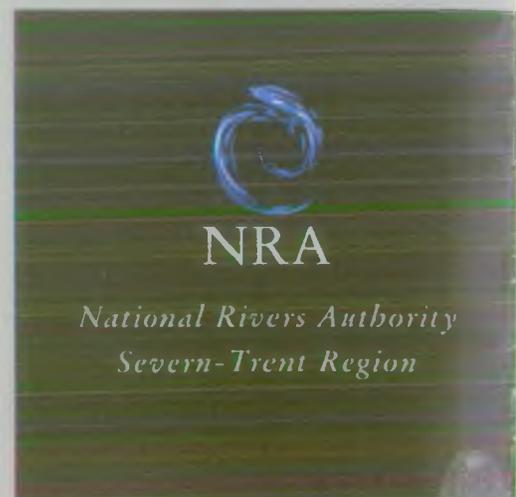


TAME CATCHMENT MANAGEMENT PLAN CONSULTATION REPORT JANUARY 1996



Your views

We want your views, comments, ideas and criticisms

This is the basis for consultation between the NRA and all those with interests in the catchment. Please consider:-

- The Vision for the Catchment.
- The issues and options identified in the report.
- Alternative options for resolving identified issues.
- Raising additional issues not identified in the report.
- Raising anything else you feel is important.

All comments received will be treated as public information unless you explicitly state otherwise in your response.

Following the consultation period all comments received 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.

We intend that the Plan should influence the policies and action of developers, planning authorities and other as well as assisting in the day to day management of the Catchment.

A letter outlining the issues was sent to local authorities, national organisations, other representative bodies and representatives of the NRA Statutory Committees in the summer of 1995. All the comments have been incorporated into this document where possible. A list of organisations that were contacted is given in Appendix 1. We are grateful for the useful suggestions received.

Comments on the Consultation Report should be sent to:

Tony Stanley
National Rivers Authority
Upper Trent Area
Sentinel House
9 Wellington Crescent
Fradley Park
Lichfield
Staffs WS13 8RR

All contributions should be made in writing by: 31 March 1996

If you or your organisation need further information or further copies of this Report, please contact Jonathan Jenkin at the above address or by telephone on (01543) 444141 Ext 4086.

ENVIRONMENT AGENCY



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**River Tame
Catchment Management Plan
Map 1**

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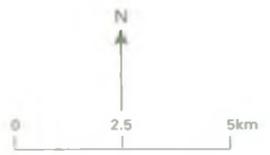
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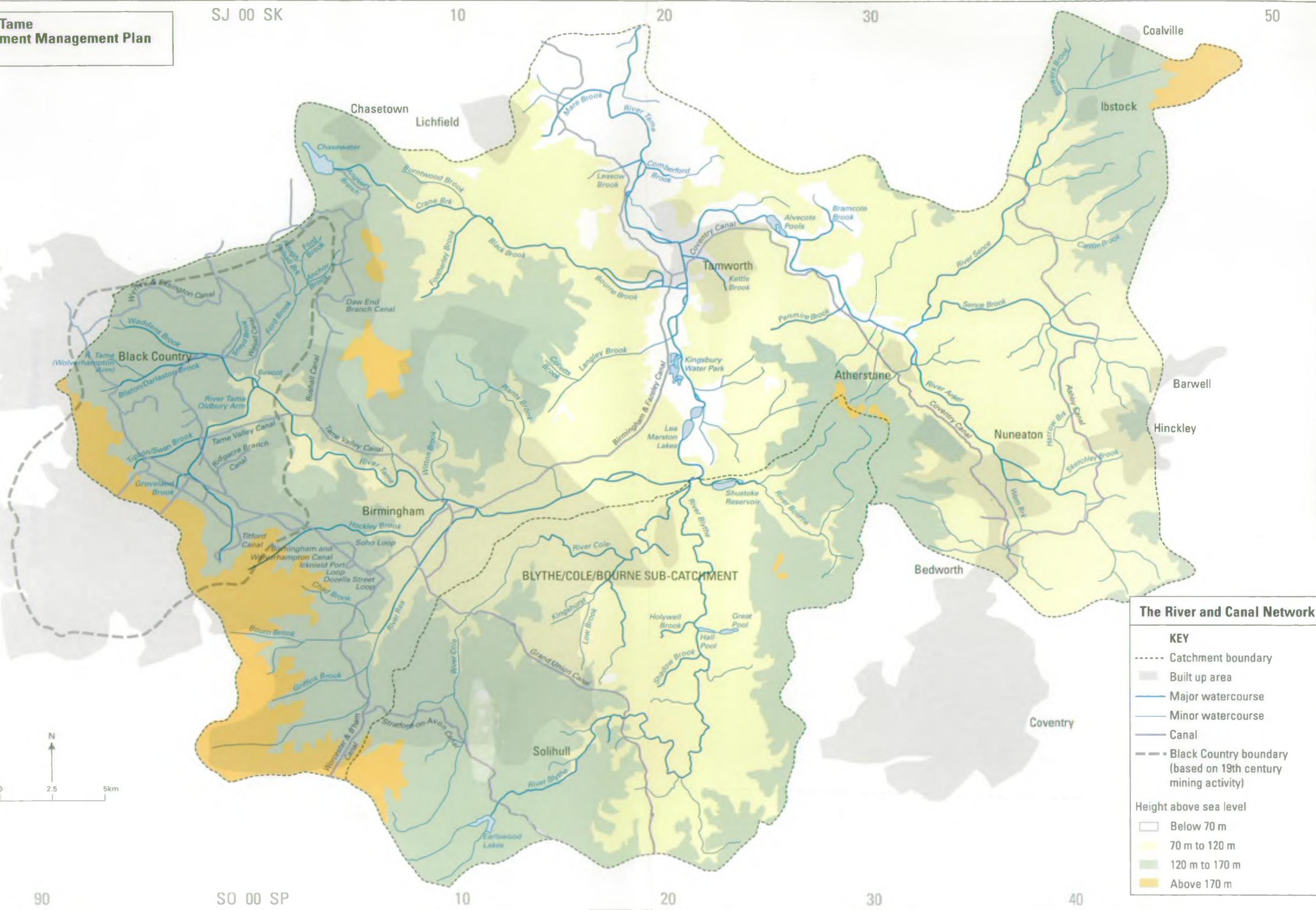
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The River and Canal Network

- KEY**
- Catchment boundary
 - Built up area
 - Major watercourse
 - Minor watercourse
 - Canal
 - - - Black Country boundary (based on 19th century mining activity)
- Height above sea level
- Below 70 m
 - 70 m to 120 m
 - 120 m to 170 m
 - Above 170 m



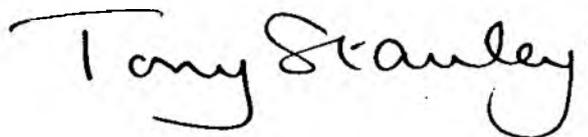
Foreword

The National Rivers Authority was created in 1989 to conserve and enhance the natural water environment and to reduce the risks to people and the developed and natural environment from flooding. In its role as 'Guardian of the Water Environment', it 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 Tame catchment. It provides a framework for consultation and is 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 water environment.

In April 1996 the NRA will merge with Her Majesty's Inspectorate of Pollution and the Waste Regulation Authorities to form the Environment Agency. The new body will be responsible for the environmental protection of water, air and waste and will continue to seek to prevent and control pollution. The Agency will be responsible for developing and implementing the Action Plan.



Tony Stanley
Area Manager
Upper Trent Area

Contributors

This report has been compiled by the National Rivers Authority (NRA) with contributions from key organisations operating in the catchment. The Authority is grateful to the Ministry of Agriculture Fisheries & Foods (MAFF) Land Use Planning Unit, at Crewe, for the provision of background information on agriculture in the catchment. The following NRA staff members have been directly involved in the development of this Report:-

Ian Baird	-	Development Control Officer
Vic Brown	-	Senior Engineer
Aliça Burton	-	Water Resources Officer
Andrew Crawford	-	Area Conservation and Recreation Officer
Doug Freakley	-	Senior Pollution Control Officer
John Gilhooly	-	Senior Pollution Control Officer
John Jarman	-	Word Processor Operator
Jonathan Jenkin	-	Catchment Management Planning Officer
Alex Minshull	-	Assistant Planning Liaison Officer
Jill Stone	-	Tame Quality Officer
Chris Thomas	-	Senior Hydrogeologist
Amanda Wright	-	Corporate Planner

National Rivers Authority
Information Centre
Head Office
Class No
Accession No A.Q.Y.K.....

The NRA's Vision For The Tame Catchment

The River Tame is the major tributary of the River Trent and with the River Anker drains an area of 1,470 sq km (568 sq miles). The catchment contains a population of 1.75 million people and includes most of Birmingham and the Black Country and the towns of Tamworth, Hinckley and Nuneaton. The West Midlands conurbation dominates the upper reaches of the river while the lower reaches are more rural in character. The river system is overlain by an extensive canal network which makes a significant contribution to the water environment. At Lea Marston the River Tame flows through purification lakes below which quality improves significantly.

A River Unnoticed

"Grey Willows whispered by the Rea, where lovers dreamt and children play in clean fields on a summers day".

Harry Reeves (Walking the River Rea 1989) from a pictorial map of Birmingham 1730.

The River Rea is an important tributary of the River Tame and flows through the centre of Birmingham. Largely unnoticed today the River Rea and the River Tame were once well known for their fisheries and valued by local people.

For over 100 years, industrialisation and an inadequate infrastructure resulted in the main river system being grossly polluted along with significant sections of the canal network. Many of the upper reaches of the river system were seen only as a means of removing industrial waste, sewage and the run-off from factories, houses and roads. This activity killed all life in the main river (although the River Anker and its tributaries were never so grossly polluted) and seriously polluted the River Trent for many years.

In the 1930's when J B Priestley visited the Black Country, he wrote:-

"I descended into the vast smoky hollow and watched it turn itself into so many workshops, grimy rows of houses, pubs and picture theatres, yards filled with rusted metal and great patches of waste ground, which was as shocking as raw sores and open wounds Industry has ravished it; drunken storm troops have passed this way; there are signs of atrocities everywhere; the earth has been left gaping and bleeding; and what was once bright fields have been rummaged and raped into these dreadful patches of waste ground"

D Dilworth (The Tame Mills of Staffordshire 1976).

Sixty years later, the heavy industry, the smoke and the grime have largely disappeared. Water quality has improved and gross pollution has been removed. However the legacy of the past remains, in the form of contaminated land, a large urban area dominating the upper reaches of the catchment and a river system that is largely unnoticed by the people who live within its catchment.

A Valued Future

The NRA's vision for the future is of a diverse and sustainable water environment which is valued by local people. The River Tame can never again be the clear trout stream it was in 1730 but it can be much more than it is.

Upstream of Lea Marston the rehabilitation of river corridors, the improvement of canals and the removal of litter and other debris would do much to improve the appearance of rivers and canals making them the focus for redevelopment and enhancement schemes. Downstream of Lea Marston, the lower reaches of the River Tame, the River Anker and the River Sence do provide a more balanced and sustainable water environment. There is the potential for improved fisheries, greater water based recreational activity and a greater diversity of wildlife and improved nature conservation habitats.

The NRA's key objectives for the Tame catchment are:-

- The improvement of river corridors in urban areas by:-
 - Setting new development back from the river bank so restoring the river corridor.
 - Making existing rivers and canals the focus for redevelopment.
 - Opening up culverted watercourses.
 - Promoting tree and shrub planting to develop buffers against pollution and to improve wildlife, nature conservation habitats and landscape.
 - Introducing channel variation and variation in the river bed structure where this does not conflict with flood defence requirements.
 - Developing the River Tame Walkway.
- To ensure the proper redevelopment of contaminated land particularly where it is having an adverse impact on the water environment.
- To address the problem of urban run-off and its effects on the river system, with particular regard to reaches of the River Tame below Lea Marston and the maintenance of a viable fish population.
- To maintain and where necessary improve, water quality by addressing the problems of combined sewer overflows, sewage effluent discharges, industrial discharges, pollution from contaminated land and spoil heap run-off and in the lower reaches of the catchment from agriculture (including nitrates).
- To protect and enhance existing nature conservation habitats and maintain and where possible increase the biodiversity of the catchment.
- To seek to protect the environmental quality of the canal network and support where appropriate the enlargement of the network.
- To ensure that current levels of protection from the risk of flooding from the River Tame are maintained and enhanced where necessary to meet appropriate standards and to provide adequate arrangements for flood forecasting and warning.
- To support measures to increase water based recreation particularly the use of abandoned

The NRA's Vision For The Tame Catchment

sand and gravel workings and other off line water bodies, where this does not prejudice nature conservation objectives.

- To assess the impact on the water environment of rising groundwater in Birmingham and suggest an appropriate future course of action.
- To manage ground and surface water resources to maintain and enhance the aquatic environment, particularly the Lichfield aquifer, while meeting the needs of the catchment.

For the potential of this catchment to be realised it requires the commitment and enthusiasm of others. To achieve a shared vision we need to work in partnership with all those who are interested in this large and important catchment.



The River Tame upstream of Bentley Mill Way, Willenhall.

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PART I

THE TAME CATCHMENT

- SECTION 1 **MANAGING THE WATER ENVIRONMENT**
- SECTION 2 **CATCHMENT OVERVIEW**
- SECTION 3 **ISSUES, OPTIONS & ACTIONS**
- SECTION 4 **TOWN & COUNTRY PLANNING & THE WATER ENVIRONMENT**

PART I is separated into four sections. The issues and options for action and the planning guidance will be developed following public consultation for inclusion in the Action Plan later in the year. PART II provides background information into the uses, activities and resources of the catchment. It also contains information about the current state of the catchment when compared to national and local targets.



This report has been produced on Recycled Paper and Board



SECTION 1

MANAGING THE WATER ENVIRONMENT

1.1 The National Rivers Authority

- The NRA's National Role
- Statutory Committees
- The NRA's Mission Statement
- Corporate Aims
- Data Collection and Other Routine Activities

1.2 Catchment Management Plans

- Introduction
- Steps in the CMP Process
- Content of the Consultation Report
- Sustainability and Sustainable Development

This section highlights the importance of the water environment and the NRA's approach of integrated catchment management planning. The role of the NRA in protecting the water environment is explained together with the aims of catchment management planning and the purpose of this Consultation Report. The section ends with an explanation of the meaning of sustainability and sustainable development.

1.1 The National Rivers Authority

The NRA's National Role

The NRA was created in 1989 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. It is divided into 8 regions and 26 areas. The head offices are located in Bristol and London.

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

The NRA is the UK's 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.

The Royal assent of the Environment Act in July 1995 paved the way for the creation of the Environment Agency for England and Wales. The new Agency will come into being in April 1996 and will be formed by bringing together the NRA, Her Majesty's Inspectorate of Pollution (HMIP) and Waste Regulation Authorities (currently part of Local Government). The Agency will have responsibility for the water environment, air quality, waste regulation and integrated pollution control.

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 own 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 planning process and Catchment Management Plans (CMPs). 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. The Environment Agency will continue a committee system through a new structure and new responsibilities.

The NRA's 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.

Corporate Aims

The NRA's corporate aims are to:-

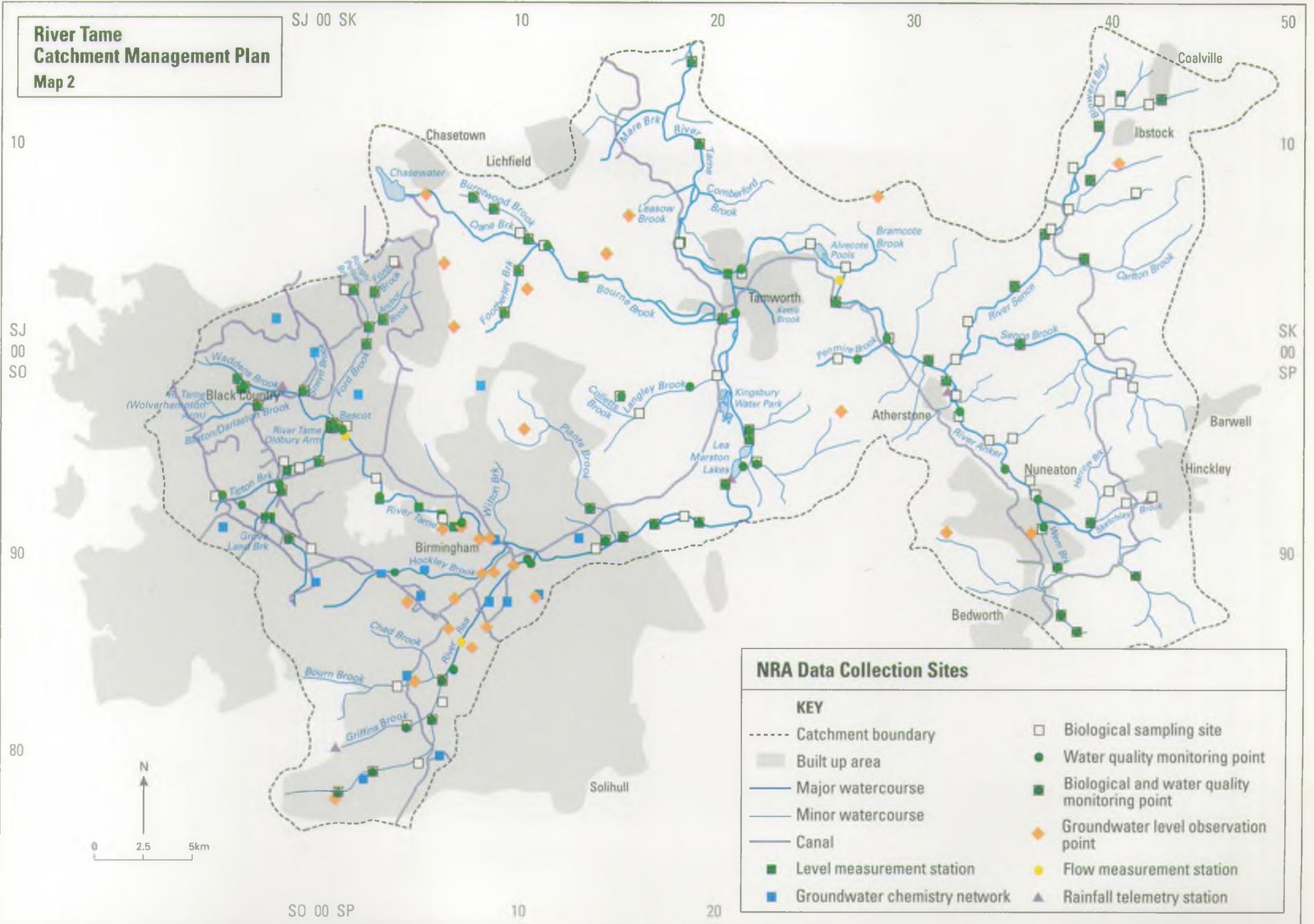
- Achieve a continuing overall improvement in the quality of rivers, estuaries and coastal waters through the control of pollution.
- Manage water resources to achieve the right balance between the needs of the environment and those of the abstractors.
- Provide effective defence for people and property against flooding from rivers and the sea.
- Provide adequate arrangements for flood forecasting and warning.
- Maintain, improve and develop fisheries.
- Conserve and enhance wildlife, landscape and archaeological features associated with inland and coastal waters of England and Wales.
- Develop the amenity and recreational potential of inland and coastal waters and associated lands.
- 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.

Data Collection and Other Routine Activities

Introduction

The Severn-Trent Region is divided into four Areas, each headed by an 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 at the local level. The Tame catchment is located in the Upper Trent Area and managed from the area office at Lichfield. This catchment plan, like all others, does not highlight routine day to day activities. CMP is a long term planning tool which seeks to direct manpower and financial resources to resolve issues and problems in the catchment. This involves not just the NRA but other interested groups. This section explains our routine, day to day work.

**River Tame
Catchment Management Plan
Map 2**



Data Collection

The NRA manages an extensive monitoring and survey operation that charts rainfall and river flows, water quality, groundwater, fisheries and nature conservation. The information gained by this operation underpins all our activities. This data is used by many other organisations in the UK and in other parts of the world.

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. Map 2 shows the location of various monitoring points within the catchment.

River Levels and Flows

River levels are measured continuously at 13 gauging stations which are equipped with chart recorders and a link to the NRA's computer based river forecasting system. River flows are measured at five of the stations.

Rainfall

Rainfall is monitored continuously at 9 sites across the catchment and measured intermittently at many more.

Satellites and weather radars are also used to forecast rain events.

Groundwater Levels and the Groundwater Chemistry Network

A network of 31 observation boreholes are maintained to monitor groundwater levels. Levels are checked once a month and the boreholes are located over the major aquifers. There are currently 13 groundwater chemistry network boreholes. These are part of a regional groundwater chemistry network used to monitor the chemical quality of groundwater. Samples are usually taken twice a year.

Surface Water Quality - Chemical Monitoring

Chemical monitoring of rivers, canals and still waters is undertaken on a regular basis. Rivers are monitored at 81 sites across the catchment and canals at 40 sites. Samples are analysed for a wide range of substances to assess compliance with European Union (EU) Directives, Water Quality Objectives (WQOs) and for the General Quality Assessment (GQA). Discharges of effluent from sewage treatment plants and industrial processes are also routinely monitored to ensure standards set by the NRA are being achieved. About 5,000 samples are taken each year in the Tame catchment. The impact on water quality of new development is considered and regular inspections are carried out at high risk sites as part of the NRA's pollution prevention programme. High risk sites include farms, industrial premises, waste disposal sites and sewage treatment plants.

Surface Water Quality - Biological Monitoring

Biological monitoring is undertaken at 107 river sites and 40 canal sites. Normally each site is sampled three times per year. Individual river catchment surveys are also undertaken on an ad-hoc basis either to investigate poor results from routine sites or to assess the impact of pollution incidents.

Fish Stocks

Fish population surveys are carried out largely by electric fishing as part of a rolling programme every 3-4 years and cover strategic sites throughout the catchment. Estimates of fish density and biomass from the lower River Tame should be viewed as relative rather than absolute values because of the difficulties of obtaining quantitative data from a large and in places, fast flowing river. Parts of the lower River Tame and much of the River Anker cannot be surveyed efficiently during the summer because of prolific weed growth.

The development of hydroacoustic (echo sounding) methods in conjunction with electric fishing should lead to improvements in monitoring canals and larger rivers. Advances in electric fishing techniques from boats are also being exploited. Specially constructed slipways may be required at strategic locations to successfully operate the system in the lower River Tame.

Habitat Surveys

River corridor surveys have been carried out on all main rivers in the catchment. These give information on channel features, aquatic, marginal and bankside vegetation, and adjacent land use. They are of particular value in identifying important areas in advance of NRA river works.

A number of sites within the catchment were surveyed as part of the River Habitat Survey (RHS). This is based on assessing the physical structure of watercourses within 500m sample stretches; from these, a river habitat classification is being developed.

A number of surveys have been carried out on the NRA owned sites at Lea Marston, Park Hall Farm and Hints. These include surveys of the botanical, ornithological, invertebrate and archaeological interest.

Other Routine Activities

Pollution Control

Apart from monitoring water quality, the NRA deals with pollution incidents when they occur and investigates the sources of polluting discharges. The pollution of water is a criminal offence and we will prosecute when necessary. Pollution prevention is very important and regular inspections are carried out at sites across the catchment.

Water Resources

The responsibilities for water resources include licensing, 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.

Flood Defence

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

Fisheries

Routine activities include fish rescues, stocking, general advice to the public and the scientific monitoring of fisheries. Fishery bailiffs check licences and ensure that anglers and others abide by the relevant legislation.

Conservation & Recreation

Environmental Assessment procedures are followed to ensure high quality control over the our own construction works to ensure that conservation and recreation interests are not adversely affected. The Section comments on many hundreds of planning applications and local plans where development impacts on the flora and fauna of the water environment, archaeology and general landscape. Staff also collaborate with numerous external bodies.

Planning Liaison

The NRA works closely with Local Planning Authorities (LPAs) through its planning liaison function. Approximately 1,200 planning applications are reviewed each year in the catchment for their impact on the water environment and a response is made which reflects the concerns of the NRA: Local, Structure and Regional Plans are all carefully considered.



Dealing with a pollution incident...

1.2 Catchment Management Plans

Introduction

The NRA's vision for the future is of 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 integrated river catchment management planning.

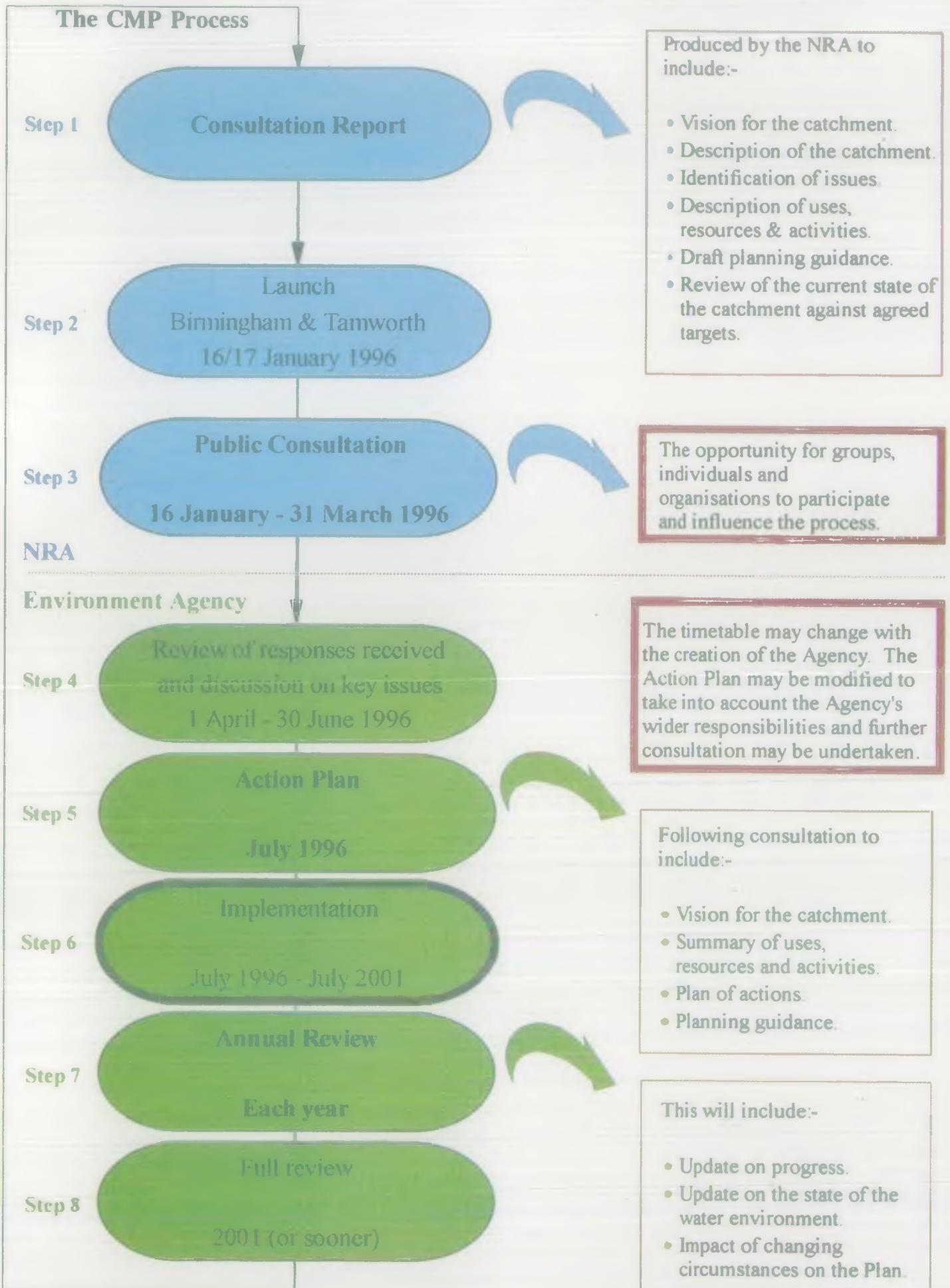
The purposes of a CMP, which is a non-statutory series of documents, are to:-

- Focus attention on the water environment of a specific river catchment.
- Involve all interested parties in planning for the future well being of that catchment.
- Balance the competing requirements and interests of all users.
- Agree a vision for the catchment which helps to guide all our activities over the next 10 to 20 years.
- Establish an integrated strategy and plan of action for managing and improving the catchment over the next five years.

