatment Plant.

STW Ltd	Severn Trent Water Ltd.
Telemetry	River levels, rainfall, temperatures and wind run are recorded on data loggers connected to the telephone network. These telemetry outstations can be automatically downloaded by forecasting and data archive systems to provide real-time and historical information.
Trade Effluent	Effluent derived from a commercial process/premises.
Transfer Station	Waste disposal facility where waste is collected prior to transport to final disposal point.
Underground Strata	A term used to signify geology under the surface soil layer. If groundwater exists, or if water is being discharged to the ground, the geology underneath the soil layer is known in the various Acts of Parliament as 'underground strata'.
UWWTD	Urban Wastewater Treatment Directive.
Water Table	Top surface of the saturated zone within the aquifer.
WDA	Welsh Development Agency.
Wetland	An area of low lying land where the water table is at or near the surface for most of the time, leading to characteristic habitats.
WO	Welsh Office.
WOAD	Welsh Office Agriculture Department.
WRA	Waste Regulation Authority.

The National Rivers Authority

Guardians of the Water Environment

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

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

The main functions of the NRA are:

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



NRA

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