The Plan will only be successful 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. This document, the Consultation Report is the first output from the process and not the finished plan. Twenty seven issues are raised which we think need to be addressed in order to make a real improvement to the water environment.

Steps in the CMP process

The CMP is developed through a number of steps which are shown across.



Content of the Consultation Report

The Vision Statement	-	The NRA's long term ambitions for the catchment. It provides the context for the report and draws out the major themes. It also sets the key objectives for achieving the vision.
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PART I	-	THE TAME CATCHMENT
Section 1	-	The role of the NRA is highlighted together with the process of catchment management planning. The principle of sustainability is also explained and applied to the Tame catchment.
Section 2	-	Describes the catchment and includes key catchment details.
Section 3	-	Lists the issues that we think are important to address over the next five years. These are discussed and options for action suggested.
Section 4	-	Sets out draft planning guidance for the catchment. We seek to identify where the planning process can be used to address catchment problems or issues.

PART II	-	ADDITIONAL INFORMATION
Section 5	-	Describes the uses, resources and activities in the catchment and identifies objectives to be met.
Section 6	-	Assesses the current state of the catchment, related to national and local targets. The catchment is considered in terms of water quality, water quantity and physical features.

Sustainability And Sustainable Development

Sustainability and sustainable development are terms frequently used by government, organisations like the NRA, local authorities and others with interests in the environment and in development. It is relatively new concept which has become a fundamental aspect of the CMP process. This part of the Report seeks to explain our understanding of sustainability and how it is applied by the NRA in the Tame CMP.

Sustainability is defined as:-

Development that meets the needs of the present without compromising the ability of future generations to meet their own needs (Brundtland Definition - used at the Rio Summit in 1992).

The NRA seeks to promote environmental sustainability. This means that activities and uses necessary for life or desirable for an improved quality of life must be undertaken within the carrying capacity of the water environment. For example, when water is abstracted from a river, sufficient should be left to maintain the nature conservation value of the watercourse and to protect the rights of other legitimate users. The discharge of sewage effluent or trade effluent should not adversely affect water quality or prevent other appropriate uses from taking place. This means that sites of importance for nature conservation should be protected as should the rights of abstractors, anglers and others.

In the River Tame catchment, the variable, sometimes poor, water quality of the River Tame and its often impoverished habitat, prevents many uses from taking place and provides a poor quality environment for both nature conservation and amenity. River quality continues to adversely affect the River Trent and the North Sea. The water environment of the catchment does not meet the needs of the present generation and will not meet the needs of future generations unless improvements can be made. The aim of the NRA is to work to address issues and current problems to enable the vision can be realised.



The Black Country in the 1940s (from conurbation - West Midlands Group 1948)



Fishing on the River Tame at Tamworth.

SECTION 2

OVERVIEW

2.1 Catchment Description

- 2.1.1 General Overview
- 2.1.2 A Short History of the Catchment
- 2.1.3 Lea Marston Purification Lakes
- 2.1.4 Land Use and Administration
- 2.1.5 Geology and Hydrogeology
- 2.1.6 Water Resources
- 2.1.7 Surface Water and Groundwater Quality
- 2.1.8 Flood Defence
- 2.1.9 Fisheries
- 2.1.10 Conservation
- 2.1.11 Recreation
- 2.1.12 Navigation

2.2 Catchment Key Details

This section of the plan provides general information about the Tame catchment.

2.1 Catchment Description

2.1.1 General Overview

This catchment plan considers the River Tame, its tributaries and the Birmingham Canal Navigation. Tributaries on the upper reaches of the river include the River Rea, The Hockley, Plants, Darlaston, Ford and Tipton Brooks and on the lower reaches the Black/Bourne Brook and the Rivers Anker and Sence. A catchment plan for the Rivers Blythe, Cole and Bourne which drain the southern area of the catchment has already been completed. Issues relating to this subcatchment can be found in the existing Consultation Report and Final Plan.

The River Tame rises in the Black Country with the Wolverhampton and Oldbury Arms of the river joining at Bescot. From here, the river flows eastwards to the north of Birmingham City Centre. The River Rea joins the River Tame close to Gravelly Hill motorway junction. Continuing east out of the West Midlands conurbation the river then turns north after its confluence with the Rivers Blythe, Cole and Bourne. The Black/Bourne Brook joins the River Tame at Fazeley and the River Anker joins at Tamworth. The river then flows into the River Trent just east of Alrewas. The upper reaches of the river are largely urbanised while the lower reaches are more rural in character.

The River Anker is the major tributary of the River Tame. It drains a largely rural catchment but includes the major towns of Hinckley, Nuneaton and Tamworth. Urbanisation at the headwaters of the catchment and urban run-off adversely affect the river system from time to time. The River Sence flows into the River Anker north of Atherstone. It drains parts of North West Leicestershire and is rural in nature. Recent industrial and commercial developments south of Coalville are having some adverse effects.

The population in the catchment in 1991 was 1.7m. Over 80% live in the West Midlands conurbation (Birmingham, Sandwell, Walsall and parts of Wolverhampton, Solihull and Dudley). The conurbation has seen a decline in population with a corresponding growth in the population of Lichfield, Tamworth, Hinckley and Nuneaton and other towns in the north of the catchment.

The principal industries are engineering, metal finishing and vehicle manufacture. Birmingham is a major administrative and financial centre and England's second city. Since the early 1980s when the West Midlands economy went through major restructuring, a lot of effort has gone into revitalising older industrial areas. The Black Country Development Corporation was formed in 1986 and through a public/private partnership has sought to redevelop older, often heavily contaminated sites, with remedial measures to control polluting discharges.

The last 30 years have seen major improvements in water quality. Capital investment by the former Upper Tame Main Drainage Authority, Severn Trent Water Authority and latterly by Severn Trent Water Ltd have led to the closure of many of the smaller sewage works in the Black Country and Birmingham, with a large proportion of sewage going for treatment at Minworth via the Black Country Trunk Sewer. New investment in the upper reaches of the River Tame to improve water quality has been agreed by the Office of Water Services (OFWAT) in conjunction with the Government and the water companies under Asset Management Plan 2 (AMP2) to run from 1995 - 2000. The money will be used for new

sewerage schemes in the Black Country and Birmingham and to upgrade Minworth and Coleshill Sewage Treatment Plants (STPs).

2.1.2 A Short History Of The Catchment

Decline

The River Tame rises on the watershed between the River Severn and the River Trent, an area only sparsely populated until the 19th Century. The existence of the South Staffordshire coalfield and ironstone created the conditions for industrialisation. Coal mining and iron smelting expanded, boosted by new techniques and the development of the canal system. Between 1800 and 1860 a semi-rural area was transformed into a series of industrial towns, with workshops, foundries, slag heaps, and overcrowded insanitary housing. Industrialisation began to seriously affect water quality and the River Tame, once a relatively small, high quality trout stream, began to suffer. In 1854 a tank at the Willenhall Gas Works burst, killing many fish and was the first reported fish kill. From 1866 onwards regular fish mortalities were reported and by 1870 Birmingham City had severe problems in disposing of sewage effluent. In 1880 the river still had an abundance of coarse fish but pollution was increasing and also seriously affecting the River Trent. Before 1800, the River Trent was a major salmon fishery. The last salmon in the River Tame were seen in 1876.

In 1881 an inquiry into pollution of the River Tame concluded that it was primarily caused by Birmingham Corporation Sewage Works and the Gas Works at Saltley. The River Tame continued to deteriorate along with the River Trent, as the area's population grew. The Public Health Act of 1875 provided the first framework for sewage and surface water disposal. The needs of a growing population required new clean water resources and at the turn of the century the Elan Valley reservoirs in mid Wales were constructed by Birmingham City Corporation. This resource continues to supply Birmingham today and provides a major addition to the flow in the River Tame in the form of sewage effluent.

By 1900 there was some improvement in the quality of the River Tame, but two world wars accelerated the decline. In 1918, there were no fish in the River Tame and fish life was precarious in the River Trent.

In 1945 the River Tame was dead, devoid of all life, as was the River Trent as far as Burton Upon Trent. Survey work undertaken in 1946 showed that gas liquors were so poisonous that sewage works could not function. The sewerage system was overloaded and untreated effluent flowed into the river system continuously.

Improvement

There were some improvements in the 1950s from improved sewerage. In 1954 the River Tame above the Minworth outfall remained sterile but some sewage fungus and tubificid worms were reported for the first time close to the River Tame/River Trent confluence at Chetwynd Bridge. However pollution continued to create major fish kills on the lower reaches of the River Trent. In 1966 the formation of the Upper Tame Main Drainage Authority allowed sewage treatment in the urbanised area to be considered as a whole for the first time.

The 1960s and 70s saw the start of major investment in the sewerage system of the West Midlands. Minworth Sewage Works was enlarged and updated following the completion of the Saltley/Minworth sewer in 1969. This development prevented 100,000 m³/d of untreated sewage from reaching the river. The Black Country Trunk Sewer was constructed in the 1970s and this allowed the closure of many unsatisfactory, small Black Country sewage works.

In the early 1960s, the then Trent River Authority forecast increased demand for drinking water supplies within its catchment and looked to the River Trent for additional resources. To do this the River Tame had to be cleaned up and in particular the problem of urban run-off had to be tackled.

Purification Lakes were proposed as a means of providing physical and biological treatment. A small pilot plant was set up at Elford in 1967 followed by a larger experimental plant at Lea Marston in 1972. Lea Marston was chosen as the site for the full scale installation because of its proximity to the urban area and the availability of existing sand and gravel pits. Following Parliamentary approval in 1973, construction of the lakes started in 1978. Lake 1 was completed in 1980 followed by Lake 2A in 1986.

2.1.3 Lea Marston Purification Lakes

The Lea Marston Purification Lakes on the River Tame at Kingsbury act as a buffer against pollution incidents upstream and minimises the impact of urban run-off. They have allowed the development of a viable coarse fishery downstream and protect the River Trent from pollution.

The Lakes form the boundary between the urban catchment of the Tame, with its poorer and more variable water quality, and the more rural downstream catchments. Further lakes were planned but have not been required.

Figure 3 shows the layout of the Lakes.

The river flows into Lake 1 (Tame Lake) via a gravel trap and grit channels. The gravel trap is a large depression in the river bed which retains stones and other heavy objects carried along by the flow. Gravel is removed from the trap, and floating booms at the entrance to the grit channels act as a debris barrier. The V-shaped configuration of the booms deflects floating debris into two stilling basins (calm areas). After passing through the gravel trap the river divides and passes into two grit channels approximately 100 metres long. After grit removal, the flow enters Lake 1.

Lake 1 covers 25 hectares and is divided by a central berm. As the flow in the river slows sediment is deposited. Eighty percent of the flow then passes into Lake 2A (Lake Lester) before returning to the river. The remaining 20% of the flow is directed into the river channel from Lake 1. The sediment in Lake 1 is removed using a suction dredger. The material is consolidated in a treatment plant on site and the consolidated sludge pumped to Severn Trent Water Ltd's Colehill STP, where it is dried prior to disposal at Dosthill tip site.

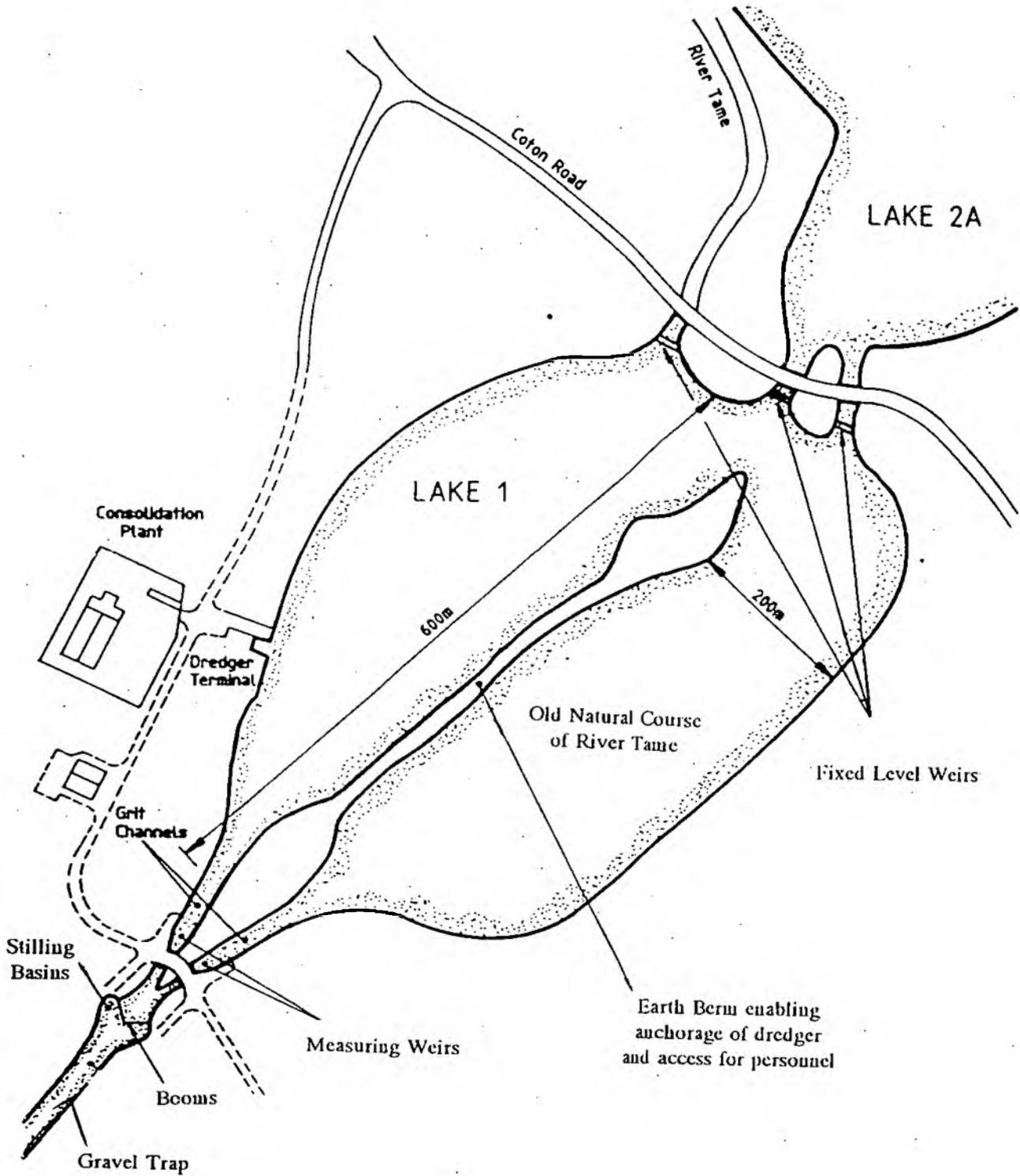


Figure 3 - Lea Marston Purification Lakes

2.1.4 Land Use and Administration

The catchment's land use can be divided roughly into three main categories; agricultural, urban land, woodland and rough grass. There is a small percentage of other uses including water. The agricultural uses account for 55% of the catchment's area and are largely found in the east and centre of the catchment. Approximately two thirds of the agricultural land is arable (36% of the catchment), with grassland occupying 14% and small amounts of fallow (5%). Most of the farms in the catchment are either crop or livestock based but as Map 4 shows, the areas of arable and grassland are intermingled, forming a mosaic of activity.

In contrast, the west of the catchment is dominated by the urban area of the West Midlands conurbation which accounts for the majority of the 466 km² of urban land in the catchment (41% of the catchment area). Vacant or derelict land is considered under this land use. There are three large settlements outside the conurbation, Tamworth, Nuneaton and Hinckley. Within the conurbation there are significant agricultural, woodland and rough grassland areas in Sutton Park and in Sandwell Valley.

There are only 41 Km² of woodland and rough grass in the catchment. The main woodland areas are Sutton Park, Hopwas, Hays Wood, (north of Tamworth) and Bentley Park Wood, Atherstone. Each of these areas has been designated as having local or national conservation importance.

National Government is represented in the land use planning system by the Regional Government offices for the West Midlands and East Midlands. These bodies produce the Regional Planning Guidance which is intended to guide local authorities in the formulation of their development plans. This includes the setting of regional priorities and identifying requirements for development land. In addition, the regional government offices co-ordinate education and training within the regions, and European funding.

The 21 local authorities which administer the catchment are shown on Map 5. These comprise 4 county councils, 6 unitary authorities, 9 district or borough councils and 2 development corporations.

Development corporations have been established in the Black Country and in Birmingham Heartlands. Their purpose is to encourage the development of the land within their areas and they have been granted a range of planning powers.

2.1.5 Geology And Hydrogeology

Map 6 illustrates the principal geological divisions present within the catchment. Within each, the underlying rocks exert a controlling influence, on land use, landscape as well as the interaction between ground and surface waters.

The western edge of the catchment is underlain by Carboniferous Coal Measures which consist of a mixed sequence of mudstones, siltstones, sandstones, coal and clay earths. Groundwater within this formation has naturally high levels of dissolved salts and metals and although it may still be of suitable quality for industrial use, the majority of this groundwater is not abstracted but discharges into surface watercourses as baseflow.

**River Tame
Catchment Management Plan
Map 4**

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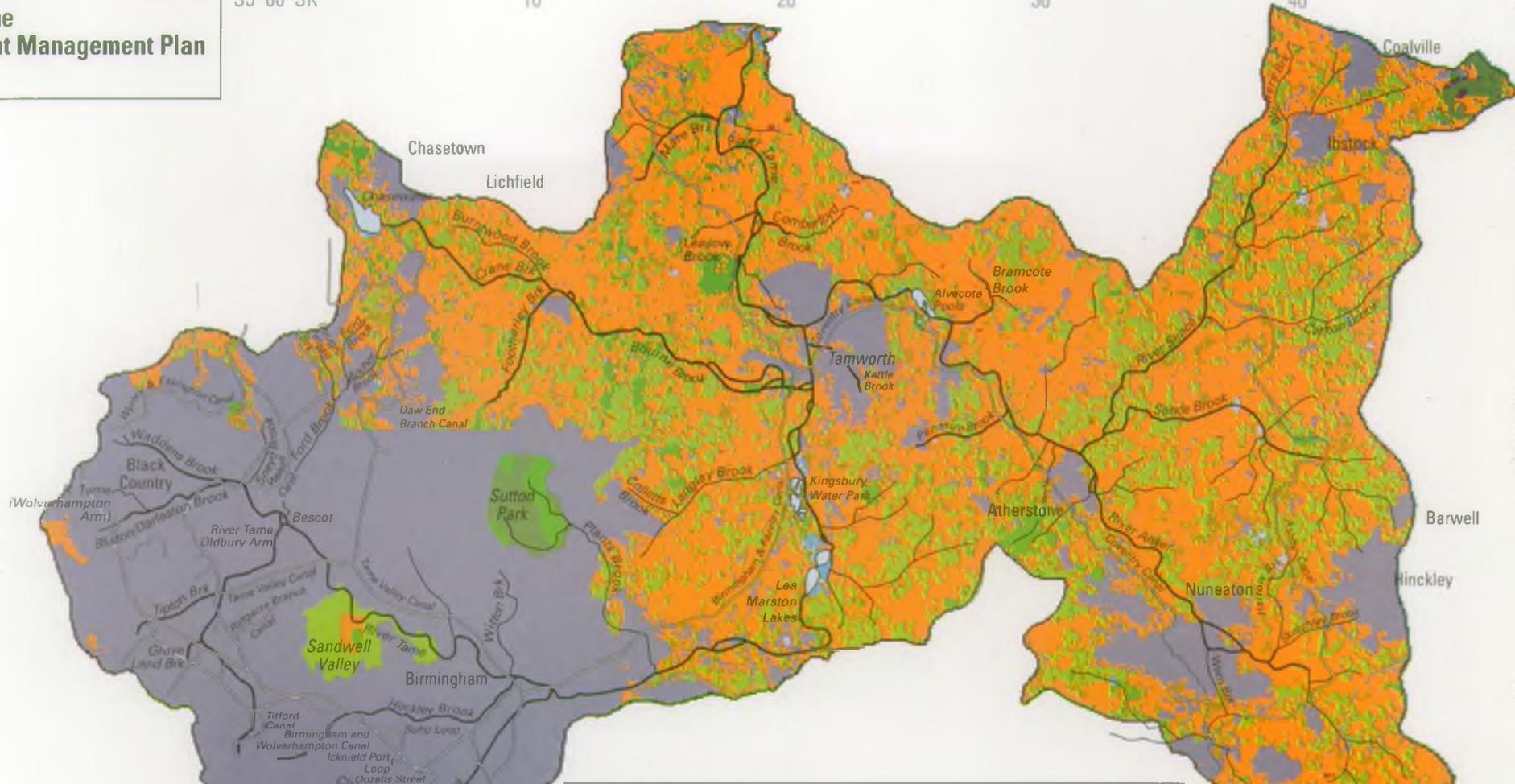
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Land Use

KEY

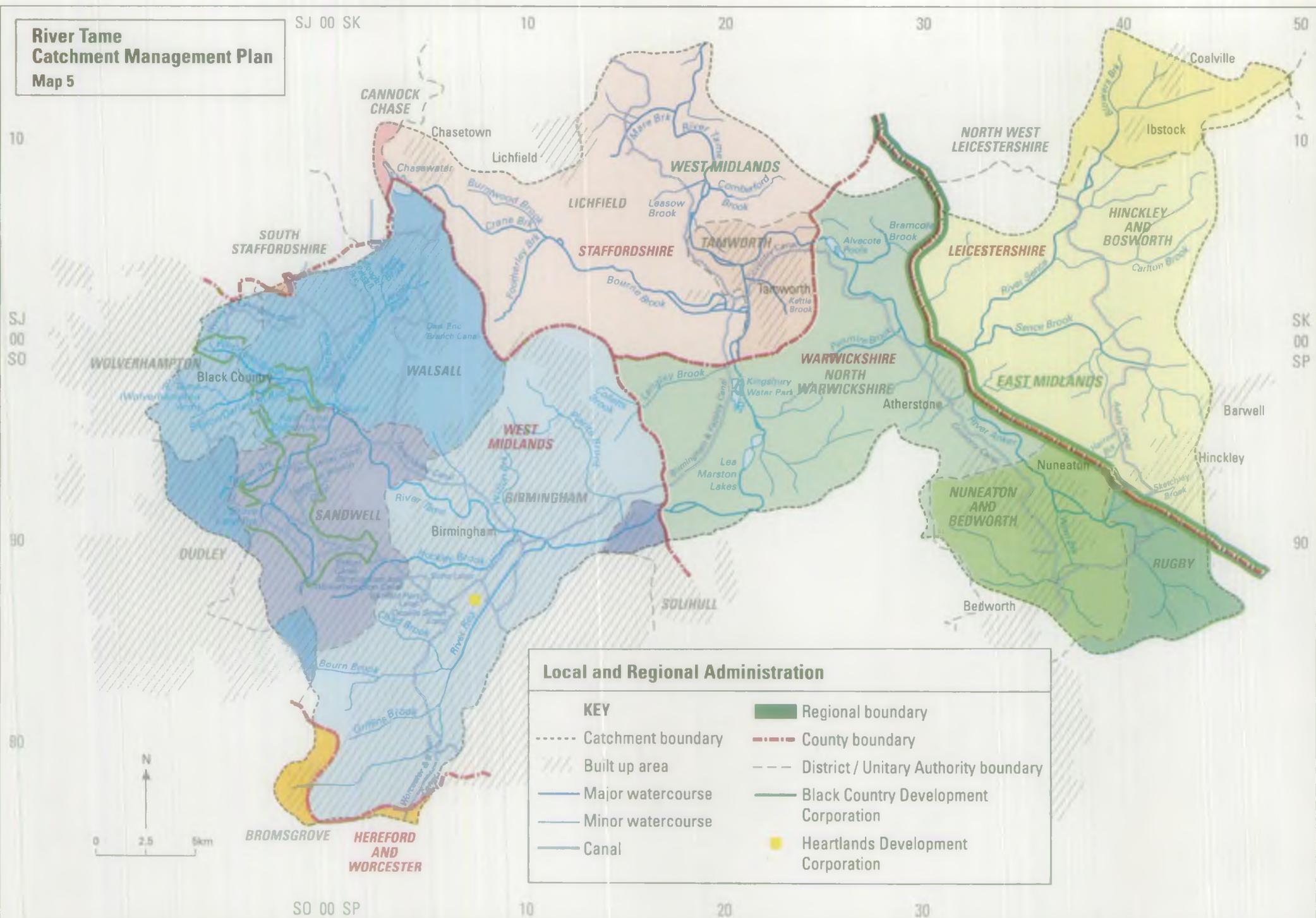
- Catchment boundary
- Major watercourse
- Minor watercourse
- Canal

Landuse classification:

- Arable
- Grass
- Fallow / bare
- Woodland
- Peat bog
- Moorland / heather / bracken
- Rough grass / upland pasture
- Urban / industrialised
- Water
- Cloud / cloud shadow



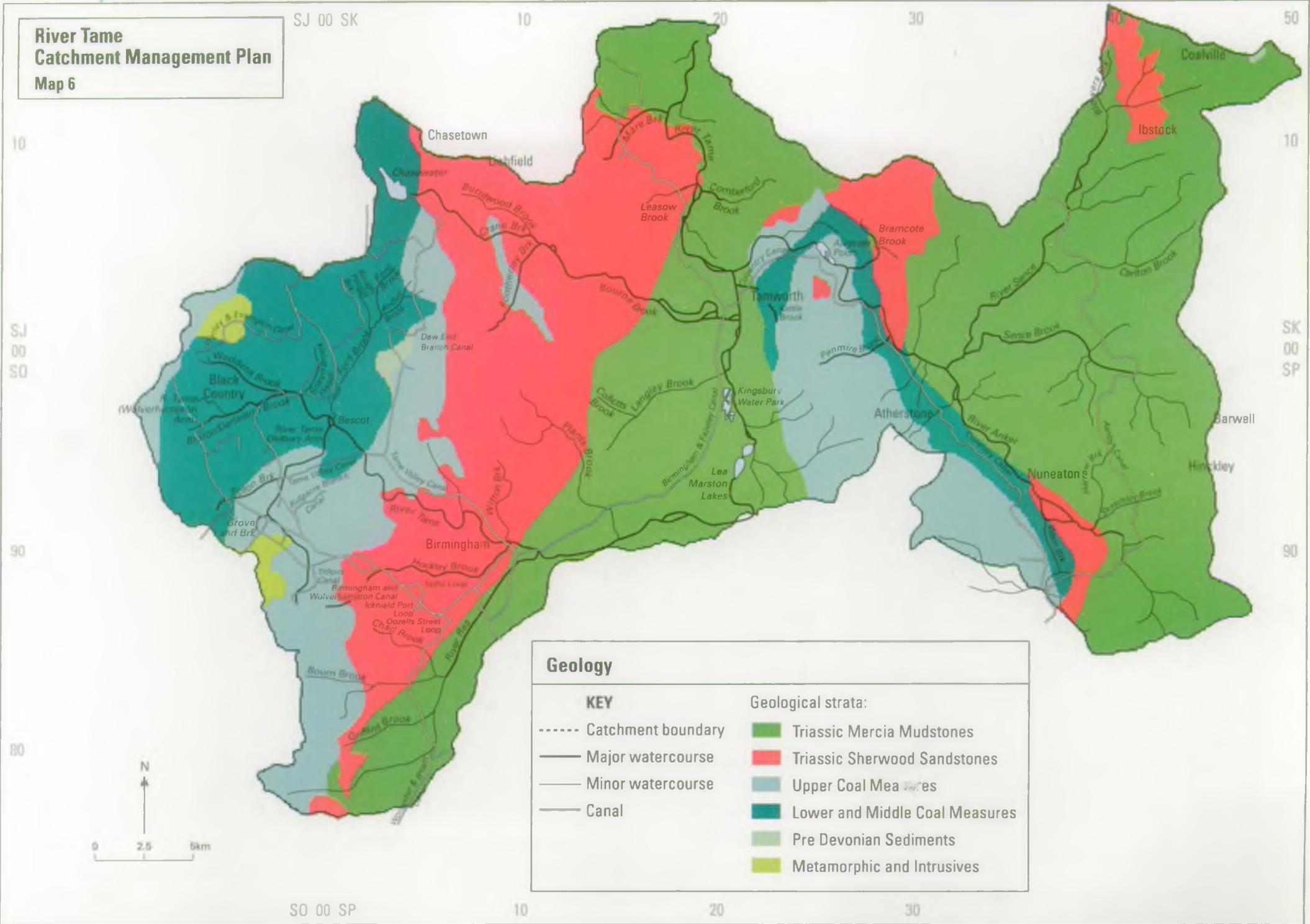
**River Tame
Catchment Management Plan
Map 5**



Local and Regional Administration

KEY	Regional boundary
Catchment boundary	County boundary
Built up area	District / Unitary Authority boundary
Major watercourse	Black Country Development Corporation
Minor watercourse	Heartlands Development Corporation
Canal	

**River Tame
Catchment Management Plan
Map 6**



Geology

KEY	
-----	Catchment boundary
—	Major watercourse
—	Minor watercourse
—	Canal
Geological strata:	
■	Triassic Mercia Mudstones
■	Triassic Sherwood Sandstones
■	Upper Coal Measures
■	Lower and Middle Coal Measures
■	Pre Devonian Sediments
■	Metamorphic and Intrusives

Within the Coal Measures of the Black Country are three areas of hard igneous rock. These have been quarried for road stone, but are of little importance to water resources. Elsewhere in Walsall, Dudley and Wolverhampton, Silurian limestone and shale are found.

Triassic Sherwood Sandstones outcrop in a band from Longbridge in the south to Shenstone in the north and underlie much of Birmingham. This consists of a thick sequence of massive red sandstones, which form a major aquifer and contain important water resources. In the Birmingham area, however, these are not used as much as they once were due to a reduction in industrial activity. This has led to a rise in groundwater levels particularly along the Tame Valley in Aston and Witton.

Further east, overlying the sandstone, and outcropping in widespread areas of the central and eastern catchment is the Triassic Mercia Mudstone (see Map 6). Consisting predominantly of red clays, with thin mudstone or sandstone bands (skerries), this formation has generally low permeability and does not constitute a significant water resource.

Separating the two areas of Mercia Mudstone, are further outcrops of both the Carboniferous Coal Measures, from Tamworth southwards, and the Triassic Sherwood Sandstone, to the north east of Tamworth and around Nuneaton. A further small area of Sherwood Sandstone is located to the south east of Coalville. The Coal Measures are worked for coal and clay while the sandstone deposits are too small to provide major water resources. Deep hard rock quarry workings located near to Nuneaton, extract ancient Cambrian shales and igneous rocks. Whilst these rock formations can store little water, their effect can be significant due to the minerals present in these rocks.

2.1.6 Water Resources

The profile of water resources and supplies varies significantly from west to east across the catchment. Any new surface water licences are subject to flow restrictions in order to protect river quality, existing licences and the ecology of the watercourse. British Waterways have certain rights to abstract water from rivers and streams to ensure that canal water levels are maintained. These rights are still enshrined in Acts of Parliament laid down over 200 years ago. For this reason the provision of adequate water resources does not normally require the consent of the NRA. This can cause problems, particularly during long dry periods when water can be diverted into the canal system without necessarily having regard to the impact on surface waters.

In the West Midlands conurbation most of the abstractions are for industrial purposes. In the north, around Lichfield, there are major public water supply abstractions while elsewhere many of the licences are for spray irrigation or livestock.

Generally the west of the catchment has sufficient water resources to grant new licences, while in the east and north resources are more restricted. In Birmingham, rising groundwater is a problem and this is discussed in Issue 11. The Black/Bourne Brook is heavily abstracted, mainly for spray irrigation, while the Lichfield Aquifer (centred to the south of the city) is over abstracted and no new licences can be granted. The Coventry Canal experiences difficulties and the NRA is working closely with British Waterways to identify additional sources of supply.

2.1.7 Surface Water And Groundwater Quality

Surface Water Quality

Water quality in the upper urbanised parts of the catchment remains generally poor. The River Tame contains a high proportion of sewage and industrial effluent. Under storm conditions it also receives large amounts of polluted run-off from surrounding land, roads, buildings etc. At Lea Marston the average flow in the river consists of 55% sewage effluent and industrial waste. In dry weather this rises to 90%.

Downstream of Lea Marston water quality has improved sufficiently to support a reasonable coarse fishery and with good quality water joining the River Tame from the Bourne/Black Brook and the River Anker, this improvement continues to the confluence with the River Trent at Alrewas.

Groundwater Quality

The quality of groundwater varies across the catchment due to the type of aquifer and the use of land. In the Black Country, natural minerals in the rocks dissolve in water to give elevated concentrations of metals and dissolved solids. Industrial activity has also had its effect both here and throughout the urban West Midlands reducing water quality through polluting discharges, waste disposal and poor site management. In the Triassic Sandstones under Birmingham, 80% of boreholes show evidence of solvent and heavy metal contamination in groundwater derived from historical industrial practices.

In the Triassic Sandstones north of Birmingham the effect of industry is less, but nitrate levels are rising due to changes in agricultural practice. The Lichfield area is an important drinking water supply source and has been significantly affected by nitrates. It has now been designated as a Nitrate Vulnerable Zone (see Issue 13 and Section 6.1.2).

In the upper reaches of the catchment, contaminated groundwater is affecting surface waters and is undoubtedly contributing to poor surface water quality. Elsewhere the yield from the Triassic Sandstones is good in quality but the volumes are limited. The Cambrian Rocks near Nuneaton yield naturally highly acidic and metalliferous waters, while the Mercia Mudstones yield very little water.

2.1.8 Flood Defence

Flood defences have been constructed in many parts of the catchment to provide protection for property. These are generally either hard defences, (flood walls made of brick, concrete or sheet piling) or soft defences, (earth embankments). There are extensive flood banks on the River Tame at Tamworth, Whitacre Heath, Water Orton and in the conurbation area at Witton, Hamstead, Bescot and Oldbury.

Other forms of flood protection have also been provided. On the middle reaches of the River Tame and Oldbury Arm, five flood balancing areas have been constructed at Ocker Hill, Sheepwash, Bescot, Sandwell and Perry Hall Playing Fields. At Nuneaton, a flood relief channel has been built on the north eastern side of the town to divert flood flows on the River Anker thereby bypassing its historic route through the centre of the town where many

serious floods have occurred in the past.

Inevitably some property and land is not protected and the NRA is unable to provide defences where the cost of doing so outweighs the benefits gained. To assist people in such areas, a flood warning service is operated. Within the catchment this system covers parts of the Rivers Tame, Anker and Sence. Further extension of the flood warning system is being considered.

2.1.9 Fisheries

In the upper reaches of the River Tame above Lea Marston Purification Lakes there are no sustainable fish populations. Minor species, particularly sticklebacks, exist locally where refuges are available and some small populations of roach, derived from off line balancing lakes, survive temporarily. Effectively the upper Tame is devoid of permanent stocks of major coarse fish species.

There is some movement of fish into the River Tame from the River Blythe during periods of improved water quality. These fish, mostly dace and chub, stimulate some local fishing interest. The stocks appear to have only a transient existence and there is little indication of reproduction.

Downstream of the two effluent discharges from Minworth STP, the river is faster and deeper and difficult to survey, but few fish are observed and fishing activity is negligible.

The purification lakes at Lea Marston bring about a change in water quality and mark the upstream limit of permanent coarse fish stocks. The weirs also present a barrier to upstream migrations. Good mixed populations of chub, dace and roach although patchy, provide some excellent sport, particularly in the vicinity of Tamworth where the contributions of the River Anker and Bourne/Black Brook improves water quality.

The River Anker supports a rapidly developing high quality mixed coarse fishery. The River Sence also holds good stocks of chub and dace in the lower reaches and in its upper section is managed to provide the only riverine trout fishery in the catchment.

Still water coarse fisheries are widespread and there is also good coarse fishing on the extensive canal network. These waters provide a variety of angling opportunities for coarse fishermen at all levels of interest and expertise.

2.1.10 Conservation

There are no rivers of major nature conservation importance within the catchment, although the Ashby Canal is designated as a Site of Special Scientific Interest (SSSI) for its water plants. Sutton Park, on the north east edge of Birmingham, is the largest SSSI in the catchment and contains the largest and richest area of ancient woodland, heath and wetland in the West Midlands county area.

The upper reaches of the River Tame and much of the Birmingham Canal Navigation contain poor water quality. The River Tame has also been modified to improve land drainage. There are however parts of the river system where the remnants of a pre-industrial past can

still be seen.

In the middle and lower reaches of the river, sand and gravel workings and other activities have left a large number of ponds, pools and larger water bodies which have become important for their bird populations. These wetland areas now extend from south of Kingsbury to the River Trent confluence.

The Rivers Anker and Sence provide a more varied habitat. The river corridors have been less modified and water quality is better. The River Anker flows through Alvecote Pools, designated an SSSI, for its vegetation, invertebrates and birds.

2.1.11 Recreation

The River Tame catchment provides relatively few water based recreational facilities for such a large population. Poor water quality restricts angling opportunities while canoeing and other water sports do not normally take place on the river system because of high bacterial levels. Angling and other water sports are usually located on ponds, canals and lakes.

The catchment offers opportunities for bird watching at Sandwell Valley and Sutton Park in its upper reaches, while on the middle and lower reaches large bird populations congregate on the pools between Hams Hall and Tamworth and at Alvecote Pools.

Access to the riverbank is generally poor, but the extensive canal network provides a system of waterside towpaths, some of which can also be used by cyclists.

2.1.12 Navigation

There are no navigable rivers but the Birmingham Canal Navigation is the most extensive canal network of any urban area in Britain.

Canals are being used as a focus for regeneration and Gas Street basin in Birmingham is a good example of what can be achieved. Many of the most famous canals pass through the catchment including the Grand Union Canal, the Birmingham and Fazeley, the Coventry Canal and the Ashby Canal. Extensions to the network are being pursued by local canal restoration groups with proposals to recreate the Lichfield Canal and extend the Ashby Canal as far as Moira.

Generally the Birmingham Canal Navigation suffers from poor quality and a legacy of historic pollution (see Issue 7). The Ashby Canal and parts of the Wyrley and Essington Canal are better quality and support good fish and invertebrate populations.

2.2 Catchment Key Details

General

River Tame Catchment (including the Blythe/Cole/Bourne subcatchments)	1,470 sq km
Catchment Plan Area	1,090 sq km
Blythe/Cole/Bourne Catchment	380 sq km
Population 1991	1.7 m
Population 2001 (projected)	1.7 m

Topography

Maximum Level (AOD)	270 m Beacon Hill
Minimum Level (AOD)	50 m Chetwynd Bridge

Administrative Details

County Councils	Hereford & Worcester County Council Staffordshire County Council Warwickshire County Council Leicestershire County Council
Unitary Authorities	Birmingham City Council Sandwell Metropolitan Borough Council Walsall Metropolitan Borough Council Wolverhampton Metropolitan Borough Council Dudley Metropolitan Borough Council Solihull Metropolitan Borough Council
District Councils	North Warwickshire Borough Council Nuneaton & Bedworth Borough Council Hinckley and Bosworth Borough Council North West Leicestershire District Council Lichfield District Council Tamworth Borough Council Rugby Borough Council South Staffordshire District Council Bromsgrove Borough Council Cannock Chase District Council
Development Corporations	Black Country Development Corporation Birmingham Heartlands
National Rivers Authority	Severn Trent Region, Upper Trent Area
Water Companies	Severn Trent Water Ltd South Staffordshire Water Plc

Main Urban Centres and Population within the Catchment (1991)

Birmingham	665,000
(part of the City lies outside the catchment)	
Sandwell	261,000
(part of the Borough lies outside the catchment)	
Walsall	259,488
Wolverhampton	83,000
(Only part of the Borough lies in the catchment)	
Nuneaton	76,434
Tamworth	69,051
Dudley	59,000
(Only part of the Borough lies in the catchment)	
Hinckley	44,645
Lichfield	28,700

Conservation

Total SSSIs	28
SSSIs with wetland interests	16
National Nature Reserves	1
Sites of Importance to Nature Conservation (SINCs)	344
SINCs with wetland interests	128
Local Nature Reserves	9
RSPB Reserves	1
Wildlife Trust Reserves	5
Historic Parks and Gardens	7
Scheduled Ancient Monuments	72

Water Resources

Long term (1969-1990) average annual rainfall	711 mm
Total licensed abstraction	136 Ml/d (Approx)
Mean flow of the River Tame at Hopwas Bridge	2,007 Ml/d
Number of licensed abstractions	309 (8 combined)
(Groundwater)	164)
(Surface Water)	153)

Fisheries

EEC designated fisheries:-

Salmonid	None
Coarse	108 km

Water Quality

Number of trade effluent discharges	191
Sewage Treatment Plants (STW Ltd)	
Final Effluents	44
Storm Effluents	33
Private Sewage Treatment Plants	47
Combined Sewer Overflows (approx)	500
Total number of consented discharges	815

Table 4 - Water quality in Rivers and Canals

Water Quality	Chemistry Component			Biological Component		
	Grade	Length (km)		Grade	Length (km)	
		River	Canal		River	Canal
Good	A	-	-	Very good	39	49
	B	22	-	Good	85	22
Fair	C	94	18	Moderate	98	69
	D	40	60	Poor	78	62
Poor	E	126	108	Very poor	14	40
Bad	F	26	14			

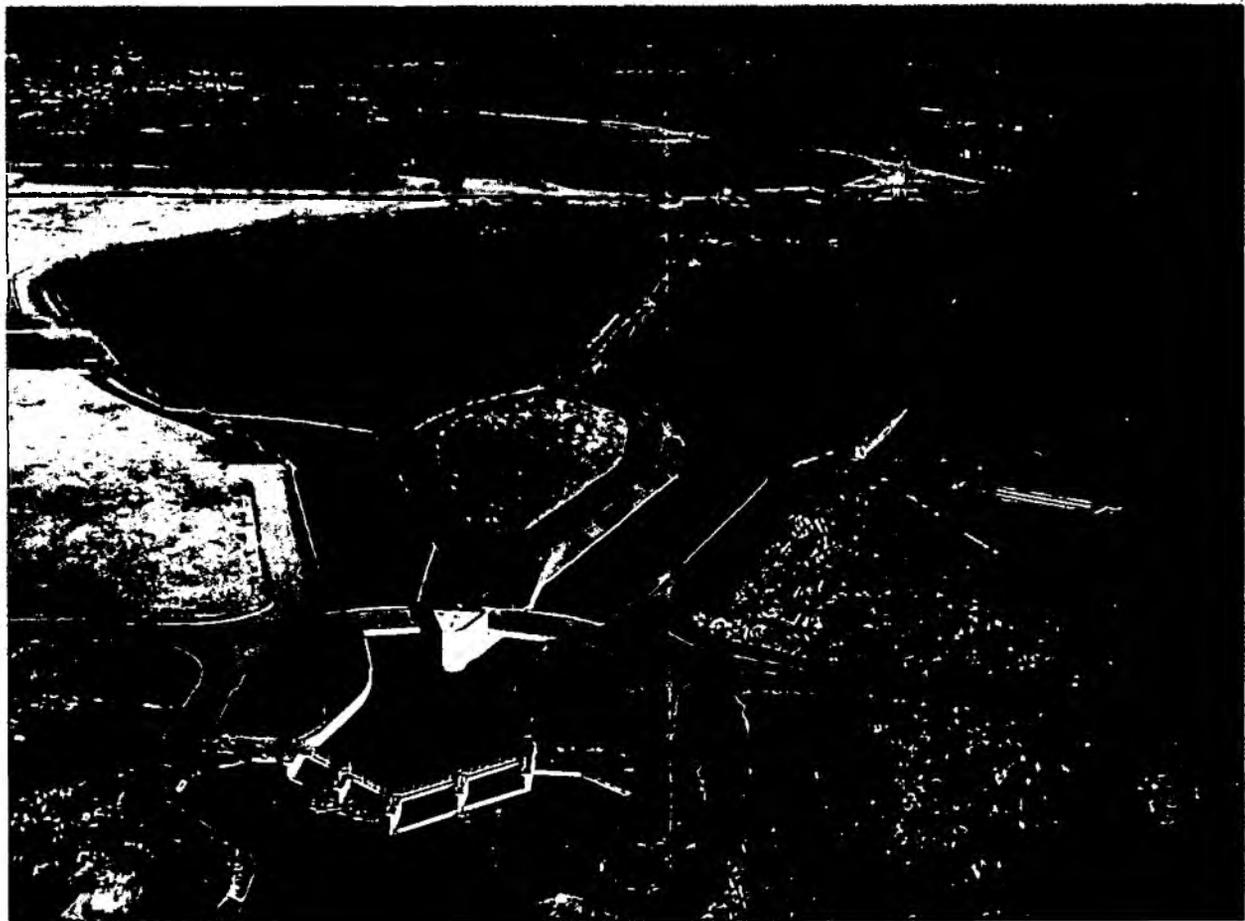
Note:- There is a variation between the lengths of river and canal monitored for chemical and biological quality.

Flood Defence

Length of Main River	285 km
Length of flood banks and flood walls maintained by the NRA	11 km
Number of urban flood alleviation schemes	3
Number of Operational sluices/pumping stations	2
Length of ordinary watercourse controlled by Birmingham City Council Bylaws	27
Number of control structures/balancing areas controlled by Birmingham City Council	5



Park Hall Farm, Castle Bromwich.



Lea Marston Purification Lakes.

SECTION 3

ISSUES AND OPTIONS

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

- Comparing the current state of the catchment (Section 6) with national and regional targets.
- Informal consultation with selected organisations.
- Considering pollution incidents and flooding complaints.
- Using the local knowledge of NRA Staff.

The options presented are the initial views of the Upper Trent 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 cooperation of many organisations and individuals.

**River Tame
Catchment Management Plan
Map 7**

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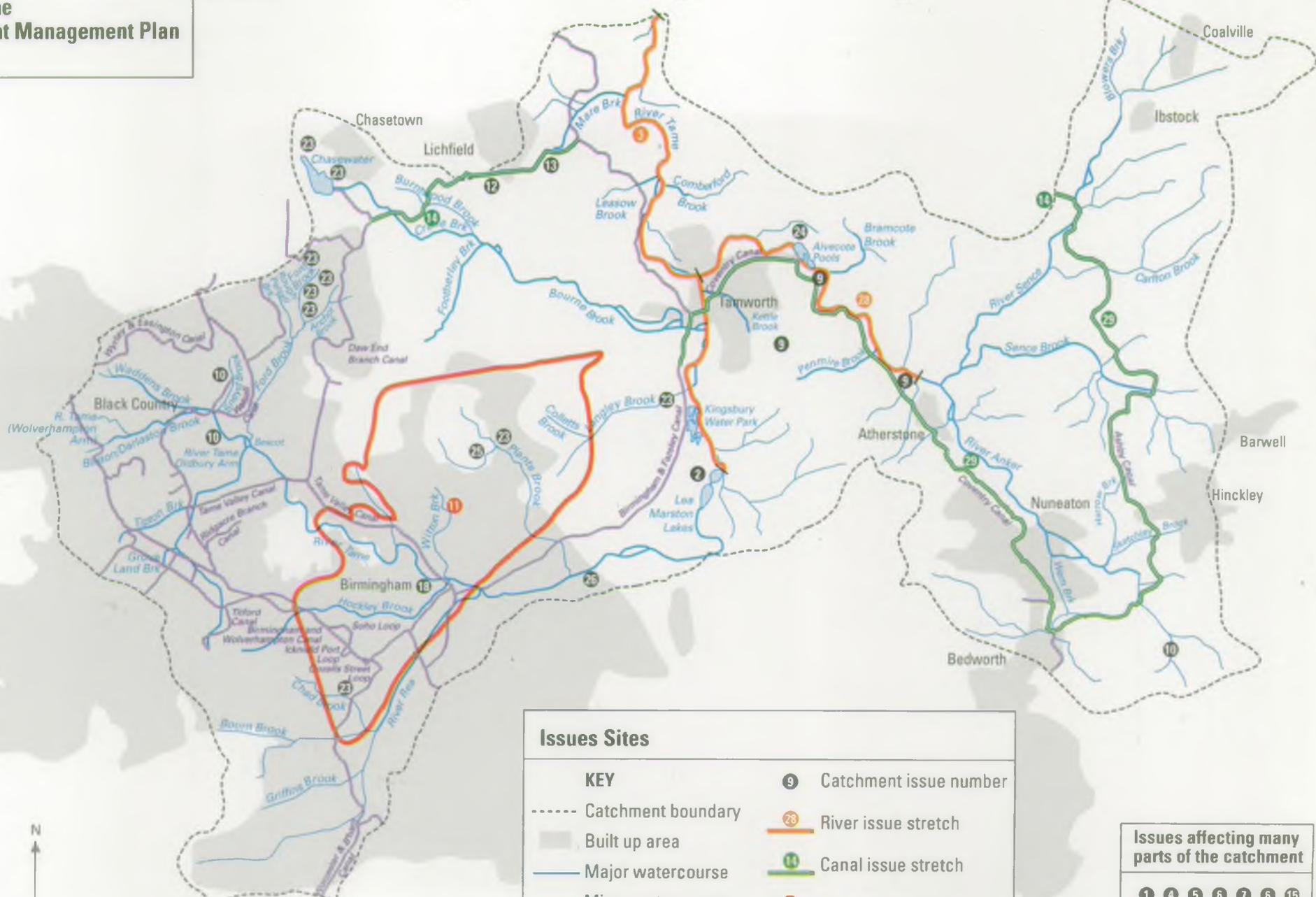
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Issues Sites

KEY	9	Catchment issue number
-----	28	River issue stretch
■	14	Canal issue stretch
—	11	Rising groundwater study area
—		
—		
—		

Issues affecting many parts of the catchment

1	4	5	6	7	8	15
16	27	19	20	21	22	27



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3.1 Catchment Issues

The issues that have been identified are not in priority order but where possible associated issues have been grouped together. Some issues affect many aspects of the water environment, while others affect only one area, eg flood defence. Some issues are site specific (see Map 7) while others can affect many parts of the catchment.

- Issue 1 Urban run-off and the de-oxygenation of surface water.
- Issue 2 The future operation of Lea Marston Purification Lakes.
- Issue 3 The sustainability of the fish population in the River Tame.
- Issue 4 River and canal lengths that fail their River Quality Objectives.
- Issue 5 River stretches that can be upgraded in order to protect water quality.
- Issue 6 Investment by Severn Trent Water Ltd to improve water quality.
- Issue 7 Poor water quality in canals.
- Issue 8 Litter, unauthorised tipping and the aesthetic pollution of rivers and canals.
- Issue 9 Contaminated run off from spoil heaps at abandoned coal mines.
- Issue 10 The effect of contaminated land on water quality.
- Issue 11 The impact of rising groundwater beneath Birmingham.
- Issue 12 The over abstraction of groundwater from the Lichfield Aquifer.
- Issue 13 Rising nitrate levels in groundwater.
- Issue 14 The impact of canal restoration schemes on existing water resources and nature conservation.
- Issue 15 Review of flood defences on the River Tame in Birmingham and the Black Country.
- Issue 16 Review of flood defences on the River Tame downstream of Water Orton.
- Issue 17 The provision of a flood warning system for the West Midlands.
- Issue 18 Flooding at Brookvale Road, Witton.
- Issue 19 Lack of public access to rivers.
- Issue 20 Development of river corridors in urban areas for wildlife and amenity.
- Issue 21 Land use in the lower Tame Valley.
- Issue 22 Provision of water based recreation sites.
- Issue 23 The production of Water Level Management Plans for SSSIs.
- Issue 24 The adverse effect of Alvecote Pools on downstream water quality.
- Issue 25 Protection of the water environment in Sutton Park.
- Issue 26 The future management of Park Hall Farm.
- Issue 27 Control of invasive plants.
- Issue 26 Weed-growth in the River Anker.
- Issue 27 The spread of zander.

3.2 Issues, Options and Actions

Introduction

This section provides a detailed description of each of the issues. Tables are included which set out possible options or actions together with who is responsible and the benefits and constraints. Abbreviations used in the tables are set out below. These can also be found in the Glossary (Appendix 4).

Wherever possible the individuals or organisations responsible for carrying out each option has been identified. In some cases these are individuals or organisations other than the NRA. The options as presented are intended to facilitate improvements to the water environment for the benefit of all users. The Action Plan will provide more detailed budget and timetable information.

This should not be taken as a definitive list of issues, nor should the proposed options be taken to be the only ones available. We hope that all groups will debate these issues and pass their comments to us for consideration.

Abbreviations (See Glossary for definitions)

AMP2	Asset Management Plan 2 (1995 - 2000)
AMP3	Asset Management Plan 3 (2000 - 2005)
BW	British Waterways
DoT	Department of Transport
EN	English Nature
HA	Highways Agency
LA	Local Authority
LEA	Local Education Authorities
LPA	Local Planning Authority
MAFF	Ministry of Agriculture, Fisheries and Food
NRA	National Rivers Authority
OFWAT	Office of Water Services
SSW	South Staffordshire Water Plc
STW Ltd	Severn Trent Water Ltd

Issue 1 Urban run-off and the de-oxygenation of surface water

In any catchment, rain falling in sufficient quantities will run-off into sewers, ditches and gulleys and directly or indirectly into rivers and groundwaters. In urban areas, rivers and streams rise quickly in response to rainfall. Little is absorbed in the ground and large volumes of water can move quickly down the river system. Rain water runs off roads, individual factory yards and roofs, industrial estates and other impermeable surfaces subject to atmospheric pollution, spillage and other contamination.

Rainfall also has a significant impact on drainage systems themselves flushing accumulated solids from surface water systems which may include sewage solids and other pollutants. Dilute, but untreated, sewage effluent may also discharge from foul water sewers where combined sewerage systems incorporate overflows.

Urban run off discolours the receiving watercourse giving it, typically, a cloudy or grey appearance due to the levels of suspended solids. These can settle on the bed of the watercourse, smothering plants and invertebrates. Its effect can also be toxic, or result in the depletion of oxygen present in the water because of chemical and biological processes which break down organic pollutants, such as oil and sewage.

The impact of urban run off was seen at its most serious in July 1995, where following heavy localised rainfall over Birmingham and the Black Country, after a long dry period and high temperatures, dissolved oxygen levels in the River Tame fell rapidly. This resulted in the loss of over 90% of the fish stocks in the River Tame downstream of Lea Marston and further fish mortalities in the River Trent. Remedial measures instigated by the NRA were successful in reducing the impact of the pollution on the River Trent fishery. Measures included the deployment of equipment to oxygenate the River Trent at Burton upon Trent and the cooperation of the Power companies who abstracted large amounts of water and aerated it through cooling towers.

Low dissolved oxygen levels are a common feature on the River Tame following heavy localised summer rainfall. However, only three earlier events in June and July 1982 and July 1983 have had any significant adverse effects downstream of Lea Marston.

The July 1995 incident has been fully investigated. Further work is underway to evaluate and trial appropriate alternative aeration/oxygenation measures that can be used to minimise the impact of future pollution events of this nature.

Issue 1 Urban run-off and the de-oxygenation of surface water			
OPTIONS/ACTIONS	RESPONSIBILITY	BENEFITS	CONSTRAINTS
1.1 <u>General</u> Assess the pollution load from urban run-off	NRA	A better understanding of the nature and extent of the problem.	Complexity of the task, staff and time constraints.

Issue 1 Urban run-off and the de-oxygenation of surface water (continued)			
OPTIONS/ACTIONS	RESPONSIBILITY	BENEFITS	CONSTRAINTS
1.2 Road Run Off			
○ Review the maintenance and operation of existing treatment measures.	NRA, HA, LAs	Development of best practice.	Cost and the difficulty of assessing the effectiveness of measures in varying conditions.
○ Provide additional pollution prevention and treatment systems on new and existing roads.	HA, DoT LAs other Road Builders	Improved water quality.	Cost. May have limited impact in the short term.
1.3 Industrial Sites			
○ Regular site visits and awareness campaigns.	NRA	Reduction in number and frequency of pollution incidents.	Staff resources.
○ Provide or improve pollution prevention measures eg bunds, interceptors and containment of first flush contaminated run off.	Site owners Site occupiers LPAs	Reduction in number of pollution incidents.	Cost of installation. Ongoing maintenance needed.
○ All drainage to foul sewer.	Site owners STW Ltd	Pollution risk to watercourse reduced/removed.	Inadequate treatment facilities at STP - Storm Sewage Overflows (CSOs) may operate prematurely. Risk to STP processes.
○ Better site selection.	LPAs Site owners	Reduced risk of serious pollution.	Site availability.
1.4 Sewerage Systems			
○ Improve the sewerage system under AMP2. (Issue 7).	STW Ltd	Improved water quality.	Expenditure limited. Not all problems addressed.
○ Identify the remaining problem sites and formulate remediation schemes.	NRA	Improved knowledge.	Resolution would be dependant on future resources under AMP3.
○ Monitor surface water sewers for wrong connections and correct where found.	STW Ltd NRA LAs	Reduced pollution.	Scale and complexity. Manpower and cost.
1.5 Investigate further and trial alternative aeration/oxygenation measures to respond to summer storms.			
	NRA	Improved response which minimises the impact of pollution.	

Refer to Sections:-	2.1.2	A short history of the River Tame.
	2.1.3	The future operation of Lea Marston Purification Lakes.
	5.1	Development and infrastructure (the nature of urban run-off).
	5.6	Sewage and trade effluent disposal.
	6.1-1	State of the catchment - River Quality Objectives.

Associated Issues:-	Issue 2	The future operation of Lea Marston Purification Lakes.
	Issue 3	The sustainability of the fish population in the River Tame.
	Issue 6	Investment by Severn Trent Water Ltd to improve water quality.

Issue 2 The future operation of Lea Marston Purification Lakes

Prior to the construction of Lea Marston Purification Lakes the River Tame was fishless throughout its length and its polluted nature, particularly in wet weather, had a severe adverse impact on the River Trent.

In 1989 the ownership and management of the lakes was transferred to the NRA. The lakes have continued to perform their design function by significantly contributing to improving water quality, most notably in dry weather, and have been successful in buffering the quality effect of storm flows on both the River Tame and River Trent.

Their role in improving water quality in the downstream River Tame and the River Trent, immediately downstream of the Tame confluence contributes to the achievement of a viable fish population in these two river reaches. They also play an important part in contributing to the UK's commitment to reduce toxic metal inputs to the North Sea (agreed at the Third North Sea Conference in March 1990).

As explained previously (see Section 2.1.2) the lakes reduce the levels of suspended solids, Biochemical Oxygen Demand and toxic metals in the river. However there is a slight increase in ammonia levels downstream of the lakes which can be sufficient to cause the river to fail its water quality objective. A project has been completed into the cause of the ammonia release and investigations are underway into options to control it.

The downstream weir from Lake 1 is impassable to fish and represents the upstream limit for this population. It is this downstream population that the NRA seeks to protect. Any fishery upstream of the lakes is adventitious and vulnerable to intermittent pollution.

The extensive fish mortality in July 1995 following a sudden summer storm illustrates that the lakes cannot, as presently operated, provide total protection against all extremes of upstream water quality. The operation and performance of the lakes, under all conditions, is currently being investigated with a view to maximising their performance and minimising their running costs. The resulting plan will include a review of current contingency measures instituted to prevent a recurrence of the July 1995 fish mortality and will ensure that any future development of the Lea Marston site is consistent with local plans and the emergent Lower Tame Valley Management Plan (Issue 21).

Issue 2 The future operation of Lea Marston Purification Lakes			
OPTIONS/ACTIONS	RESPONSIBILITY	BENEFITS	CONSTRAINTS
Continue a comprehensive review of current operations and practice.	NRA	Identify potential improvements and cost savings.	

Refer to Sections:- 2.1.2 The operation of Lea Marston Lakes
 5.1 Development and infrastructure (the nature of urban run-off).
 5.6 Sewage and trade effluent disposal.
 6.1.1 State of the catchment - River Quality Objectives.

Associated Issues:- Issue 1 Urban run off and the de-oxygenation of surface water.
 Issue 3 The sustainability of the fish population in the River Tame.
 Issue 4 River and canal lengths that fail their River Quality Objectives.
 Issue 6 Investment by Severn Trent Water Ltd to improve water quality.
 Issue 21 Land use in the lower Tame Valley.

Issue 3 The sustainability of the fish population in the River Tame

Following major improvements in water quality, considerable effort has been directed over the past decade towards encouraging the development of fish populations in the River Tame, through restocking and habitat improvement. It has been recognised, however that in the reaches upstream of Lea Marston Lakes, both water quality and instream habitat do not favour the presence of sustainable fish populations and emphasis has been placed downstream of Lea Marston.

It has been accepted that all the Tame fish populations are at risk from the impact of storm and run-off discharges from the West Midlands conurbation following long dry spells.

Although relatively minor fish kills have occurred periodically over the past decade, the dramatic incident occurring in July 1995 brought into sharp focus the perilous situation in which fish populations exist in the Tame. If the effort and resources directed towards improving the status of fish populations is not to be wasted, means need to be found to prevent such incidents from affecting the fishery.

The issue of de-oxygenation of water is considered in Issue 1 and the development of a contingency plan to protect fish stocks below Lea Marston in Issue 2. Off line pools to provide fish refuges in the event of a pollution incident could also be considered. The NRA seeks to ameliorate the effects of run-off through its own ongoing routine activities (Section 1.1).

Issue 3 The sustainability of the fish population in the River Tame			
OPTIONS/ACTIONS	RESPONSIBILITY	BENEFITS	CONSTRAINTS
3.1 Protect fish stocks from storm flows by:- <ul style="list-style-type: none"> ○ Creation of off line refuges for fish on all main rivers subject to severe intermittent pollution. ○ Provide instream habitat features for shelter. 	<p style="text-align: center;">NRA Landowners</p> <p style="text-align: center;">NRA</p>	<p>Protect existing fish populations. Encourage plant and animal diversity.</p> <p>Population not redistributed.</p>	<p>Obstructions to river bank maintenance. Manpower and cost.</p> <p>Cost.</p>
3.2 Re-stock following a pollution event.	NRA	Rapid recovery.	Cost. Does not address the ongoing problem.

Refer to Sections:-
 2.1.9 Fisheries.
 5.10 Fisheries.
 5.12 Recreation and amenity (including angling).
 6.3.2 Current state of the catchment - Fisheries.

Associated Issues:-
 Issue 1 Urban run-off and the de-oxygenation of surface water.
 Issue 2 The future operation of Lea Marston Purification Lakes.
 Issue 6 Investment by Severn-Trent Water Ltd to improve water quality.

Issue 4 River and Canal lengths that fail their River Quality Objective

RQOs are applied to all rivers and canals. The objectives, both short term and long term, are based on chemical and biological criteria and are set by the NRA. They are currently non statutory. The objectives provide a measure of performance and indicate where long term improvements are required.

Map 20 on page 134 shows lengths of rivers that fail to meet their long term RQOs and Map 21 on page 135 shows canal stretches that fail to meet their long term RQOs. Some of these failures will be met by investment by Severn Trent Water Ltd under AMP2 (see Issue 6), whilst others have failed due to unusual sample results or statistical reasons (see Section 6.1.1). Some canal lengths in the Birmingham Canal Navigation will not meet long term objectives because the criteria used to assess water quality may be inappropriate for the Navigation. This is discussed in Issue 7.

The remaining watercourse lengths require further investigation or remedial action and these are listed below. The list is split between those that we would wish to put forward for improvement when negotiating the AMP3 (2000 - 2005) environmental programme with Severn Trent Water Ltd and those lengths requiring further investigation.

Water quality problems

- a) River and canal stretches that should be considered for improvement under AMP 3.
 - Swan Brook - Woodsetton to confluence with the Tipton Brook.
 - Sketchley Brook, improvements at Hinckley STP required including the application of a colour standard.
 - Hockley Brook - Woodburn Road.
 - River Anker - Sketchley Brook to the Wem Brook (from improvements at Hinckley STP).
 - The Black/Bourne Brook downstream of Burntwood STP (A461 to Shenstone Mill).

- b) River and canal stretches that require further investigation.
 - Tipton Brook, Alexandra Road to the River Tame.
 - Groveland Brook, Johns Lane, Tipton.
 - River Rea, Gravelly Hill Industrial Estate.
 - Griffins Brook, Bourneville.
 - Griffins Brook, Stirchley.
 - Sketchley Brook, upstream of Hinckley STP.
 - Black/Bourne Brook upstream of Burntwood STP.
 - Walsall Canal, Bull Lane, Moxley.
 - Walsall Canal, Ryders Green Road.
 - Ridgacre Branch Canal.
 - Anglesey Branch Canal.
 - Birmingham Wolverhampton Canal, James Mill.
 - Icknield Port Loop, Icknield Port Road.

Issue 4 River and Canal lengths that fail their River Quality Objectives (RQOs)			
OPTIONS/ACTIONS	RESPONSIBILITY	BENEFITS	CONSTRAINTS
4.1 Highlight river stretches that could be improved under AMP3.	NRA	Maximises benefit to the water environment from investment.	Amount of money available. Competing problems elsewhere.
4.2 Investigate further those river and canal stretches that fail their RQOs where the cause cannot clearly identified.	NRA (Lead) STW Ltd	Could lead to future improvements under AMP 3 and beyond.	Cost.

Refer to Sections:-

- 2.1.2 A short history of the River Tame.
- 2.1.3 Lea Marston Purification Lakes.
- 2.1.7 Surface water and groundwater quality.
- 5.3 Contaminated land.
- 5.6 Sewage and trade effluent disposal.
- 6.1.1 State of the catchment - surface water quality.

Associated Issues:

- Issue 2 The future operation of Lea Marston Purification Lakes.
- Issue 5 River stretches that can be upgraded in order to protect water quality.

- Issue 6 Investment by Severn Trent Water Ltd to improve water quality.
- Issue 7 Poor water quality in Canals.
- Issue 9 Contaminated run off from spoil heaps at abandoned coal mines.
- Issue 10 The effect of contaminated land on water quality.
- Issue 24 The adverse effect of Alvecote Pools on downstream water quality.

Issue 5 River stretches that can be upgraded in order to protect water quality

River Quality Objectives are applied to all rivers and canals. The objectives, both short term and long term are based on chemical and biological criteria and are set by the NRA. They are currently non statutory. The objectives provide a measure of performance and indicate the current status of a watercourse.

In some lengths of river in the catchment, current water quality exceeds the long term RQO. Where this is sustainable it is proposed to upgrade the long term objective to protect future water quality:-

- i) River Tame, upstream of Waddens Brook (5.5 km).
River Tame, downstream of Waddens Brook (0.3 km).

These two stretches of the River Tame have improved dramatically in recent times following the completion of a number of major sewerage schemes. As a result, the current quality of the two sites is sustainable and it is proposed to upgrade the long term River Quality Objective to RE4.

- ii) River Rea, Cannon Hill Park (9.7 km)

The current objective of this watercourse is RE4. As a result of a sustainable improvement in water quality, it is intended to upgrade the long term objective for this brook to RE3.

- iii) Plants Brook, Castle Bromwich (2 km)

The current quality of this brook is RE4 compared with a long term objective of RE5. This quality is sustainable due to the correction of wrong sewer connections as part of the Castle Vale redevelopment. It is intended to upgrade the river to RE4.

- iv) Burntwood Brook, upstream of Burntwood STW (1 km)

The current quality of this stretch is RE3 with a long term objective of RE4. As this quality is sustainable it is intended to upgrade the long term river quality objective to RE3.

- v) River Sence, upstream Kelham Bridge (2.4 km)
River Sence, Pisca Lane (2 km)

The current long term objectives of these stretches are RE4. It is intended to upgrade both to RE3.

Issue 5 River stretches that can be upgraded in order to protect water quality			
OPTIONS/ACTIONS	RESPONSIBILITY	BENEFITS	CONSTRAINTS
5.1 Upgrade the long term RQOs where possible.	NRA	Building on past improvements. Creates new baseline in accordance with long term objectives.	-

Refer to Sections:- 2.1.7 Surface water and groundwater quality.
5.3 Contaminated land.
5.6 Sewage and trade effluent disposal.
6.1.1 State of the catchment - surface water quality.

Associated Issues:- Issue 4 River and Canal stretches that fail their River Quality Objective.
Issue 6 Investment by Severn Trent Water Ltd to improve water quality.

Issue 6 Investment by Severn Trent Water Ltd to improve water quality .

In July 1994 announcements were made by the Office of Water Services (OFWAT) about the overall funding arrangements of the private water companies for Asset Management Plan 2 (1995-2000) (AMP2). Top priority for expenditure under AMP2 was given to meeting present and future statutory obligations, both EC and domestic. These include the EC Directive for Freshwater Fisheries, Dangerous Substances and Urban Waste Water Treatment. Within the plan area such expenditure is restricted to Oldbury and Walsall Wood Sewage Treatment Plants. However, at the time of writing the closure of the Oldbury Works, with the diversion of all flows to the Black Country Trunk Sewer (BCTS), is expected.

Lower priority has been given to schemes to achieve River Quality Objectives (RQOs) and these were referred to as discretionary schemes. In Severn Trent Region the agreed expenditure for such schemes is not sufficient to bring about all of the RQO improvements identified by the NRA. However, a significant proportion of this expenditure will take place within the Tame catchment and improvements are planned at Minworth and Coleshill Sewage Treatment Plants, for completion by the year 2000.

A number of improvements to the sewerage system are also planned including groups of combined sewer overflows (CSOs) discharging to the Birmingham/Wolverhampton Canal in the Brasshouse and Londonderry Lane areas of Smethwick, the latter discharging, via a canal feeder, to the Birmingham/Wolverhampton Canal (see Issue 7).

A major scheme is proposed on the BCTS and the Saltley/Minworth link sewer, the details of which have not been finalised but is expected to result in improvements to a large number of major CSOs. This improved infrastructure will either reduce the need for many of the combined sewer overflows or will reduce the frequency of their operation. Other schemes include improvements to a number of CSOs discharging to the Rough Brook in Goscote and Pelsall areas, two CSOs to the Ford Brook in Walsall and individual schemes in Stubbers Green, Aldridge and Willenhall.

It is anticipated that the CMP Action Plan resulting from this study will highlight potential projects for the AMP 3 programme (2000 - 2005) (see Issue 4).

Issue 6 Investment by Severn Trent Water Ltd to improve water quality			
OPTIONS/ACTIONS	RESPONSIBILITY	BENEFITS	CONSTRAINTS
6.1 Agree details and monitor implementation of schemes in AMP2 programme.	NRA STW Ltd	Improved water quality.	
6.2 Assess water quality benefits of completed schemes.	NRA	Measure achievement and identify future schemes for AMP3.	

Refer to Sections:- 2.1.7 Surface and groundwater quality.
 5.6 Sewage and trade effluent disposal.
 6.1.1 State of the catchment - River Quality Objectives.
 Appendix 3 National & European Legislation.

Associated Issues:- Issue 1 Urban run off and the de-oxygenation of surface water.
 Issue 2 The future operation of Lea Marston Purification Lakes.
 Issue 3 The sustainability of the fish population in the River Tame.
 Issue 4 River and canal lengths that fail their River Quality Objectives
 Issue 7 Poor water quality in Canals.
 Issue 8 Litter, unauthorised tipping and the aesthetic pollution of rivers and canals.
 Issue 25 Protection of the water environment in Sutton Park.

Issue 7 Poor water quality in Canals

The Birmingham Canal Navigation (BCN) is predominantly classified as having poor water quality (Rivers Ecosystem (RE) Class 5).

The NRA has responsibility for water quality while British Waterways (BW) has overall responsibility for maintaining and managing the canal network. They use NRA and their own data on water quality to support the operation of the network.

Poor water quality in the BCN and other canals is caused by:-

- Contaminated silt.
- The static nature of canal water.
- Boat traffic.
- Combined sewer overflows.
- Wrong sewer connections.
- Urban run-off.
- Blue/green algae and algal blooms.

Improvements in water quality and the promotion of public access play an important part in encouraging greater use of the canal network.

The static nature of any canal together with the constant requirement to maintain water levels

acts to concentrate substances discharged to it. Historically streams were diverted and run-off from adjacent land discharged to the canal system to maintain water levels. This resulted in the laying down of a silt containing heavy metals, oils and other pollutants which is costly to remove and remediate. These contaminated sediments limit aquatic vegetation and fisheries. Sediment disturbance by boat traffic results in release of mineral oils and organic matter which can cause oil sheens, de-oxygenation and fish mortalities. During 1993, approximately 24,000 m³ of sediment was removed from the BCN in central Birmingham as part of Project Aquarius and was processed prior to off-site disposal.

Current discharges, as a result of combined sewer overflows, wrongly connected domestic sewage discharges and industrial effluents, and general urban run-off, have a deleterious effect on water quality throughout the system. Significant improvements are planned by Severn Trent Water Ltd (STW Ltd) to groups of combined sewage overflows discharging to canals in the Smethwick area, as part of the AMP2 (see Issue 7). The NRA, BW and STW Ltd are also working together to consider standards for CSO discharges to canals in the future.

Where nutrient levels are sufficient and other conditions are favourable, algae can grow and adversely affect water quality. Despite this and general poor water quality, fish populations do survive in the BCN and other canals in the catchment and the system represents an important fisheries resource (Section 5.10). BW have therefore questioned the application of the river quality classification scheme to canals which invites "unfavourable" comparison with water quality in other waters. The chemical criteria used to assess River Quality Objectives was developed primarily to assess natural watercourses.

Listed below are those canals which do not achieve their long term objectives and where the classification system may be inappropriate. There are no planned improvements which will result in the objectives being met within the Plan period.

- Ashby Canal, Burton Hastings and Market Bosworth.
- Birmingham and Fazeley Canal, Fazeley.
- Wryley and Essington Canal, Daw End Branch.
- Rushall Canal, Aldridge Road.
- Tame Valley Canal, Holloway Bank, Newton Road.
- Tame Valley Canal, Salford Bridge.

The following canal water quality monitoring sites are likely to be influenced by seasonal fluctuations in algae. In all sites, with the exception of the Titford Canal, there will be an impact from boat traffic. As a result it is expected that these sites will not meet their objective during the plan period.

- Oozells Street Loop Canal, Sheepcote Street.
- Soho Loop Canal, Western Road Bridge.
- Titford Canal, Wolverhampton Road.
- Coventry Canal, Fradley Airfield.

Some branch canals are no longer used or have become silted up and overgrown. Where future redevelopment/restoration is unlikely, consideration is being given to ending formal water quality reporting on these stretches.

The Renaissance Initiative, an ambitious plan put forward by British Waterways and the Heart of England Tourist Board (HETB) seeks to further upgrade the BCN and provide a focus for tourism and other regeneration projects. The principal objective is to raise canal related tourism by 20 percent thereby securing 480 jobs. The projected investment in environmental improvement is £1.8m. The scheme also envisages improved access to and from local town centres and an improved system to manage water resources.

In recent years a large number of redevelopment/reclamation projects have been completed in the plan area incorporating adjacent canal "corridors". The Gas Street Basin in the centre of Birmingham is a particularly striking example of the contribution an upgraded waterway can make to urban regeneration.

Issue 7 Poor water quality in Canals			
OPTIONS/ACTIONS	RESPONSIBILITY	BENEFITS	CONSTRAINTS
7.1 Further improvements to canal bed silts.	BW	Improved water quality and environment.	Funding.
7.2 Assess the impact of improvements to CSOs under the AMP2 programme.	NRA	Development of appropriate standards (see 7.4) and possible identification of sites for inclusion in the AMP 3 programme.	
7.3 Further investigate canal lengths that fail their river quality objective.	NRA	Allows appropriate action to be taken.	
7.4 Develop appropriate overflow conditions for CSO discharges to canals.	NRA, STW Ltd and BW	Sustainable improvements in water quality.	
7.5 Reconsider the application of River Ecosystem classes to canals.	NRA, BW		
○ Downgrade canals to meet achievable quality.	NRA	Quality assessed consistently across the country in all watercourses.	Not necessarily an appropriate method. Suggests canal water quality is getting worse.
○ Develop a new classification system for canals.	NRA	More appropriate to the ecology of the system. Provides a real measure of the trend in water quality.	Lack of consistency across all watercourses. May not provide a real measure of changes in water quality.

Issue 7 Poor water quality in Canals (continued)			
OPTIONS/ACTIONS	RESPONSIBILITY	BENEFITS	CONSTRAINTS
○ Use RE system to classify canals.	NRA	More appropriate to the ecology of the system. Provides a real measure of the trend in water quality	The RE classification was not developed for general water quality classifications.
7.6 Declassify the derelict Gower and Anson branch canals for the purposes of formal water quality reporting.	NRA	Reduced monitoring costs.	

Refer to Sections: 2.1.2 A short history of the River Tame.
 5.1 Development and infrastructure (the nature of urban run-off).
 5.6 Sewage and trade effluent disposal.
 6.1.1 State of the catchment - River Quality Objectives.

Associated Issues:- Issue 1 Urban run off and the de-oxygenation of surface water.
 Issue 4 River and canal lengths that fail their River Quality Objectives.
 Issue 6 Investment by Severn Trent Water Ltd to improve water quality.
 Issue 8 Litter, unauthorised tipping and the aesthetic pollution of rivers and canals.
 Issue 19 Lack of public access to rivers.

Issue 8 Litter, unauthorised tipping and the aesthetic pollution of rivers and canals

In common with many urban catchments, stretches of the canal system and the River Tame and its tributaries suffer from litter, unauthorised tipping and other forms of aesthetic pollution.

The NRA has developed and is trialling an assessment scheme which measures aesthetic pollution in terms of the presence of litter, gross items, sewage debris, dog faeces, iron deposits, surface scums, oil, colour and odour. In this context aesthetic pollution does not include the wider visual appearance of the watercourse and its surroundings.

Litter can prove difficult to address as the polluter is usually hard to identify. Under common law riparian owners have responsibilities relating to the stretch of watercourse which falls within the boundaries of their property. Both the Local Authority, who may also be the riparian owner, and the NRA also have certain legal powers; to prevent flooding and to minimise the risks to public health by pollution. However, the complex nature of the legislation may result in no single organisation having an obvious responsibility.

Where possible the NRA seeks to reduce litter and unauthorised tipping through the cooperation of the general public without recourse to legal action, with its many difficulties and costs.

Issue 8 Litter, unauthorised tipping and the aesthetic pollution of rivers and canals			
OPTIONS/ACTIONS	RESPONSIBILITY	BENEFITS	CONSTRAINTS
8.1 Continued development of a pilot GQA aesthetics monitoring programme.	NRA	Quantitative measure of problems at individual sites.	-
8.2 Implement the GQA aesthetics monitoring programme (if required by 8.1).	NRA	National measurement providing quantitative evidence on the aesthetic appearance of watercourses.	Cost.
8.3 Promote clean up initiatives:-			
○ Dispose of unauthorised tipped material and reduce its future re-appearance through site management.	Riparian owners NRA LAs	Improved environment.	Cost and commitment of partners.
○ Improve access to and methods of waste disposal.	BW LAs	Improved environment.	Set up and service costs.
○ Removal/prevention of sewage derived debris.	STW Ltd	Improved environment.	Cost.
○ Education through Schools, Libraries, information to the general public and increased access to the waterside.	NRA LEAs Product Manufacturers	Improved environment.	Manpower and cost. Long term, requiring an on-going commitment.

Refer to Sections:- 5.6 Sewage and trade effluent disposal.
5.13 Recreation and amenity.

Associated Issues:- Issue 6 Investment by Severn Trent Water Ltd to improve water quality.
Issue 7 Poor water quality in Canals.
Issue 19 Lack of public access to rivers.

Issue 9 Contaminated run-off from spoil heaps at abandoned coal mines.

Acidic surface water draining from old colliery spoil heaps is a well documented problem that affects many mining areas. Drainage from spoil heaps can contain considerable amounts of ferrous and ferric salts (mainly sulphates), sulphates of aluminium, calcium, zinc and nickel, and often sulphuric acid. The iron salts and the sulphuric acid are usually assumed to originate from the atmospheric oxidation of iron pyrites which are generally associated with the formation of coal deposits. It is likely that the high acidity may also be due to bacterial action from sulphur producing organisms.

In the Tame catchment acidic run-off from the closed Birch Coppice, Baddersley Ensor and Pooley Hall colliery sites causes water quality problems in the receiving watercourses with Birch Coppice being the largest and most serious.

The Penmire Brook, which receives the contaminated Birch Coppice site run-off, is a

tributary of the River Anker and can also be used as a feeder for the Coventry Canal. Run-off is causing a serious deterioration in water quality such that it is not suitable for use in the canal. Chemical treatment has been carried out for a number of years but for various technical reasons this has so far failed to resolve the problem. A consent to discharge from the Birch Coppice site has been issued with effect from 1 October 1995. This consent limits the levels of metals allowable in the discharge to protect the brook.

Issue 9 Contaminated run off from spoil heaps at abandoned coal mines			
OPTIONS/ACTIONS	RESPONSIBILITY	BENEFITS	CONSTRAINTS
9.1 Chemically treat acidic run-off.	British Coal Property Division	Improvement in water quality.	Rainfall dependent giving variable flows to treatment.
9.2 Restore and cap spoil heaps.	British Coal Property Division	Improvement in water quality due to reduced volume/quality of discharge.	Suitable materials not readily available.
9.3 Re-profile and compact spoil heap.	British Coal Property Division	Improvement in water quality due to reduced volume/quality of discharge.	May not resolve problem sufficiently.

Refer to Sections:- 2.1.2 A short history of the catchment
 2.1.5 Geology and hydrogeology
 2.1.7 Surface water and groundwater quality
 5.4 Mineral working
 6.1.1 State of the catchment - River Quality Objectives.

Associated Issues:- Issue 4 River and canal lengths that fail their River Quality Objectives.

Issue 10 The effect of contaminated land on water quality

Contaminated land has a significant effect on groundwater and surface water in the catchment. Pollution usually comes from individual sites but in certain areas it is more diffuse. The most widespread problems are in the West Midlands conurbation which has a legacy of contaminated land. A characteristic of the Black Country is the complexity of some of the sites which can include mine workings, tipping from past industries and occasionally old infilled canals or disused railway lines.

Redevelopment provides the opportunity to remediate contaminated sites and the NRA works closely with Local Planning Authorities, developers and other agencies to ensure that the water environment is enhanced by re-development. Some sites are of particular concern, partly due to the lack of resources required to clean them up and partly because the historical nature of the contamination prevents legal redress to the polluter. Such sites include Slacky Lane and Bentley Mill Lane in Walsall where toxic metal contaminated water from historical tipping discharges via old mine workings to the Rough Brook and the River Tame respectively. These sites make a major contribution to heavy metals in the Wolverhampton arm of the River Tame, and the NRA will support schemes that result in their remediation.

In the upper reaches of the River Anker near Hinckley a waste disposal site at Villa Farm is also a cause of concern. Liquid waste was deposited in the lagoons in the past and whilst the site has been closed for many years the lagoons remain. Waste is now contaminating underground water to the west of the site and removal of the source is necessary to prevent further contamination.

Leachability triggers have been agreed and apply to all contaminated sites in the Black Country. These triggers help to ensure that land is remediated to an appropriate standard. More generally across the catchment the NRA, through planning liaison, and close cooperation with other public bodies will seek to ensure that all contaminated land is remediated to an appropriate standard.

Issue 10 The effect of contaminated land on water quality			
OPTIONS/ACTIONS	RESPONSIBILITY	BENEFITS	CONSTRAINTS
Remediation of Slacky Lane, Bentley Mill Lane and Villa Farm.	Landowners LAs	Reduced pollution of groundwater and surface waters.	Cost. Application of new legislation.

Refer to Sections:- 2.1.2 A short history of the catchment.
 2.1.7 Groundwater quality.
 5.3 Contaminated Land.
 5.7 Surface and Groundwater Abstraction.
 6.1.1 State of the catchment - River Quality Objectives.
 6.1.2 State of the catchment - Groundwater quality.

Associated Issues:- Issue 2 The future operation of Lea Marston Purification Lakes.
 Issue 4 River and canal lengths that fail their River Quality Objectives.
 Issue 11 The impact of rising groundwater beneath Birmingham.

Issue 11 The impact of rising groundwater beneath Birmingham

Due to a decline in abstraction by industry groundwater levels are rising in Birmingham.

Two studies have been carried out in recent years involving Birmingham City Council, the NRA, CIRIA (Construction Industry, Research and Information Association) and consultants. One report looked at what levels groundwater was likely to rise to, indicating the potential problems to buildings close to the River Tame. The other discussed options for resolving the problem. The available resource, estimated to be as much as 50 MI/d, has been highlighted in an NRA report on a national water resources strategy and possibilities for pumping water to the Tame or via canals to the south east have been discussed. The long industrial history of the area has resulted in organic solvent, hydrocarbon and metals contamination. This would be a concern for any future abstractor but more immediately the water level is rising into contaminated land and remobilising pollutants from the ground into the groundwater and surface water systems.

The NRA has no responsibility in respect of the effects of rising water on properties, only its effect on the water environment. An option is to study the groundwater quality in detail and assess its potential risk to surface waters via seepages as well as direct discharges.

Issue 11 The impact of rising groundwater beneath Birmingham			
OPTIONS/ACTIONS	RESPONSIBILITY	BENEFITS	CONSTRAINTS
11.1 Further investigate the potential impact of rising groundwater.	NRA	Problems and opportunities quantified. Facilitate the best use of the available resource.	-

Refer to Sections:- 2.1.5 Geology and Hydrogeology.
 2.1.6 Water resources.
 5.2 Industry.
 5.3 Contaminated land.
 5.7 Surface water and groundwater abstraction.
 6.2.2 State of the catchment - Groundwater.

Associated Issues:- Issue 10 The effect of contaminated land on water quality.

Issue 12 The over abstraction of groundwater from the Lichfield Aquifer

The broad outcrop of Triassic Sherwood Sandstones between Sutton Park and Lichfield provides important supplies of groundwater. Abstraction from this aquifer for public supply by South Staffordshire Water Plc (SSW) is close to or in excess of the assessed recharge. This has led to a progressive decline in groundwater levels and a consequent reduction of springflows, pool levels and baseflow support to watercourses.

Flows have diminished in the Black Brook, but the greatest impact has been on the Leamonsley Brook, immediately south of Lichfield. Although this lies just outside the CMP area, it is influenced by groundwater abstractions that occur within the CMP area. A compensation borehole has been drilled and provides flows to the lower reaches of the Leamonsley Brook which maintains flows to Minster and Stowe Pools in the centre of Lichfield. Pools in the upper reaches are also seriously affected and local compensation schemes are being developed. The only long term solution is to reduce the quantity of groundwater abstracted from the aquifer, to restore a sustainable balance between abstraction and recharge.

SSW are co-operating with the NRA and the Office of Water Services (OFWAT) to reduce groundwater abstraction, with financial assistance under AMP2, and a Memorandum of Understanding has been agreed.

To accommodate these planned reductions in abstraction, replacement supplies from other sources are required. This is being achieved partly by taking water more evenly across the aquifer. The main development is a new abstraction from the River Blithe at Nethertown east of Rugeley and outside the Tame catchment.

Issue 12 The over abstraction of groundwater from the Lichfield Aquifer

OPTIONS/ACTIONS	RESPONSIBILITY	BENEFITS	CONSTRAINTS
<p>12.1 Implement the Memorandum of Understanding between SSW and NRA to reduce abstraction from the Lichfield aquifer to:-</p> <ul style="list-style-type: none"> ○ Develop alternative water supplies to replace cutbacks in Lichfield groundwater abstraction. ○ Complete and assess findings of hydrogeological modelling of the Lichfield aquifer. ○ Commission alternative supplies and reduce SSW abstraction licences in the Lichfield aquifer. 	<p>SSW NRA</p> <p>SSW NRA</p> <p>SSW NRA</p>	<p>Improved resource balance and more even distribution of public water supply.</p> <p>Will provide a predictive tool for targeting and assessing benefits of cutback scenarios.</p> <p>Provides the prospect of a recovery in stream flow and pool levels, as well as enhanced alternative water supplies.</p>	<p>Timescale and cost.</p>

Refer to Section:- 2.1.5 Geology and Hydrogeology.
 2.1.6 Water resources.
 5.7 Surface water and groundwater abstraction.
 6.2.2 Current state of the catchment - groundwater.

Associated Issues:- Issue 13 Rising nitrate levels in groundwater.
 Issue 14 The impact of canal restoration schemes on existing water resources and nature conservation.

Issue 13 Rising nitrate levels in groundwater

Nitrate levels in groundwater in the Lichfield aquifer are rising and this is due primarily to changes in agricultural practice.

Under EC legislation nitrate levels in drinking water must not exceed 50mg/l. Most of the public water supply boreholes in the Lichfield Triassic Sandstone aquifer either exceed this limit or are likely to do so before 2010. The high nitrate is so prevalent that SSW have installed nitrate removal plants and blending facilities at Little Hay, Pipe Hill, Bourne Vale and Shenstone sources to ensure that public water supplies comply with legislation. Because the Lichfield aquifer is over abstracted, the source catchments for the individual boreholes coalesce so in order to comply with European legislation, a Nitrate Vulnerable Zone has been defined along the geological boundary of the aquifer. Within this zone, action will be required to reduce the levels of nitrates reaching underground resources. Programmes must be agreed before 1999.

Issue 13 Rising nitrate levels in groundwater			
OPTIONS/ACTIONS	RESPONSIBILITY	BENEFITS	CONSTRAINTS
13.1 Designate NVZs, consult on restrictions to be imposed.	MAFF	Reduced nitrates in the aquifer and surface water.	
○ Review in 1997.	MAFF NRA	Continued implementation.	
13.2 Continue to remove nitrates at water treatment works.	SSW	Drinking water meets EC Directive standards.	Cost. Does not prevent further increases in nitrate levels

Refer to Section:-
 2.1.4 Land use and administration.
 2.1.5 Geology and Hydrogeology.
 5.7 Surface water and groundwater abstraction.
 5.9 Agricultural activity.

Associated Issues:- Issue 12 The over abstraction of groundwater from the Lichfield Aquifer.

Issue 14 The impact of canal restoration schemes on existing water resources and nature conservation

The NRA under its recreation duties generally supports the restoration of disused canals where this does not conflict with its other duties, eg conservation and water resources.

Within the catchment there are two canal restoration schemes being developed by local canal restoration groups. Both these proposals are at an early stage so exact details have to be confirmed but abstraction licences from the NRA will be required if new sources of supply are to be used. In addition the Ashby Canal extension (from Snarestone to Moira) may need to abstract surface water during the winter for the new sections at Spring Cottage and Moira Furnace and from existing boreholes for the Snarestone section.

The northern part of the existing Ashby Canal is designated as a SSSI because of its water plants. An increase in boat traffic resulting from the new extension, above 600 boat movements per year, would cause severe damage to the conservation value of the site (see Issue 24).

The Lichfield Canal would link the Wyrley and Essington Canal in Walsall with the Coventry Canal. This is a larger project, the source of water for which has not been determined. The route passes through an area where water resources are scarce and it is therefore unlikely that licences would be granted for either groundwater or summer surface water abstraction. It could therefore require water from existing canal sources where spare capacity exists. This could adversely affect river systems elsewhere in the catchment.

A small section of the old Lichfield canal near Pipehill Wharf is a SINC. Although the conservation value of the site would be lost if restoration was undertaken we feel that the

likely benefits of the overall scheme would outweigh this loss. However a suggested route proposes using the line of an existing minor watercourse under the A38. This would result in the brookcourse being culverted, which is unacceptable and an alternative option will need to be sought.

Issue 14 The impact of canal restoration schemes on existing water resources and nature conservation			
OPTIONS/ACTIONS	RESPONSIBILITY	BENEFITS	CONSTRAINTS
14.1 Assess the impact of the Ashby Canal extension and the Lichfield Canal on water resources and nature conservation.	Canal Trusts NRA, EN	Ensure resources are available and that nature conservation interests are not prejudiced.	Availability of local water resources. The extent of future controls on boat traffic.

Refer to Sections:- 2.1.6 Water Resources.
 5.7 Surface water and groundwater abstraction.
 5.14 Navigation.

Associated Issue:- Issue 12 The over abstraction of Groundwater from the Lichfield Aquifer.
 Issue 23 The production of Water Level Management Plans for SSSIs.

Issue 15 Review of flood defences on the River Tame in Birmingham and the Black Country

The River Tame Improvement Scheme through the West Midlands conurbation completed in 1989 was the culmination of a comprehensive programme of flood alleviation measures on the River Tame and its major tributaries. A working party of Local Authority, Land Drainage Authorities and MAFF originally set up in 1971, had agreed a 1 in 50 year standard of protection for residential and commercial properties at risk in the floodplain. The NRA's current target standard of protection for flood defence for such land use (see table 11) is 1 in 100 years and accordingly the consequences of a 1 in 100 year design flood flow now needs to be assessed. Fifteen years of recorded data are now available to make better estimates of the design flow. A mathematical modelling exercise using this data will be required to determine 1 in 100 year flood levels for the River Tame from Curdworth to Bescot and up the Oldbury and Wolverhampton arms (to the head of Main River).

In using the model to investigate flood levels and levels of protection for different flood flows, the standards of maintenance should be reviewed to ensure optimum cost effective standards are applied. This may involve the use of low maintenance grass/wildflower mixes and reduction of mowing in appropriate situations.

Issue 15 Review of flood defences on the River Tame in Birmingham and the Black Country			
OPTIONS/ACTIONS	RESPONSIBILITY	BENEFITS	CONSTRAINTS
15.1 Predict river flood flows and flood levels on the River Tame in the conurbation.	NRA	To define the extent of flood risk.	Cost. £30,000
15.2 In the light of the results of 15.1. Check that existing flood defences are meeting an acceptable design standard and uprate them where necessary.	NRA	Defences meet acceptable standards of flood risk.	Cost of improvement works. Environmental impact.
15.3 Review maintenance regime required to satisfy the design conditions and take any opportunities for environmental enhancements as appropriate.	NRA	Reduced maintenance costs. Improved habitat.	Need to ensure no reduction in effectiveness of flood defences.

Refer to Sections:- 2.1.8 Flood Defence.
 5.8 Flood water storage and flood defence.
 6.3.4 Current state of the catchment - flood defence.

Associated Issues:- Issue 16 Flood defences on the River Tame downstream of Water Orton.
 Issue 17 The provision of a flood warning system for the West Midlands.
 Issue 20 The development of river and stream corridors in urban areas for wildlife and amenity.

Issue 16 Review of flood defences on the River Tame downstream of Water Orton

A recent mathematical hydraulic model of the River Tame from Water Orton to the River Trent confluence has identified some reaches where possible flood protection works are required. Existing flood defences at Minworth, Water Orton, Whitacre Heath, Fazeley and Tamworth need to be checked in the light of the results of the exercise. Possible uprating works will be considered and in certain instances existing defences may need to be extended in length or raised.

Issue 16 Review of flood defences on the River Tame downstream of Water Orton			
OPTIONS/ACTIONS	RESPONSIBILITY	BENEFITS	CONSTRAINTS
16.1			
○ Check that existing defences are meeting acceptable design standards and uprate them where necessary.	NRA	Maintenance of existing designed levels of protection.	Cost of remedial works. Environmental impact.
○ Investigate the need for new defences.	NRA	Protection of properties at risk.	Need to demonstrate that the benefit of any proposed scheme exceeds costs.
16.2 Identify new flood defence works for inclusion in capital programme as required.	NRA	Protection of life and property to agreed standards.	Costs. Environmental impact.

Refer to Section:- 2.1.8 Flood defence
5.8 Flood water storage and flood defence
6.3.4 Current state of the catchment - flood defence.

Associated Issues:- Issue 15 Flood defences on the River Tame in Birmingham and the Black Country.

Issue 17 The provision of a flood warning system for the West Midlands

Flood warnings are disseminated in flood risk areas by Emergency Planning Officers of West Midlands local authorities, in conjunction with the Police, using flood warning information issued by the NRA.

On the 1 September 1996 the Environment Agency will take over as the lead authority in flood warning dissemination and will need to have in place new flood warning procedures whereby warnings are passed on to persons in properties at risk. On certain reaches it may be necessary to set up a Flood Warden System or other arrangements in compliance with national policy.

Residential and commercial properties in the River Tame floodplain are protected by flood defences but for flood events in excess of the standards of protection these areas are at risk. Such areas include Oldbury, Tipton, Bescot, Sandwell, Perry Barr, Witton and Gravelly Hill.

Upstream of Bescot, the fast rise in river levels following intense rainfall limits the lead time in issuing warnings and therefore constrains their effectiveness.

Issue 17 The provision of a flood warning system for the West Midlands			
OPTIONS/ACTIONS	RESPONSIBILITY	BENEFITS	CONSTRAINTS
17.1 Investigate the feasibility of setting up flood warden systems on parts of the River Tame in the West Midlands conurbation.	NRA West Midlands Emergency Planning Officers	Efficient dissemination of flood warnings.	Time needed to set up flood warden system. Sufficient volunteer wardens. Rapid response of urban catchment upstream of Bescot.

Refer to Sections:- 2.1.8 Flood defence
5.8 Flood water storage and flood defence
6.3.4 Current state of the catchment, flood defence.

Associated Issues:- Issue 15 Flood defences on the River Tame in Birmingham and the Black Country
Issue 18 Flooding at Brookvale Road, Witton.

Issue 18 Flooding at Brookvale Road, Witton

River engineering works to confine the flood river flows were completed in the late 1980s but serious surface water flooding has occurred behind the defence since. The most notable event was in September 1994 when flood water seriously affected commercial premises and led to the closure of the A4040. Flooding is caused by surface water sewer and highway drain outfalls to the river being submerged resulting in flood water backing up the system. Whilst the NRA is not directly responsible for addressing the problem of surface water runoff collecting on the landward side of river defences, the Authority has indicated its willingness to contribute to the cost of the scheme. There is a need for a pumped surface water drainage system to complement the flood defence works already completed and such a scheme is being discussed by the NRA, Birmingham City Council (the highway authority) and STW Ltd who are responsible for surface water sewerage.

Issue 18 Flooding problems at Brookvale Road, Witton			
OPTIONS/ACTIONS	RESPONSIBILITY	BENEFITS	CONSTRAINTS
18.1 Design and construct a surface water flood alleviation scheme.	Birmingham City Council STW Ltd NRA	Protection of residential and commercial properties and reduced traffic disruption.	Benefits must outweigh costs.

Refer to Sections:- 2.1.8 Flood defence
5.8 Flood water storage and flood defence
6.3.4 Current state of the catchment - flood defence.

Associated Issues:- Issue 17 The provision of a flood warning system for the West Midlands.

Issue 19 Lack of public access to rivers

There is a desire for better access routes for both pedestrians and cyclists, not only for recreation but also for going to work and to school without the danger of using roads. River corridors often provide the opportunity to develop such routes. Improved access will also help in the control of litter and aesthetic pollution (Issue 8) and in the development of river corridors for wildlife and amenity purposes.

The NRA and its predecessor body have a long history of support for riverside paths particularly the Tame Walkway, along the River Tame.

In the urban parts of the catchment, river corridors provide some of the major linear open spaces. In many cases informal paths alongside rivers, form links between access points such as public open space and road bridges. Such paths are often illegally created by cutting through fences and are in consequence mainly used by children because of access difficulties and the poor and often muddy surface.

Issue 19 Lack of public access to rivers			
OPTIONS/ACTIONS	RESPONSIBILITY	BENEFITS	CONSTRAINTS
19.1 Develop the Tame Walkway (and where possible as a cycleway) along the whole of the River Tame.	NRA LAs Landowners	Improved public access, greater awareness of the river and reduced car/bike/pedestrian conflict. Improved reporting of pollution.	Existing obstructions, lack of space along river corridors, complex land ownership. Increased maintenance costs. Requires the co-operation of landowners.
19.2 Develop other footpaths, bridleways and cycleways adjacent to rivers and streams in the urban area.	NRA LAs Landowners	Improved public access; greater awareness of the river and reduced car/bike/ pedestrian conflict. Improved reporting of pollution.	Existing obstructions, lack of space along river corridors, complex land ownership. Increased maintenance costs. Requires the co-operation of landowners.
19.3 Develop links between riverside paths and other public rights of way, such as canal towpaths and cycleways to form long distance routes.	NRA LAs	Improved public access, opportunity to link up a fragmented system.	Existing obstructions, lack of space along river corridors, complex land ownership. Increased maintenance costs. Requires the co-operation of landowners.
19.4 Promote public access and schemes to upgrade canal corridors.	BW, LAs Civic and amenity groups	Improved quality of life.	Time and cost.

Refer to Sections:- 2.1.3 A short history of the catchment.

- 2.1.11 Recreation.
- 5.13 Recreation and Amenity.
- 6.3.3 State of the catchment - Recreation and Amenity.

- Associated Issues:-
- Issue 7 Poor water quality in Canals.
 - Issue 8 Litter, unauthorised tipping and the aesthetic pollution of rivers and canals.
 - Issue 20 Development of river corridors in urban areas for wildlife and amenity.
 - Issue 26 The future management of Park Hall Farm.
 - Issue 27 Control of invasive plants.

Issue 20 Development of river corridors in urban areas for wildlife and amenity

Watercourses and their remaining floodplains often provide important open space in built up urban areas in the catchment. However, rivers and streams have been heavily modified in many areas to maximise the use of valuable land and to reduce the risk of flooding. In extreme cases the river channel has been culverted, covered over and rendered largely lifeless. An example is the River Tame immediately downstream of Chester Road at Castle Bromwich where the channel is smooth concrete and completely shaded by the M6.

Channels are often modified by being deepened and resectioned to create as far as possible self cleansing channels, so that storm water will flow quickly and efficiently away. This leads to the virtual elimination of the transition zone between land and water, the most valuable area for conservation. Such channels are extremely hostile to aquatic organisms.

The removal of trees and scrub also reduces the value of the river corridor for terrestrial wildlife such as invertebrates and voles with consequent effects on predators such as bats and owls.

In addition, pollution has been so severe in the past that aquatic life was nearly eliminated from all major rivers in the West Midlands conurbation and severely reduced in other urban areas. With lower pollution levels today flora and fauna have started to re-colonise but are hampered by poor channel structure, the hostile physical environment and the absence of upstream sources of colonisation. (It is difficult for both plants and animals to colonise the river corridor moving upstream against the flow of the river.)

The water vole has declined in Britain this century, a decline that has probably been accelerated by predation by introduced American mink. The River Tame catchment has retained a reasonable population of water voles, probably because they are not dependent upon high water quality, and mink are scarce in urban areas.

Issue 20 Development of river corridors in urban areas for wildlife and amenity			
OPTIONS/ACTIONS	RESPONSIBILITY	BENEFITS	CONSTRAINTS
20.1 Create a continuous river corridor by setting back all new development from the river bank as part of a long term strategy.	NRA LPAs Developers	New habitat. Improved access for the public and for flood defence/pollution control monitoring purposes.	Loss of land available for development.
20.2 Restore culverted watercourses to open channels where possible and normally resist further culverting.	NRA, LAs Landowners, Developers	Improved habitat. Pollution control and flood defence benefits.	Loss of land available for development and cost.
20.3 Undertake a detailed survey of the river corridor.	NRA	Highlight areas of opportunity. Optimise use of scarce resources.	Cost and manpower.
20.4 Regeneration of the river corridor:- ○ Encourage where possible the removal of hard bank reinforcement and replace with soft engineering works or create a transition zone in front of hard engineering works. ○ Where possible reprofile river banks and beds to create shallow margins, riffles, pools and shallows. ○ Tree and shrub planting along river corridors in urban areas where tree cover has been lost.	NRA Developers LPAs NRA LAs Landowners LAs	Improved habitat. Improved habitat. Improved in stream diversity, increased fish holding. Improved amenity and habitat.	Increased maintenance costs. Need to ensure no increased flood risks. Cost. Need to ensure no increased flood risks. Cost and maintenance. Need to ensure no reduction in the effectiveness of flood defences.
20.5 Where possible create bankside reed areas and longer grass to protect water voles.	NRA LAs	Improved water vole habitat.	Need to ensure no increase in flood risk.

Refer to Sections:-
 2.1.10 Conservation.
 2.1.11 Recreation.
 4.2 Planning guidance for the Tame catchment - the development of river corridors in urban areas.
 5.11 Conservation, Ecology.
 5.13 Recreation and amenity.
 6.3.1 State of the catchment - conservation targets.

Associated Issues:-
 Issue 15 Review of flood defences on the River Tame in Birmingham and the Black Country.
 Issue 19 Lack of public access-to-rivers..
 Issue 26 The future management of Park Hall Farm.

Issue 21 Land use in the lower Tame Valley

A working group has been set up, headed by North Warwickshire Borough Council to consider the future development of the Lower Tame Valley from Minworth to Hopwas. The group consists of local authority planners, developers, landowners, conservation and wildlife groups together with the NRA, English Nature and the Sports Council.

Large areas of land along the river corridor are exploited for sand and gravel. The Tame valley straddles the Staffordshire/Warwickshire border and is a much degraded landscape. The lakes that result from the extraction process provide important opportunities for recreational facilities and wildlife habitats. The aim of the working group is to provide a long term strategy to direct future development, reconcile conflict and maximise the benefits to local people and wildlife.

At present the group is focused on land between Kingsbury and Tamworth, the area currently subject to development pressures. There is demand for watersports (see Issue 22) but the suitability of a particular site is dependant on access, the size and nature of the water body and the proximity of wildlife sites. Noisy recreational pursuits are often in conflict with the development of nature reserves.

Issue 21 Land use in the lower Tame Valley			
OPTIONS/ACTIONS	RESPONSIBILITY	BENEFITS	CONSTRAINTS
Develop an indicative management plan for the middle and lower reaches of the River Tame Valley.	LPAs, EN Landowners Conservation & Recreation groups	Resolution of conflict and enhanced recreation facilities and wildlife habitats.	Requires general agreement. Must be in accordance with adopted structure and local plans.

- Refer to Sections:-
- 2.1.5 Geology and Hydrogeology.
 - 2.1.10 Conservation.
 - 2.1.11 Recreation.
 - 5.4 Mineral working.
 - 5.11 Conservation, Ecology.
 - 5.12 Conservation, Landscape.
 - 5.13 Recreation and Amenity.
 - 6.3.1 Current State of the Catchment - Ecology & Landscape targets.
 - 6.3.3 Current State of the Catchment - Recreation targets.

Associated Issues:- Issue 22 Provision of water based recreation sites.

Issue 22 Provision of water recreation sites

The large number of people living in the catchment creates great demand for new water based recreation sites. The relatively small number of existing sites is due, in part, to the poor bacterial quality of many rivers, canals and other watercourses making them unsuitable for activities such as canoeing, boating and waterskiing. This apparently unmet demand puts pressure on existing facilities and on those available further afield such as at Carsington Water and on the River Severn.

Opportunities exist in the catchment for new water based recreation sites, on the River Tame below Lea Marston, at worked out hard rock quarry sites and on restored sand and gravel pits in the middle and lower reaches of the Tame Valley. These options are currently being considered in part by a local authority led working group (see Issue 21).

The NRA is proposing to work with the Sports Council and Local Authorities to develop plans for water based recreational provision, by highlighting sites, preferred locations and developing criteria by which sites can be considered. The development of recreational facilities should not prejudice important conservation sites. These plans may have to extend beyond the catchment boundary to include the middle reaches of the River Trent valley below the River Tame/River Trent confluence.

Issue 22 Provision of water based recreation sites			
OPTIONS/ACTIONS	RESPONSIBILITY	BENEFITS	CONSTRAINTS
22.1 Carry out survey to assess need for new water based recreation sites	NRA LAs Sports Council	Provide facilities that meet demand.	Cost. Limitations of existing information. Water quality.
22.2 Develop Strategic Recreational Plan.	NRA Sports Council LAs Landowners	Improved water based recreation. Resolution of conflict.	Conflicting priorities between co-operating groups ie conservation vs recreation.

Refer to Sections:- 2.1.11 Recreation.
5.4 Mineral working.
5.1.3 Recreation and amenity.
6.3.3 Current State of the Catchment - recreation targets.

Associated Issues:- Issue 21 Land use in the lower Tame Valley.
Issue 25 Protection of the water environment in Sutton Park.

Issue 23 The production of Water Level Management Plans for SSSIs

In 1994 MAFF published the document "Water Level Management Plans - A Procedural Guide for Operating Authorities" which required the Operating Authority (NRA, Internal Drainage Boards (IDBs) or District Councils as appropriate) to prepare management plans for water dependant SSSIs over the next few years. These plans will attempt to take into account all interests, including flood defence, agriculture, conservation and water resources. The plans are intended to be reference documents to help provide continuity and stability in site management which can help occupiers, English Nature and the Operating Authority in fulfilling their statutory conservation obligations. Those SSSIs in the Tame catchment that are water dependant and require WLMPs have been identified in discussions with English Nature and the NRA and have been listed in table 10 on page 165 which gives the location and the Operating Authority. Where there is a SSSI on land in the control of British Waterways clarification is being sought from MAFF by English Nature to decide whether British Waterways should be considered to be the Operating Authority.

The NRA is the Operating Authority for the following SSSIs adjoining "main" rivers:-

- Alvecote Pools (River Anker).
- Birches Barn Meadows (River Anker).
- Whitacre Heath (River Tame).

Discussions are currently on going with the NRA, English Nature and land owners over preparation of these plans. For those SSSIs associated with ordinary watercourses in the catchment, district councils have a responsibility. The NRA will help with any hydrological assessments required.

Issue 23 The production of Water Level Management Plans for SSSIs			
OPTIONS/ACTIONS	RESPONSIBILITY	BENEFITS	CONSTRAINTS
23.1 Prepare WLMPs for Alvecote Pools, Birches Barn Meadows and Whitacre Heath SSSI.	NRA	Conservation of the SSSIs.	Agreement with English Nature and landowners.
23.2 Help district councils with hydrological assessments for which they are responsible.	NRA	Conservation of the SSSIs.	Agreement with English Nature and landowners.

Refer to Sections:- 2.1.10 Conservation.
 5.11 Ecology.
 6.3.3 State of the catchment - physical features.

Associated Issues:- Issue 14 The impact of canal restoration schemes on existing water resources and nature conservation.
 Issue 24 The adverse effect of Alvecote Pools on downstream water quality.
 Issue 25 Protection of the water environment in Sutton Park.

Issue 24 The adverse effect of Alvecote Pools on downstream water quality

Alvecote Pools are a series of shallows, pools and marsh land south of Shuttington and east of Tamworth on the Warwickshire/Staffordshire border. They were formed as a result of coal mining subsidence in the latter part of the 19th Century. The area is an SSSI of 129 ha (318 acres), containing a variety of aquatic and semi aquatic habitats of great biological interest and supports bird populations of regional importance.

The River Anker flows through three of the pools with a further pool not connected to the river. The connected pools have acted as settlement lagoons for the suspended solids in the river and historically have helped to improve downstream water quality. Currently these deposited solids are being scoured out of the pools. This causes visible discolouration, especially under low flow conditions, as far as the confluence with the River Tame at Lady Bridge, Tamworth. Any remedial action will need to consider the likely effects on the SSSI. A Water Level Management Plan (Issue 23) is being formulated by the NRA and any actions will need to comply with this plan. Survey work is currently being carried out to quantify the problem.

Issue 24 The effect of Alvecote Pools on downstream water quality

OPTIONS/ACTIONS	RESPONSIBILITY	BENEFITS	CONSTRAINTS
24.1 Allow natural succession to continue.	NRA	No disturbance to SSSI.	Downstream water quality affected. Loss of fishery and amenity.
24.2 De-sludge pools connected to the River Anker.	NRA	Restore settlement function of the pools with improvement in downstream water quality.	Cost and complexity of sludge disposal. Will require regular maintenance. Possible damage to the SSSI.
24.3 Divert river flows around the pools.	NRA	Improved water quality.	Possible damage to the SSSI. Land acquisition necessary. Cost.
24.4 Plant reedbeds downstream of pools.	Landowners NRA	Reduce the cloudiness of water.	Possible damage to the SSSI. Could aggravate local flooding problems.

Refer to Sections:-
 2.1.10 Conservation.
 5.11 Conservation - Ecology.
 6.1.1 State of the catchment - River Quality Objectives.
 6.3.1 Conservation targets.

Associated Issues:-
 Issue 3 The production of Water Level Management Plans for SSSIs.
 Issue 4 River and canal lengths that fail their River Quality Objectives.

Issue 25 Protection of the water environment in Sutton Park

A recent botanical survey of the pools and streams in Sutton Park, commissioned by English Nature, showed that several species which are sensitive to eutrophication have now become extinct.

Until recently a number of storm and emergency sewer overflows existed on the southern and western side of the park. The construction of the new main sewer along Monmouth Drive and the resulting abandonment of two sewer overflows has led to a major reduction in direct sewage nutrient input into Powells Pool.

However the storm overflow at Bridle Lane and the emergency overflow at Thornhill Park are still in existence. The potential for further discharges from these and from domestic wrong connections to add nutrients to the system still pose a threat to the rarer aquatic plants in the Park.

Issue 25 Protection of the water environment in Sutton Park			
OPTIONS/ACTIONS	RESPONSIBILITY	BENEFITS	CONSTRAINTS
25.1 Increase the capacity of the sewer network.	STW Ltd	Reduced nutrient input by reduction in the operation of the overflows.	Not required under the agreed AMP2 programme.
25.2 Seek to improve overflow discharges by the installation of screens and/or redesign overflow to retain maximum pollution load.	STW Ltd	Reduced nutrient input by retention of sewer overflow discharge.	Not required under AMP2.
25.3 Reduce nutrient levels by removing silt and vegetation on an annual basis from Longmoor, Powells and Wyndley Pools.	Birmingham City Council	Reduced nutrient levels.	Disturbance of habitat and mobilisation of nutrients. Cost.
25.4 Remove all fish from Longmoor and Wyndley Pools, and carp and bream from Powells Pool.	Birmingham City Council	Reduced mobilisation of nutrients.	Public acceptability. Cost.

Refer to Sections:- 5.11 Conservation, Ecology.

Associated Issues:- Issue 6 Investment by Severn Trent Water Ltd to improve water quality.
 Issue 22 Provision of water based recreation sites.
 Issue 23 The production of Water Level Management Plans for SSSIs.

Issue 26 The future management of Park Hall Farm

Park Hall Farm is an area of land owned by the NRA and located in the River Tame valley on the eastern edge of the West Midlands conurbation between Castle Vale and Castle Bromwich. It is a long narrow site with an area of approximately 200ha and flanked by the M6 motorway and the River Tame. It is primarily wet floodplain meadow with ponds and wetlands. Areas of woodland border the site.

The land was originally bought for flood defence reasons but is no longer required for that use. It is currently let to a local farmer for horse and cattle grazing. Ecological, botanical and archaeological surveys were undertaken in 1992, prior to the installation of an underground pipeline crossing the site. Survey work was limited but highlighted the importance of the site particularly for birds and invertebrates. The ecological report also recommended that the site presented an excellent recreational resource and one that is currently underused. The limited access routes to the area will be affected by future plans to widen the adjacent M6 corridor.

Issue 26 The future management of Park Hall Farm

OPTIONS/ACTIONS	RESPONSIBILITY	BENEFITS	CONSTRAINTS
26.1 Sell the land.	NRA MAFF	No liabilities.	Ensure that NRA's wider conservation & recreation duties can be met.
26.2 Retention of land in NRA ownership.	NRA MAFF	Existing conservation values maintained.	Does not further NRA operational objectives. Cost.
○ Undertake detailed habitat and wildlife survey.	NRA	Better understanding of the ecology and wildlife of the site.	
○ Produce management strategy, to include development of the Tame Walkway along the river embankment.	NRA, together with EN, LEAs and other interested groups	Agreed priorities for the future use of the site. Completion of further section of River Tame walkway.	Cost and manpower.
○ Following public consultation implement agreed management strategy.	NRA and other partners	Improved habitats, better access and amenity for local residents.	Cost of new works and on-going maintenance. Potential M6 widening and access difficulties.

- Refer to Sections:-
- 1.1 NRA aims and objectives.
 - 2.1.10 Conservation.
 - 2.1.11 Recreation.
 - 5.11 Conservation Ecology.
 - 5.13 Recreation & Amenity.
 - 6.3.1 State of the catchment - Conservation targets.
 - 6.3.3 State of the catchment - Recreation and amenity-targets.

- Associated Issues:-
- Issue 19 Lack of formal access to rivers.
 - Issue 20 The development of river corridors in urban areas for wildlife and amenity.

Issue 27 Control of invasive plants

Three very invasive weed species, Giant Hogweed, Japanese Knotweed and Himalayan Balsam grow in the catchment. All three species suppress native vegetation and can cause extensive erosion problems.

Japanese Knotweed is a very vigorous perennial which overwhelms other vegetation. It spreads downstream by means of broken off root material and can damage river bank protection works, cause increased risk of flooding in summer and increased erosion in the winter (when it dies down leaving no ground cover). It is extensively distributed in the Tame catchment and is beginning to be a problem in several areas. We need to identify any areas where Japanese Knotweed grows near watercourses and develop a programme of control.

Himalayan Balsam is a vigorous annual which also overwhelms native vegetation and can cause erosion problems in winter when it dies leaving no ground cover. It is spread by seed so the NRA Flood Defence maintenance programme should include cutting of Himalayan Balsam wherever possible prior to seeding to reduce its spread.

Giant Hogweed is a perennial plant which can grow up to 5m tall with leaves up to 1m across. It can take 4 years for the plant to flower after which it dies. Each plant can produce more than 50,000 seeds which can remain viable for 15 years. Seeds are dispersed by wind and water. It should not be touched without wearing protective clothing because the plant produces large volumes of sap which, on contact with skin, and in the presence of sunlight, causes severe irritation, swelling and painful blistering. It is known to grow in the catchment of the River Anker near Nuneaton but has not been recorded in other areas. We will identify any area where Giant Hogweed grows and carry out a programme of control. Any person who has identified Giant Hogweed in their local area, should contact this office.

Issue 27 Control of invasive plants			
OPTIONS/ACTIONS	RESPONSIBILITY	BENEFITS	CONSTRAINTS
27.1 Identify areas colonised by Japanese Knotweed, Himalayan Balsam and Giant Hogweed close to watercourses.	NRA	Identify size of the problem.	Manpower resources.
27.2 Consult with other bodies and coordinate a programme of spraying waterside areas of Japanese Knotweed and Giant Hogweed starting at the top ends of the catchment.	NRA LAs Landowners	Reduced flood risk. Reduced erosion risk. Reduced public health risk. Improved wildlife and amenity.	Manpower and cost.
27.3 Coordinate programme of cutting Himalayan Balsam.	NRA LAs Landowners	Reduced erosion risk. Improved amenity.	Manpower resources.

Associated Issues:- Issue 19 Lack of public access to rivers.

Issue 28 Weed growth in the River Anker

The River Anker is particularly affected by in-channel weed growth during the summer months. The most common weed is unbranched bur-reed. This weed covers the surface of the water, shuts out light and makes fishing extremely difficult. The excessive weed growth may be caused by the high nutrient input to the river derived from sewage effluent from Hartshill and Polesworth STP and the lack of tree cover.

The physical cutting and clearance of weed on an annual basis involves a substantial resource implication which is likely to increase in the future.

Issue 28 Weed growth in the River Anker			
OPTIONS/ACTIONS	RESPONSIBILITY	BENEFITS	CONSTRAINTS
28.1 Review current weedcutting practice to increase efficiency and effectiveness.	NRA	Increase in angling use of river.	Possible ecological impact.
28.2 Plant bankside trees to promote shading.	NRA Riparian Owners	Reduce weed growth.	Cost and maintenance.

Refer to Sections:- 2.1.9 Fisheries.
 5.6 Sewage and trade effluent disposal.
 5.10 Fisheries.
 6.3.2 Current State of the Catchment - Fisheries.

Issue 29 The spread of zander

Zander are large predatory fish originally from Europe which were introduced into the Great Ouse Relief Channel in East Anglia and have spread both naturally and through illegal introductions into the canal system of the East Midlands. Zander are now present in the Coventry and Ashby Canals and have entered the Birmingham and Fazeley Canal. There are unconfirmed reports of zander in Alvecote Pools on the River Anker.

Since zander are fish eating, their impact on prey species, particularly in enclosed waters, can be pronounced. Attempts to control their numbers by regular removals have succeeded in slowing the progress of colonisation but not in halting it.

Recent studies being carried out by British Waterways are aimed at gaining a better understanding of the relationship between zander and their prey and the effectiveness of existing control measures. The results of the study will have important implications for developing future policy on the management of zander. This may include greater emphasis on control or culling, measures to prevent further spread along the canal system or simply acceptance of the species, allowing it to reach its own balance with other predator and prey species.

Issue 29 The spread of zander			
OPTIONS/ACTIONS	RESPONSIBILITY	BENEFITS	CONSTRAINTS
29.1 Evaluate findings of BW investigation and formulate policy on future control of Zander population distribution.	NRA BW	Stabilization of prey population.	-

Refer to Sections:- 5.10 Fisheries.
 6.3.2 Current State of the Catchment - Fisheries.

SECTION 4

TOWN AND COUNTRY PLANNING AND THE WATER ENVIRONMENT

4.1 Introduction and the Role of Planning Liaison

4.2 Planning Guidance for the Tame Catchment

This section highlights the important link between Town and Country planning and the water environment. Section 4.2 proposes a number of land use statements for use by Local Planning Authorities in the Tame catchment when formulating Development Plans and in development control policy.

4.1 Introduction and the Role of Planning Liaison

Introduction

The NRA is well placed to influence activities affecting the water environment, particularly the river corridor, through the Water Resources Act 1991 and associated legislation. However away from the river corridor, we have far less direct control.

Town and Country planning by Local Planning Authorities (LPAs) is the usual means for deciding changes in the use of land. Through development plans and the implementation of development control, local councils decide on the location of new houses, shops, offices and factories, roads, schools etc. They also decide on redevelopment proposals for existing built up areas and changes of use of land or buildings. These decisions can have a profound affect on the water environment and it is important that we, as guardians of the water environment, are able to influence this process.

The role of planning liaison

Under the 1990 Planning Act and through amendments to the General Development Order, local authorities must consult the NRA on development plans and when considering certain types of planning applications. Usually, local authorities consult the NRA on a wider range of applications which may affect the water environment. Through planning liaison we seek to maximise our influence by providing local councils with information, comments, objections or support. This allows councillors, when making decisions to know the NRA's views and to take these into account. Planning liaison is the link between the NRA's functions and local councils. We are often involved directly with applicants and developers to ensure that the water environment can be protected or enhanced. Development plans are particularly important because they set the framework for development into the future and are the key to the determination of planning applications.

The NRA has published "Guidance Notes for Local Planning Authorities on Methods of Protecting the Water Environment through Development Plans". This provides a guide to LPAs on what policies should be included and why they are important. The document provides general guidance only and policies should be tailored to meet local conditions.

Catchment Plans

Catchment Plans provide a vision for the future. They set out the problems and issues in the river catchment and therefore provide an important source of information to planning authorities. Regional Planning Guidance issued by the Government for both the East and West Midlands requires planning authorities to consider catchment plans when producing their development plans.

4.2 Planning Guidance for the Tame Catchment

The impact of proposed development

The NRA seeks to ensure that development is sustainable, in terms of the water environment. As part of this we would like to see development directed to those parts of the catchment best able to absorb it. The effects of development can be positive as well as negative and depend upon:

- The characteristics of the development, such as the proposed uses and the design of the scheme.
- The location within the catchment, most importantly in relation to the availability of water resources and whether it lies in the headwaters or lower down in the catchment.
- The characteristics of the particular site, such as the presence of watercourses and former uses.

Within the conurbation the majority of proposals for residential and employment uses involve the redevelopment of formerly developed land. There are also some major allocations for redevelopment outside the urban area, for example the site of the former Hams Hall Power Station. These sites offer potential for positive effects upon the water environment through the remediation of contaminated land and improvements to the river corridor.

Where sites have been contaminated by former uses they often pollute or pose a risk of pollution of ground and surface waters. Where appropriate the NRA will seek to ensure that the polluter pays for the remediation of contaminated sites. However, in many instances the contamination took place many years ago and there is currently no one responsible for their remediation. In these circumstances, the redevelopment of sites offers positive opportunities for effective remediation, thereby reducing actual and potential pollution of the water environment. It is important that the NRA is able to influence the design of site investigations and remediation schemes to ensure that they address the problems effectively.

Within the parts of the catchment much of the open river corridor has been lost to development and the channel has been heavily modified for flood defence purposes. This has resulted in a corridor of variable recreational and conservation value and hence redevelopment offers an opportunity to improve the river corridor by improving public access and increasing opportunities for wildlife.

In the eastern parts of the catchment most of the large development sites are likely to be on agricultural land. The development of these sites has the potential to adversely affect the water environment in a number of ways, in particular by changing the water quality of receiving waters and by altering the surface water run-off characteristics of the catchment. Large allocations of land for development have been made south of Coalville and at Basset's Pole, some of which is already committed. The size of these allocations and their locations in the headwaters of small, high quality watercourses means that they pose a potential threat to the water environment. The capacity of the water environment to absorb additional allocations within that area is very limited and if additional allocations are made, special measures may be required to ensure that the water environment is not adversely affected. In the areas already allocated the effects of each development will need to be very carefully

assessed and where appropriate additional measures incorporated into the schemes. The NRA has been consulted on the proposed Birmingham Northern Relief Road and measures have been agreed to mitigate its impact.

Land use statements

Set out below are a number of draft land use statements that reflect the issues and problems identified in this report. Their aim is to identify areas of planning policy that if adopted by LPAs would help to resolve some of the problems in the catchment. These statements are local to the catchment and should be seen within the context of the national guidance notes issued in January 1994. These statements should be used by planning authorities when formulating development plan policies and in development control policy.

These draft statements have been included on the basis that they are open for discussion and change. Comments from planning authorities are particularly welcome.

Urban runoff and pollution of the water environment

The Issue

Urban run-off (Issue 1) is one of the most important problems facing the Tame catchment. It has two main components:

- Untreated sewage from sewer overflows.
- Contaminated surface water run-off.

The NRA is working with STW Ltd and OFWAT to ensure that investment is directed to improving the water environment. We give high priority to schemes which will reduce sewer overflows into watercourses, and have secured significant investment in the Tame catchment for the period 1995-2000.

Contaminated surface water run-off is however a much more complex problem which requires the efforts of the NRA, LPAs and industry. Most rain falling on hard surfaces in urban areas runs off into surface water sewers, and these eventually discharge into watercourses. Therefore, contaminated surface water entering the public surface water sewer is likely to cause pollution of rivers. The main sources of contamination of surface water include:

- Oil and petrol from parking areas, especially those used for heavy good vehicles.
- Spillages of oils and chemicals.
- Leaks from storage tanks and pipelines.
- Water used for washing vehicles, yards etc.

In the conurbation over a third of reported pollution incidents were oil related.

The NRA's role

The NRA controls discharges of trade effluent to watercourses and sewers but does not control the discharge of contaminated surface water which is an important source of pollution. The NRA is able to take action against those responsible for such pollution but it is usually very difficult to trace pollution through the sewer network. It is especially difficult if the pollutant is a common one such as oil and is only discharged following rain. The NRA is committed to the prevention of pollution as a primary goal. In the Tame catchment we are actively pursuing pollution prevention and have originated a campaign directed at industry to encourage them to take the simple precautions which prevent contamination of surface water.

The LPA's role

The following guidance supports the inclusion of water quality protection in planning policies and decisions:

- PPG 12 "Development Plans and Regional Planning Guidance" states that planning policies should reflect the need to protect water quality.
- PPG 23 "Planning and Pollution Control" states that sewage disposal is capable of being a material consideration in the determination of planning applications and should be taken into account in drawing up development plans. In this catchment sewage includes foul drainage, trade effluent and contaminated surface water.

Guidance for LPAs

Developments should not normally be permitted which in the opinion of the LPA, after consultation with the NRA, pose an unacceptable risk of pollution of surface waters, either directly or via the surface water sewerage system.

The LPA should ensure that all new industrial and commercial developments have an adequate means of foul and surface water drainage. Hardstandings, roadways and storage areas must be properly drained with oil interceptors or other pollution prevention measures as required. All above ground oil tanks, chemical stores and sources of polluting material must be bunded or otherwise contained and the containment properly maintained for the life of the facility.

Industrial development outside the urban area

The issue

There is pressure to develop industrial sites with good access to the motorway network. Several large sites have been proposed for development in rural parts of the catchment where the water environment is of high quality and sensitive to change. These developments have the potential to have two main adverse effects on the water environment:

- Decline in the quality of surface waters, from contaminated surface water run-off, trade effluent and sewage effluent.

- Changes to the surface water run-off characteristics of the catchment from the increase in hard surfaces and reduced infiltration.

Both these aspects need to be considered by LPAs and the NRA when allocating sites for industrial development, drawing up site development briefs and determining applications.

The NRA's role

The NRA advises LPAs and developers on the likely effects of development on the water environment and measures necessary to reduce these impacts. The NRA issues consents for trade effluent and surface water discharges direct to watercourses. When determining these consents the NRA will have regard to the character of the receiving waters and within legislative constraints will ensure that appropriate measures are implemented to reduce the adverse impacts.

The NRA supports the re-development of existing sites, particularly where this will result in significant improvements to the water environment. In general, we will support the development of derelict sites in preference to greenfield sites wherever possible.

The LPA's role

The following guidance supports the inclusion of water quality protection and land drainage considerations in planning policies and decisions:

- PPG 12 "Development Plans and Regional Planning Guidance" states that planning policies should reflect the need to protect water quality and land drainage issues.
- PPG 23 "Planning and Pollution Control" states that sewage disposal is capable of being a material consideration in the determination of planning applications and should be taken into account in drawing up development plans. In this catchment sewage includes foul drainage, trade effluent and contaminated surface water.

Guidance for LPAs

Developments should not normally be permitted which in the opinion of the LPA, after consultation with the NRA, pose an unacceptable risk of pollution of surface waters, either directly or via the surface water sewerage system.

The LPA should ensure that all new industrial and commercial developments have an adequate means of foul and surface water drainage. Activities which include wet industrial processes or the storage and use of chemicals with a significant pollution potential will not be supported without a connection to the public foul sewer and the installation of adequate pollution prevention measures. Hardstandings, roadways and storage areas must be properly drained with oil interceptors or other pollution prevention measures as required. All above ground oil tanks, chemical stores and sources of polluting material must be bunded or otherwise contained and the containment properly maintained for the life of the facility.

Development of contaminated land

The issue

There are significant areas of land within the catchment that are contaminated to some degree and this contamination can cause significant pollution of the water environment (Issues 1 and 10). The redevelopment of contaminated sites provides the opportunity to reduce the actual and potential pollution of the both ground and surface waters. The NRA strongly supports the remediation of contaminated land but this must be to a suitable standard.

The NRA's role

The NRA advises developers and LPAs on the effects of development on the water environment and on the most appropriate remediation strategies. To assist with this we have defined the acceptable concentrations of soluble contaminants in redeposited material. These trigger levels have been developed for and are widely used in the Black Country, to minimise the future risks of pollution and ensure consistency between sites.

The LPA's role

The following guidance supports the inclusion of water quality protection in planning policies and decisions:

- PPG 12 "Development Plans and Regional Planning Guidance" states that planning policies should reflect the need to protect water quality. It emphasises the need to pay particular attention to the protection of the groundwater quality.
- Circular 11/95 states that planning conditions may be used to ensure that the development of contaminated land does not expose the wider environment to risks from the contaminants present.

Guidance for LPAs

Developments should not normally be permitted which, in the opinion of the LPA, after consultation with the NRA, pose an unacceptable risk to the quality of ground or surface waters.

When development is permitted the LPAs should ensure that, before development commences, the site has been thoroughly investigated and an appropriate remediation strategy developed. Where the site is known or strongly suspected to be contaminated to a significant degree, the LPA should ensure that site investigations are undertaken before the determination of any planning application. Where the site is known or suspected of being slightly contaminated the LPA should use planning conditions to ensure that the site investigation is carried out before development commences.

To achieve satisfactory development, which does not cause pollution of the water environment, the LPA should consult the NRA. They should ensure that the applicant provides the appropriate information to allow the NRA to determine the need for a site investigation, the extent and nature of contamination, and the effectiveness of any

remediation strategy.

Protection of groundwater resources

The issue

Groundwater resources are very important in the catchment and are a major source of high quality public water supply. Both the quantity and quality of groundwater resources should be protected.

In the Lichfield and Shenstone areas the resources are heavily used and in parts over used (Issue 12). The NRA is working with South Staffordshire Water plc to develop alternative supplies to ensure that rates of abstraction are sustainable. Contamination which rendered part of the resource unsuitable for this use could have significant adverse effects on the ability of the area to meet the demand for drinking water, without the development of more expensive and potentially environmentally damaging alternatives.

Groundwater resources require special protection from pollution since once contaminated it is not usually possible to rehabilitate the resource. To ensure sustainable provision of water resources the precautionary principle should be adopted, to avoid unacceptable risk of pollution of the resource.

The NRA's role

The NRA controls abstractions of water to conserve the resource, protect the wider water environment that is dependant upon the groundwater, and safeguard the rights of existing abstraction licence holders. The NRA supports initiatives to reduce demand through the promotion of efficient use of water and to recharge groundwater resources. The NRA advises LPAs on the likely effects of development on the quantity and quality of groundwater resources, taking into account the proposed uses, abstraction requirements and the vulnerability of the aquifer.

The vulnerability of the aquifer to pollution depends upon many factors, such as the overlying geology and the presence of boreholes. The NRA has mapped the vulnerability of aquifers and identified the areas where special protection is required. In 1992 we produced a guidance document, "Policy and Practice for the Protection of Groundwater", which includes outline information on the vulnerability of aquifers and the measures required to protect the resource. We are currently developing detailed aquifer vulnerability maps for the whole country and large parts of the catchment have been mapped

The LPA's role

The following guidance supports the inclusion of groundwater resource protection in planning policies and decisions:

- PPG 12 "Development Plans and Regional Planning Guidance" states that planning policies should reflect the need to protect groundwater quality and recommends that LPAs take into account the NRA's groundwater vulnerability maps when drawing up development plans.

- PPG 12 also states that the capacity of existing infrastructure, in particular the availability of water supplies, should be taken into account in the preparation of development plans.
- RPG 11 "Regional Planning Guidance for the West Midlands" states that development plans should assist in protecting the availability of water supplies. It also states that LPAs should have regard to the NRA's Regional Water Resources Strategy and guidance contained in the NRA's document "Policy and Practice for the Protection of Groundwater" (1992).

Guidance for LPAs

Development should not normally be permitted unless there is adequate water resources available to serve the development, or where they can be made available without adversely affecting existing abstractions, river flows, water quality, agriculture, fisheries, amenity or nature conservation.

In the Lichfield and Shenstone aquifer areas development should not normally be permitted which in the opinion of the LPA, after consultation with the NRA, will lead to a significant reduction in recharge to the aquifer. Clean, uncontaminated roof water should be directed to soakaways to recharge the aquifer, wherever ground conditions are suitable.

Development should not normally be permitted which in the opinion of the LPA, after consultation with the NRA, poses an unacceptable risk of pollution of groundwater resources. Where development is permitted in areas where the groundwater is vulnerable the LPA should ensure that appropriate pollution control measures are included to prevent an unacceptable risk of pollution of the water resource.

The development of river corridors in urban areas

The issue

The river corridor is an important resource (Issues 19 & 20). In urban areas it provides open space, a corridor for wildlife, a buffer against the pollution of rivers and can act as a focus for development or redevelopment. In much of the conurbation the river corridor has been degraded by past pollution, development and flood defence works. This has resulted in a corridor of generally low wildlife value and restricted public access. However, there are many areas of value for both nature conservation and amenity and most of the rivers have significant potential for improvement.

In all development adjacent to watercourses, provision must be made to provide access for flood defence and land drainage purposes. It is usually possible to combine the provision of this access with other river corridor enhancements, to the benefit of the development itself.

The NRA's role

The NRA aims to promote and improve river corridors for wildlife and public amenity, including the creation of public riverside footpaths such as the Tame Walkway, from Willenhall to the River Trent. We enhance the river corridor as part of flood defence,

conservation and recreation duties and we work with LPAs and developers to ensure that the river corridor is enhanced during development, wherever possible.

The LPA's role

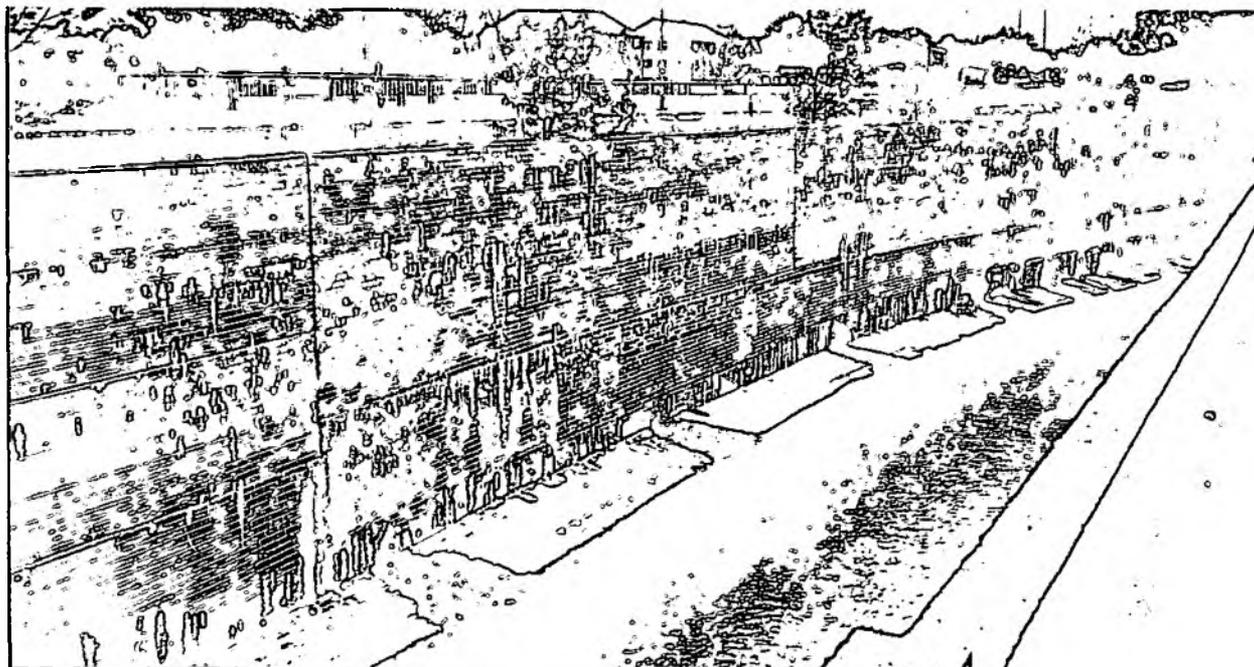
The following guidance supports the inclusion of river corridor protection and enhancement in planning policies and decisions:

- RPG 11 "Regional Planning Guidance for the West Midlands" states that LPAs should adopt policies to protect the river corridor and work with the NRA to identify river corridors that might provide a useful focus for enhancement of recreation and conservation.
- Circular 30/92 "Development and Flood Risk" states that LPAs should ensure that development does not interfere with the ability of the NRA and other bodies to carry out flood control works.

Guidance for LPAs

Development should not normally be permitted which in the opinion of the LPA, after consultation with the NRA, will adversely affect the ability of the NRA and other bodies to carry out flood control works. Wherever possible the LPA should seek to ensure that the protection of this access also leads to an enhancement of the river corridor more generally.

Development should not normally be permitted which in the opinion of the LPA, after consultation with the NRA, will lead to a significant reduction in the recreational, amenity or nature conservation value or potential of the river corridor. Wherever possible the LPA should seek to ensure that development in or adjoining the river corridor leads to an enhancement of the recreational, amenity and nature conservation value of the river corridor.



River Rea downstream of Cannon Hill Park.

PART II

SUPPORTING INFORMATION

- **SECTION 5** **CATCHMENT USES &
RESOURCES**

 - **SECTION 6** **CURRENT STATE OF
THE CATCHMENT**
-



Contaminated Land

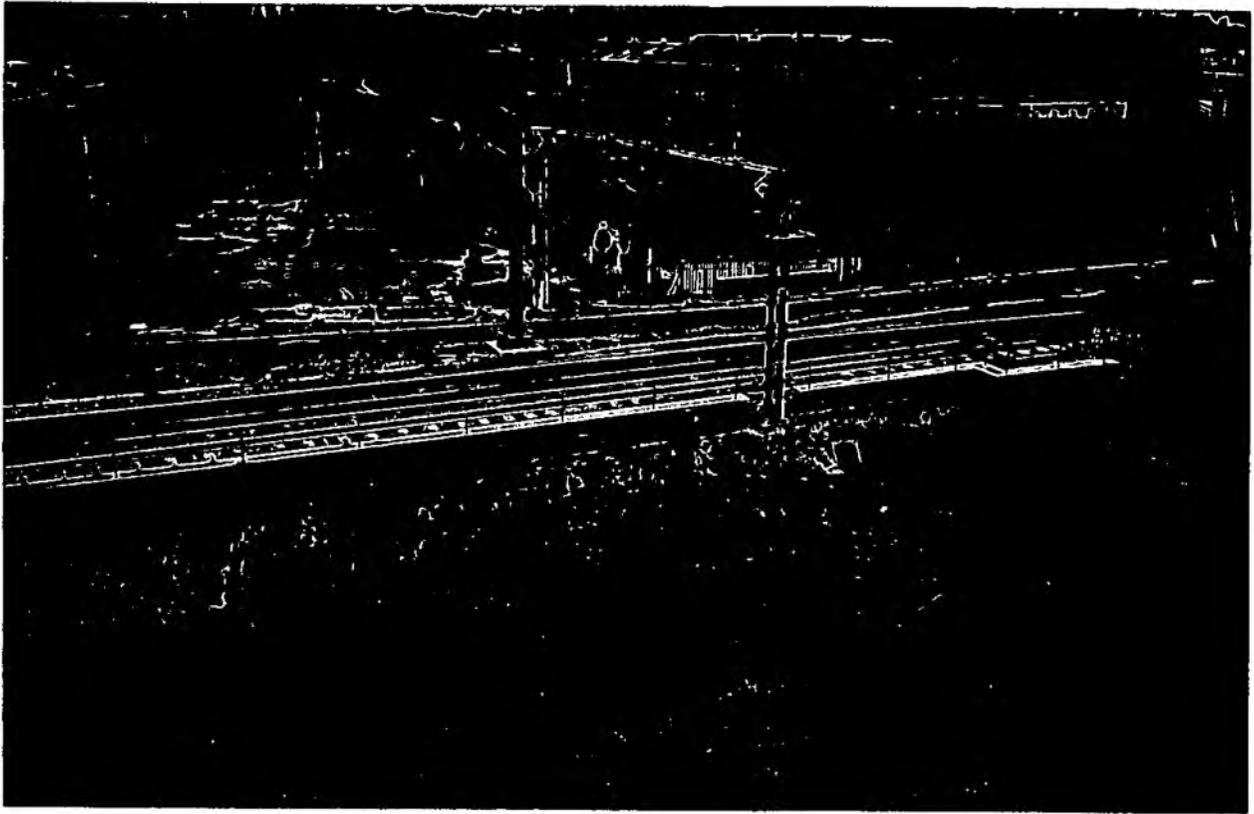
SECTION 5

CATCHMENT USES & RESOURCES

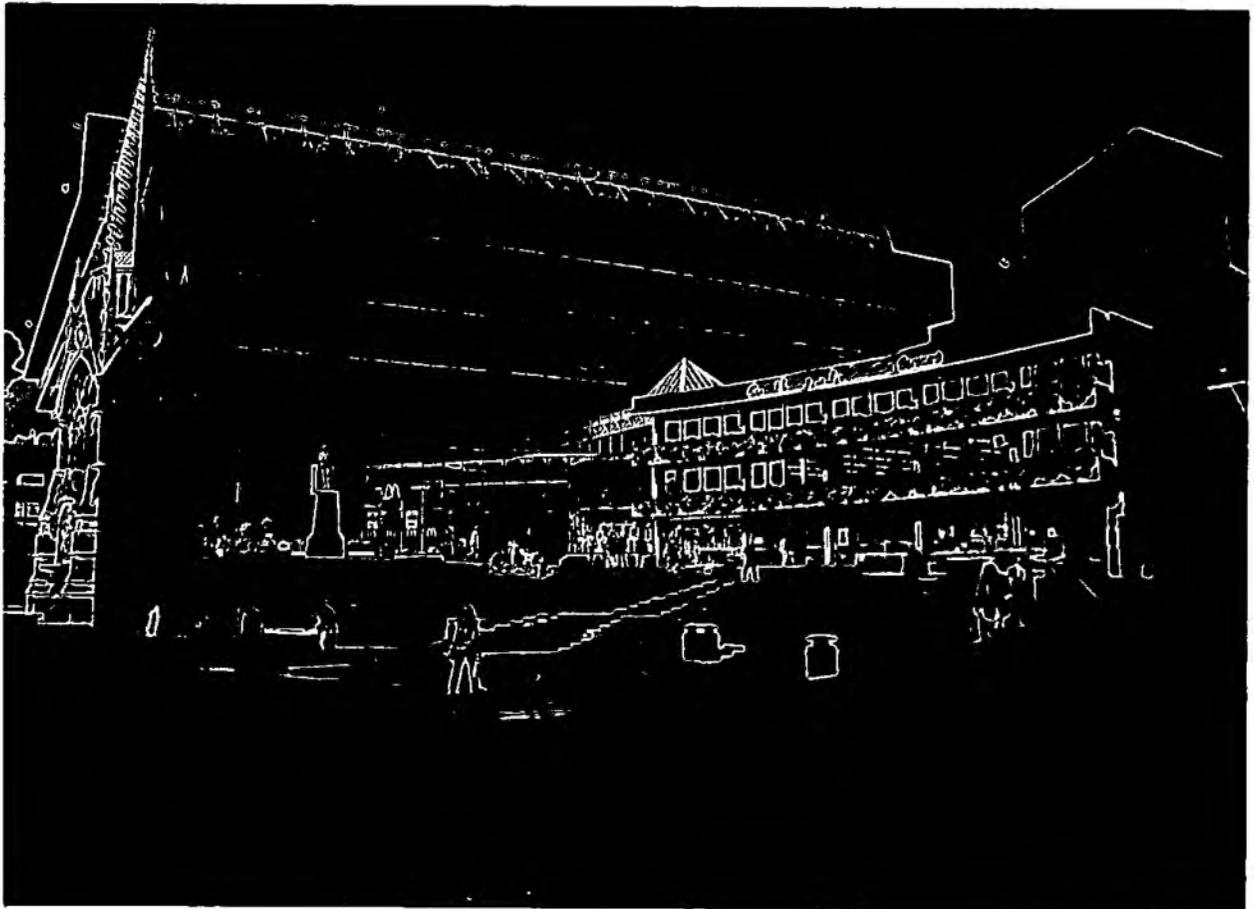
This section details all the current and future uses and resources in the catchment. A general description of the nature of the NRA's responsibility is given, together with a set of management objectives. A Local Perspective describes the use or resource in the catchment.

National and European Legislation impacts on the water environment and on the activities of the NRA. Appendix 3 lists the legislation that has the greatest impact, with a brief description.

- 5.1 Development and Infrastructure.
- 5.2 Industry.
- 5.3 Contaminated Land.
- 5.4 Mineral Working.
- 5.5 Solid Waste Disposal.
- 5.6 Sewage and Trade Effluent Disposal.
- 5.7 Surface Water and Groundwater Abstraction.
- 5.8 Flood Water Storage and Flood Defence.
- 5.9 Agricultural Activity.
- 5.10 Fisheries.
- 5.11 Conservation - Ecology
- 5.12 Conservation - Landscape, Archaeology.
- 5.13 Recreation and Amenity.
- 5.14 Navigation.
- 5.15 Forestry.
- 5.16 Hydropower and Renewable Energy.



The Urban Catchment



Birmingham Central Library

5.1 Development and Infrastructure

General

Development includes new building works, changes in land use, development of communications and the construction of new roads, sewers and other services. The NRA has a responsibility to protect and enhance the water environment; to achieve this aim it must work closely with Local Planning Authorities (LPAs).

A major objective of this CMP is to provide the LPAs with a clear picture of the NRA's responsibilities and policies toward 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. Section 4 presents some draft planning guidance for LPAs.

The strategic objective for this category are:

- To ensure that development does not adversely impact on the water environment, and wherever possible, to ensure that it proceeds in a way that benefits the water environment.
- To ensure that development is compatible with the NRA's aims of achieving sustainable development of the water environment.
- To ensure that, wherever appropriate, the NRA's input to the land use planning system will further the objectives set out in this CMP.

Local Perspective

The problem of urban run-off

Over 41% of the catchment is urban land and most of this is concentrated around the headwaters of the River Tame.

Urban run-off after heavy rain adversely affects the water environment in the catchment and the problem is exacerbated by the location of the West Midlands conurbation. The main sources of contaminated run-off come from roads, industrial estates and combined sewer overflows.

Sources of polluted run-off

Roads, car parks and other large impermeable surfaces.

The catchment contains an extensive road network including a number of motorways (see Map 3). Drainage from roads can be contaminated with oil, fuels, rubber and metals from the traffic and also salt and urea used for de-icing. The use of de-icers is monitored each winter, in association with the Highways Agency. New design standards for motorways and trunk roads require the provision of additional pollution prevention and water treatment measures and these are being applied to new schemes as they occur.

In recent years individual problem sites have been required to install containment facilities

on a first flush basis whereby contaminated run-off is collected and treated before discharge to watercourse. Subsequent uncontaminated surface run-off is allowed to discharge, as before.

Industrial sites

Changes to the historic industrial base within the catchment have seen the demise of the large factory and the corresponding growth of the small, multi-purpose industrial estate on both redeveloped and greenfield sites.

Frequently built to a standard unit design, they can be occupied by a diverse range of industries, each of which can pose a different threat to the aquatic environment. Effective controls for such situations are difficult to enforce and frequent discharges, especially oil related ones, give rise to water quality problems; usually entering the watercourse via the site surface water drainage system. Responsibility for the site is often split between site owners, site developers and site occupiers. This is further complicated with discharges to foul sewer and surface water sewer being under the control of the local sewerage undertaker whilst direct discharges to watercourses are controlled by the NRA. Pollution prevention initiatives are carried out along with intensive surveys of individual estates where resources allow.

Combined Sewer Overflows (CSOs)

Combined sewerage systems incorporate overflows designed to prevent foul flooding of property, as a result of overloading during storm conditions (Issues 4, 7 & 25). During a storm event dilute untreated sewage discharges from these overflows directly into rivers and streams. Dilute sewage can lead to an increased level of suspended solids in the watercourse followed by the settlement of material smothering plants and invertebrates. Sewage also causes the depletion of oxygen in the water as a result of the chemical and biological activities which break it down.

Planning context

The land use planning system is administered by 21 authorities, which includes 4 county councils, 6 unitary authorities, 9 district councils and 2 development corporations. A full list of these and a map showing their boundaries is given in Section 2.

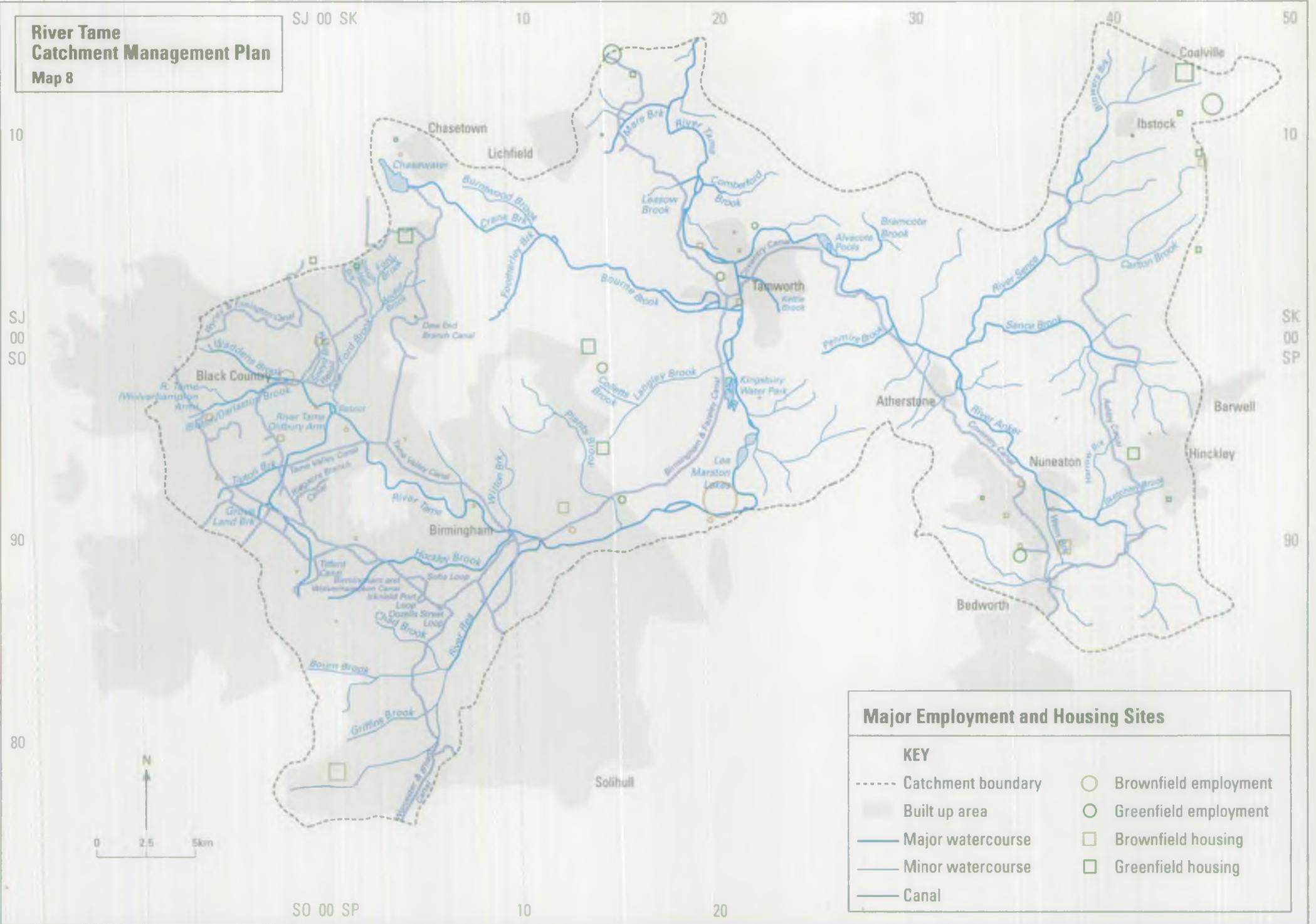
The administrative areas of each of these authorities has a different character and so each authority has set its own detailed objectives for future development. However, their strategic objectives have a common basis in regional planning guidance, issued by central government. Both the regional and local objectives are expressed through the production of development plans, which are in turn a key consideration in the determination of individual planning applications.

The majority of the catchment lies within the area addressed by the Regional Planning Guidance for the West Midlands (RPG10, 1995). The parts of the catchment which lie within Leicestershire are included in the guidance for the East Midlands (RPG8, 1994).

The regional guidance identifies priority objectives for the catchment which include:

- achieving economic prosperity

**River Tame
Catchment Management Plan
Map 8**



Major Employment and Housing Sites			
KEY			
	Catchment boundary		Brownfield employment
	Built up area		Greenfield employment
	Major watercourse		Brownfield housing
	Minor watercourse		Greenfield housing
	Canal		

- conserving and enhancing the environment
- regenerating the older urban areas
- diversifying the rural areas
- ensuring a high quality of life and a choice of opportunities for the citizens

There has been a shift in the emphasis which reflects the changing attitudes of policy makers and their desire to address the issue of sustainable development through the planning system. A key part of this process is an acknowledgement that environmental capacity should act as a limiting factor on economic development. In particular, the guidance identifies the availability of water resources and sewage infrastructure, flood risk and the protection of the water environment as key factors which may limit development and which should be considered during the writing of development plans.

This approach is compatible with the NRA's objectives and this CMP is intended to contribute to the sustainable development of the catchment, as set out in Section 1.1.

Future development

Each development plan aims to make land available to meet the needs of the area for housing and employment. The demand for development land is met by two types of sites: allocated sites and windfall sites. The allocated sites are those identified in the plan as being suitable for specific uses, and are usually the larger sites. In addition, planning permission may be granted for sites not identified in the plan, such as infilling or conversions and these are termed windfall sites. In urban areas the contribution that windfall sites make to the supply of land for development, particularly housing, can be very significant and may even exceed the amount of allocated land.

The land use planning system is only one of several principle factors that affect the rate and location of development in the catchment. The estimates which follow are based upon the allocations of land in development plans and information on the amount of windfall land expected by each authority and should be considered as indicative.

Housing development

The NRA estimates that there are likely to be 2,500 new houses built in the catchment each year, that is 15,000 new houses by the year 2001. The density of development will vary between individual sites but it is likely that the average density will be approximately 27 dwellings per hectare and so these rates of building will require the use of approximately 90 ha of land per year, 550 ha by 2001.

Two thirds of these houses are likely to be built in the west of the catchment, in and around the conurbation, with much of the development on small sites. In the eastern part of the catchment there are large allocations at Tamworth and in North West Leicestershire.

Development Plans

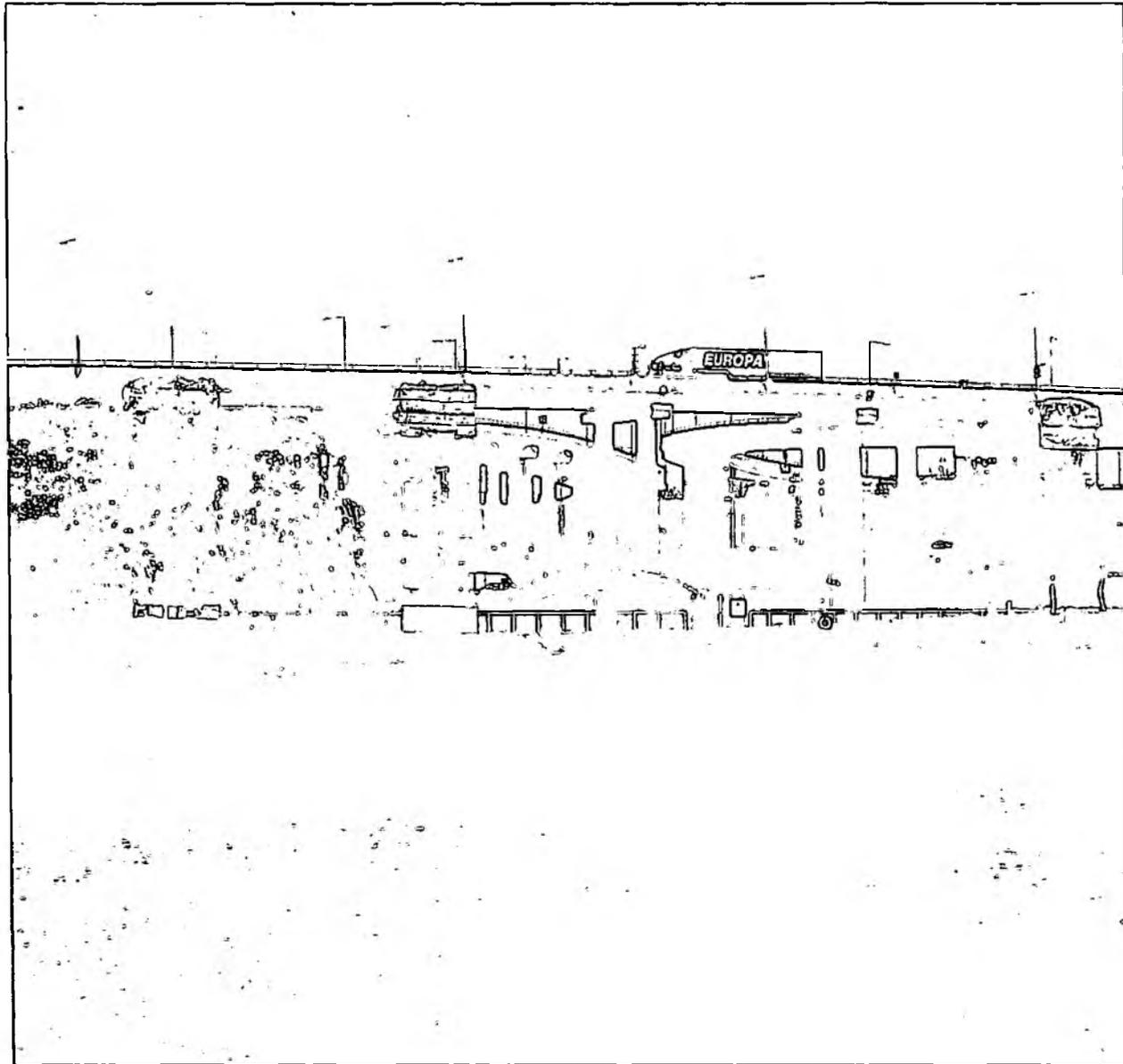
Local Planning Authority	Development Plan Title	Status and consultation dates	Comments
Birmingham City Council	The Birmingham Plan	Adopted July 1992	
Bromsgrove BC	Bromsgrove Borough Local Plan	Deposit November 1993	Inquiry December 1995
Cannock Chase DC	Cannock Chase Local Plan	Deposit March 1994	
Dudley MBC	Dudley UDP 2001	Adopted November 1993	
Hinckley and Bosworth BC	Hinckley and Bosworth Local Plan	Consultation July 1994	
Lichfield DC	Lichfield Local Plan	Deposit December 1994	Inquiry September 1995
Leicestershire CC	Leicestershire Structure Plan	Adopted January 1994	
North Warwickshire DC	North Warwickshire Local Plan	Adopted May 1995	
North West Leicestershire DC	North West Leicestershire Local Plan	Deposit February 1995	
Nuneaton and Bedworth BC	Nuneaton and Bedworth Local Plan	Adopted 1994	
Rugby BC	Rugby Borough Council	Deposit January 1994	Awaiting Inspector's Report
Sandwell MBC	Sandwell UDP	Deposit May 1993	Subject to a legal challenge July 1995
Solihull MBC	Solihull UDP	Modifications June 1994	Awaiting Inspectors Report
Staffordshire CC	Staffordshire Structure Plan 1986-2001	Adopted April 1991	Under review
Tamworth BC	Tamworth Local Plan	Deposit September 1992	Subject to a legal challenge
Walsall MBC	Walsall UDP 1995	Adopted January 1995	
Warwickshire	Warwickshire Structure Plan 1986-2001	Adopted September 1995	
Wolverhampton MBC	Wolverhampton UDP 1998-2001	Adopted September 1993	

Industrial development

Most of the industrial development in the catchment is likely to be on allocated sites with relatively small amounts of windfall land. Within the catchment there is approximately 1,000 hectares of land allocated for business uses that has not yet been developed. A proportion of this land is subject to specific constraints such as ground contamination, which mean that it may not be developed by 2001.

Transport development

The Birmingham Northern Relief Road (BNRR) is the main transport infrastructure project planned for the next few years and if approved is likely to be completed by 2005. The BNRR will link the M42 to the M6 following a route around the north east of the conurbation. The project will result in significant development, with toll booths and a possible new service area.



The M6 at Aston

5.2 Industry

General

Water is used by industry in large quantities for manufacture and for cooling purposes. In older industrial areas heavy abstraction of underground water supplies lowered water tables, and historical pollution has contaminated land and underground water supplies.

Today most large industrial sites are well regulated with discharge consents rigorously enforced. Many of the larger industries, particularly heavy engineering and manufacturing have been reduced in size. De-industrialisation has led to the growth of mixed use industrial estates and business parks. Change has created new problems associated with pollution prevention and detection.

The strategic objectives for this category are:-

- To ensure that economic growth and development does not adversely affect the water environment.
- To ensure that industry does not compromise the use of surface water and groundwater.
- To ensure that industry does not threaten the ecology of rivers or river corridors.

Local Perspective

The upper reaches of the Tame catchment in the West Midlands conurbation has a rich industrial heritage. Mining and iron and steel production was gradually replaced by manufacturing which remained the back bone of the economic success of the area until very recent times. Industry however remains a major land use and impacts on the water environment of the catchment.

Most of the discharges to rivers and streams from industrial sites are site drainage run-off and cooling water. In general this is less significant than the discharge of treated sewage effluents which form a much larger proportion of the flows in rivers and streams.

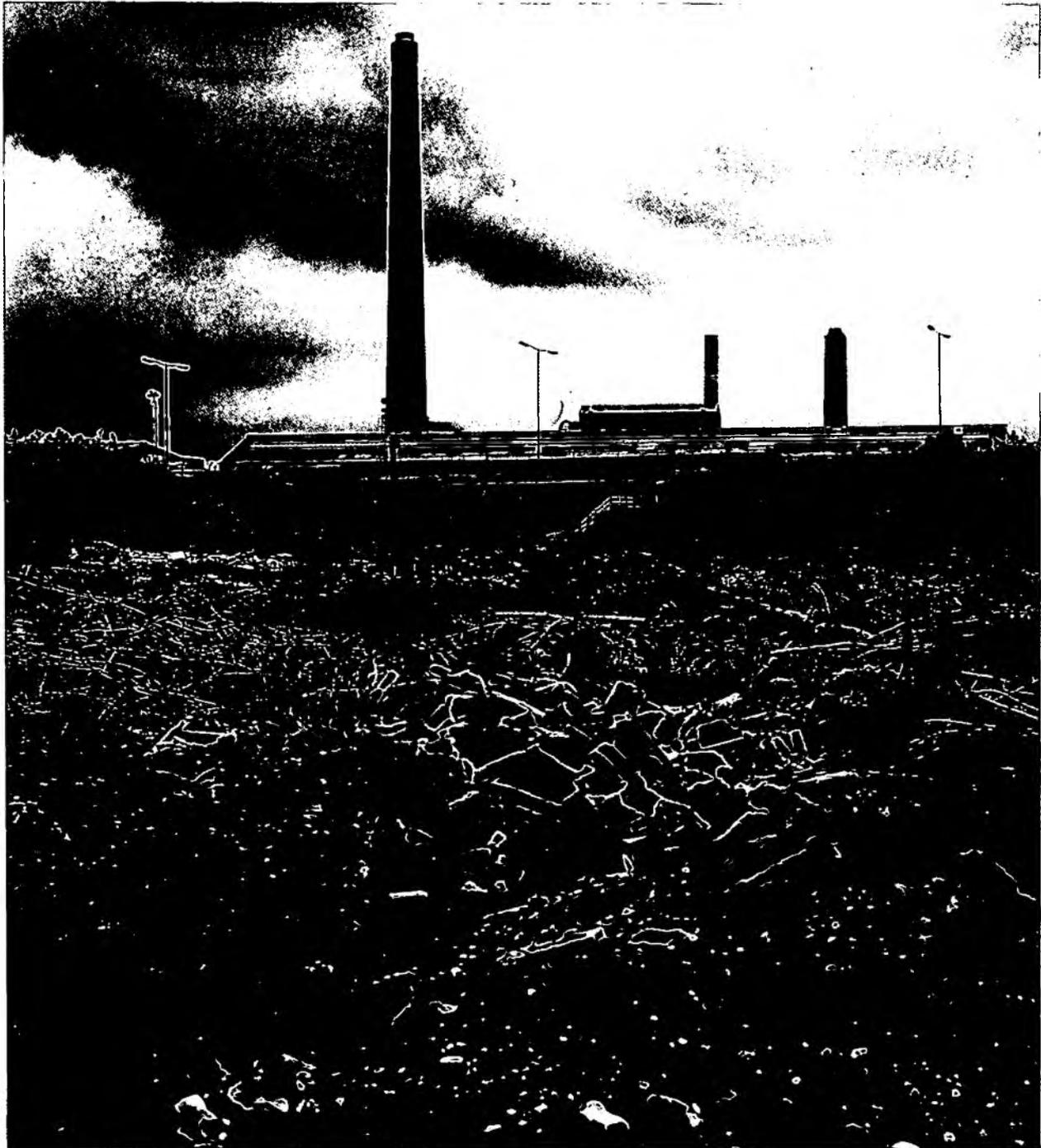
In its headwaters the catchment contains a wide diversity of industry although it now includes much less heavy engineering and iron and steel production than in former years. No active mines or significant mineral extraction continue to operate. The legacy of these, and other industries, is a proliferation of contaminated land sites.

Within the Ford Brook catchment, clay extraction and brick and tile production give rise to much smaller discharges. While on the Rea, Rover at Longbridge, Rhone-Poulenc, Frankley Water Treatment Works and Cadburys, are all significant sites.

On the Tame itself brick production and metal finishing together with small automotive industry related sites are represented. One of the larger sites is the Railtrack depot at Bescot. Downstream of Lea Marston mineral extraction and brick production predominates although there are a number of oil terminals concentrated at Kingsbury.

Along the River Anker good road and rail links have led to the development of many business parks and industrial sites. Manufacturing continues to play a part in the economy with the Triumph motorcycle factory located at Hinckley. New development is having an adverse effect on some of the small tributaries on the upper reaches of the River Anker. The Harrow Brook at Hinckley and the upper reaches of the River Sence near Coalville suffer intermittent polluting discharges which together with debris and litter is affecting long term water quality and the aesthetic appearance of these watercourses.

Industry remains a potential source of pollution and incidents tend to be linked to new industries and those undergoing rapid expansion.



Derelict land in the Black Country

5.3 Contaminated Land

General

The water environment is often not the main priority of owners and developers of contaminated land. From the initial desk study, through site investigations and design and implementation of any remediation, water must be considered in detail. On operational sites, pollution prevention must be a priority, unlike in the past where waste disposal, spillages and drainage were inadequately considered.

There are two main ways in which contaminants in polluted land can affect the environment. The first is by direct contact whilst the second is from the migration of contaminants to groundwater and surface waters. The NRA is particularly concerned with the latter issue. Contaminated land and water issues have become more linked in recent years. It is now recognised that areas of past and present industrial activity have given rise to a legacy of contamination of the underlying soils and bedrock that has the potential to affect groundwater and surface water resources in the locality. The potential problems depend on many factors that relate to the characteristics of the contaminants, the underlying geology and the use to which the land is put. These factors are complex and site specific.

The NRA has a role to play in contaminated land via its own powers under the Water Resources Act and also via its consultee role to Planning Authorities on planning permissions for redevelopment of contaminated sites. Direct liaison with landowners and their advisors also plays a vital part in this.

The Environment Act 1995 introduces provisions to allow either Local Authorities or in the case of special sites, the Environment Agency, to issue remediation notices on a contaminated site that is causing or is likely to cause harm to human health or the environment. The accompanying guidance has yet to be issued by the Government so few details are available at present on what the special sites will be and how the notices will operate.

Strategic objective for this category is:-

- Support the redevelopment of contaminated land particularly where it is having an adverse impact on the water environment.

Local Perspective

Contaminated land is a serious problem in the upper, more urban parts of the catchment due to the long history of industrial development and the legacy that remains.

Much of the Black Country has been redeveloped in recent years, partly through the Black Country Development Corporation. Several major projects including the Black Country Spine Route and the Black Country Route have provided good access to previously derelict land, the majority of which was contaminated. A characteristic of Black Country development sites is that there are usually a number of problems linked together such as mine shafts and underground workings, waste from various past industries and occasionally a canal basin that has been infilled. The redevelopment of such sites has been costly and involved many stages of site investigation and remediation, often with removal of material off-site. Some projects, such as Leabrook Road, have involved opencast coal mining and creation of

a new engineered waste repository for contaminated material on-site.

A lot of the groundwater in the area discharges as baseflow into the River Tame and much of it is contaminated either from source or as it passes through layers of contaminated material.

Surface water quality has not only been affected by specific discharges but by general seepage into the sides and base of the channels. Metal contamination is wide spread in both surface and groundwater. Two particular sites at Slacky Lane and Bentley Mill Way in Walsall have caused long term pollution problems.

The large number of redevelopments on contaminated sites have led the NRA to produce trigger levels for acceptable soluble concentrations of contaminants in material that is redeposited within the Black Country area. All the local planning authorities and waste regulation authorities have copies as do many of the consultants and developers. The figures are specific to a particular area and relate to what may be acceptable to discharge to the surface waters. By using these levels to assess contaminated land redevelopment, the NRA aims to minimise the future risks of pollution and be consistent in dealing with different sites.

In Birmingham, the closure of many industries over the last 50 years or so has led to a reduction in abstractions from groundwater and a rise in groundwater levels particularly along the Tame Valley. The concern long term, is that as water rises into previously contaminated ground, contaminants will be remobilised and discharged into surface water.

There is widespread contamination by organic solvents throughout the Birmingham Triassic Sandstones Aquifer. Studies by Birmingham University have provided valuable information on many aspects of the groundwater quality in the area. The sources of pollution are numerous and historical such that much of the aquifer is affected to some degree.

Downstream of Lea Marston and in the River Anker there are localised problems of contaminated land. Acidic run-off from the spoil heaps of abandoned coal mines in North Warwickshire and Leicestershire is adversely affecting water quality along some tributaries of the River Anker (Issue 9). At Wolvey Villa, a waste tip has contaminated underground water (Issue 10), while at Hawley Road, Hinckley a contaminated site has become the centre of a legal battle.

5.4 Mineral Working

General

Areas of current or former mineral workings 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 materials that are 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 law and may cause severe local problems.

In August 1995 the NRA signed memoranda of understanding with both the Coal Authority and RJB Mining Plc formalising its relationships and procedures in respect of non-operational mines and future abandonments. It is intended, in principle, that similar memoranda will be entered into with other private coal operators.

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.

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 are consented and monitored.

Gravel extraction may take place from the river channel or floodplain 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 fish spawning sites.

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.

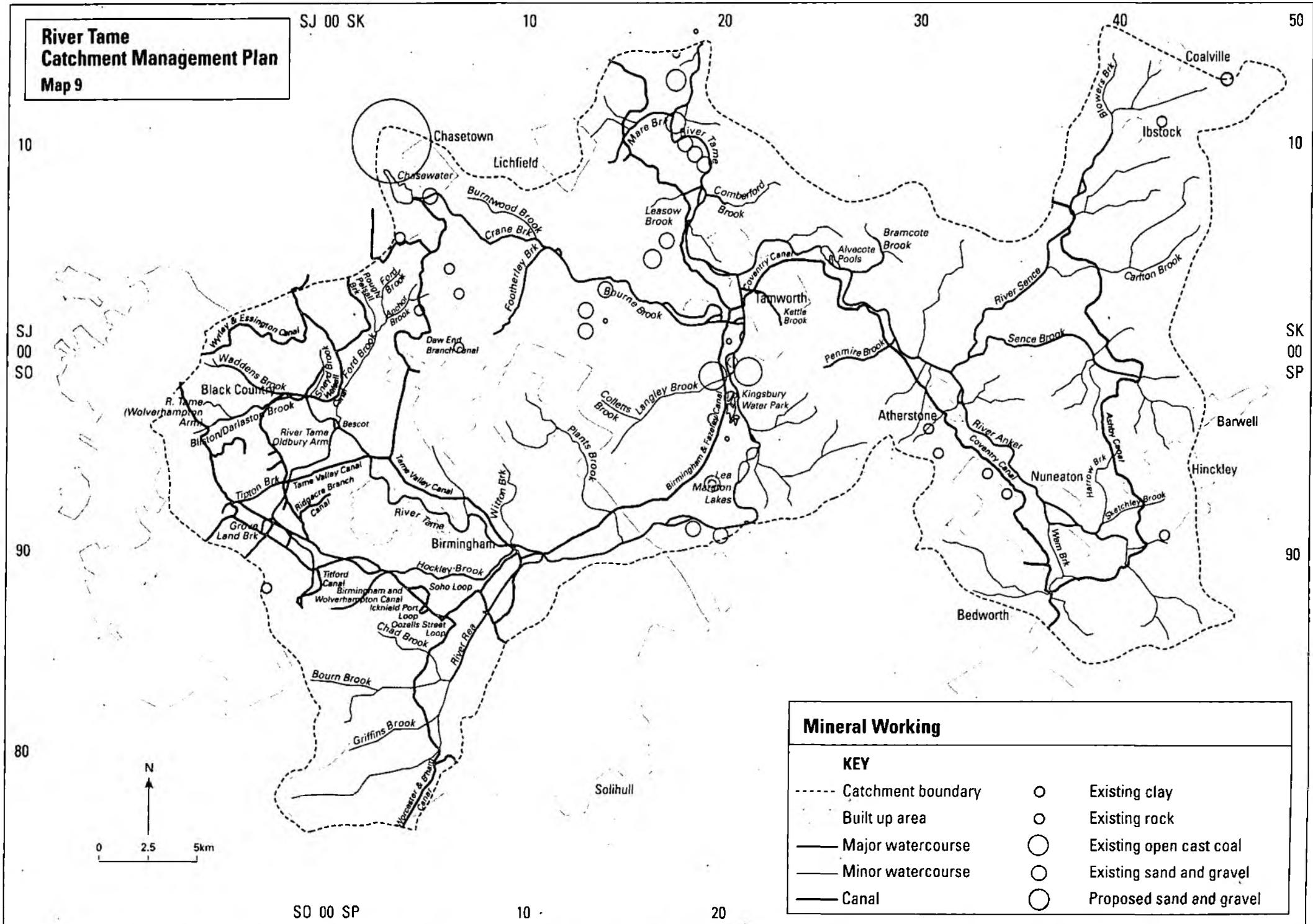
The strategic objective for this category is:

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

Local Perspective

In the past numerous minerals have been extracted from the catchment. Limestone, coal, ironstone, clay, roadstone, sands and gravels and sandstone have all been quarried or mined in the past.

**River Tame
Catchment Management Plan
Map 9**



Mineral Working

KEY	
-----	Catchment boundary
.....	Built up area
————	Major watercourse
————	Minor watercourse
————	Canal
○	Existing clay
○	Existing rock
○	Existing open cast coal
○	Existing sand and gravel
○	Proposed sand and gravel

Historically Silurian Limestone in Dudley, Walsall and Wolverhampton was extracted in large quantities. Modern subsidence problems resulting from this activity have led to a programme of progressive infilling of many of the mines using a pulverised fuel ash/cement mixture for stability. No limestone is extracted today. Coal mining has also largely ceased in the catchment with some opencast in Leicestershire continuing. Historically, many coal mines were located in the Black Country as well as near Tamworth. Opencast coal extraction formed part of the reclamation strategy at both the Leabrook/Wednesbury and Bowmans Harbour, Wednesfield, Reclamation sites. The legacy of coal mining remains with problems associated with spoil heap run-off and acidic discharges continuing. Iron bearing minewaters and the leaching of other metals, such as copper, nickel and aluminium by these acidic groundwaters are a particular problem on the headwaters of the River Tame.

Clay and ironstone have both been quarried often in association with the coal extraction. Clay for brickmaking is still quarried in large areas south of Tamworth near Dosthill.

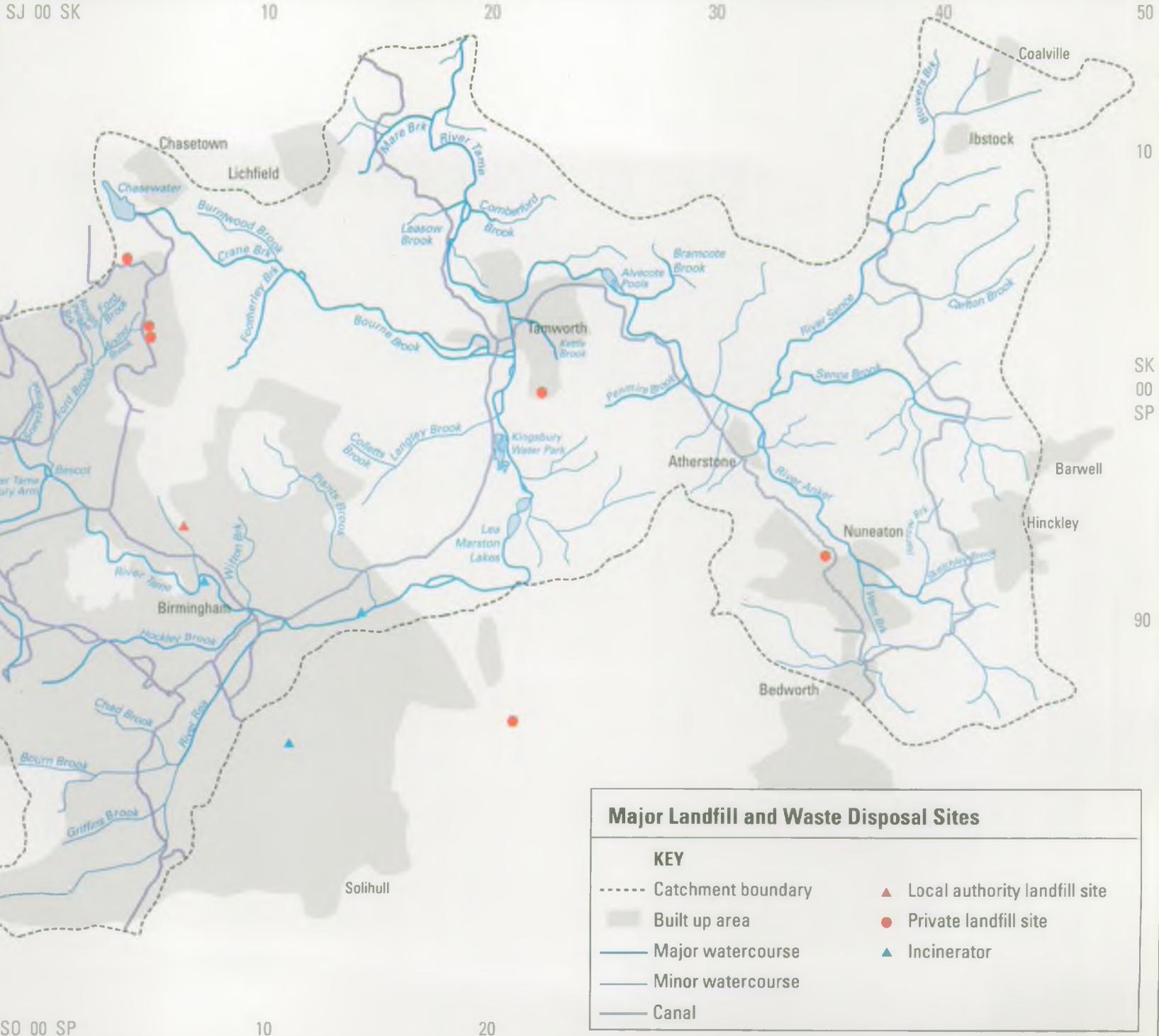
In north and west Leicestershire and north Warwickshire hard rock is extracted for roadstone from several quarries with major extractions at Bardon Quarry on the headwaters of the River Sence, south of Coalville. Restoration of these sites could provide opportunities for different land forms and for recreation. Water quality from surface drainage can however be a problem related to the natural minerals in the rock rather than any other cause.

Sandstone from the Triassic Sandstones is quarried on a limited scale north of Birmingham. Although this is on a major aquifer there have been few problems associated with the activity. Sands and gravels are extensively quarried along the River Tame Valley downstream of the West Midlands conurbation. Much of the restoration has been to water with little thought given to the strategic conservation and recreational potential these open water areas can provide. (Issues 17 & 18).



Bardon Quarry, near Coalville

**River Tame
Catchment Management Plan
Map 10**



Major Landfill and Waste Disposal Sites

KEY	
-----	Catchment boundary
■	Built up area
—	Major watercourse
—	Minor watercourse
—	Canal
▲	Local authority landfill site
●	Private landfill site
▲	Incinerator

5.5 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 or Unitary Authority. 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 cause water pollution. This is because rain falling on the site can become contaminated (leachate) and drain 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 'Policy and Practice for the Protection of Groundwater' to advise local 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 many waste disposal facilities within the catchment. These include not just landfills but incinerators, transfer stations, waste storage sites, waste treatment or processing sites and scrapyards. There are a few major landfills, such as those near Tamworth and Nuneaton.

All these facilities are generally operated in a satisfactory manner with respect to the water environment. Within the West Midlands area there is a specialist waste team based with Walsall Metropolitan Borough Council which provide expertise to all the Metropolitan Borough Councils on matters relating to all aspects of waste regulation. Following the formation of the Environment Agency in 1996 waste regulation will be integrated into the Agency and will work along side water pollution protection within the same authority.

**River Tame
Catchment Management Plan
Map 11**

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0 2.5 5km

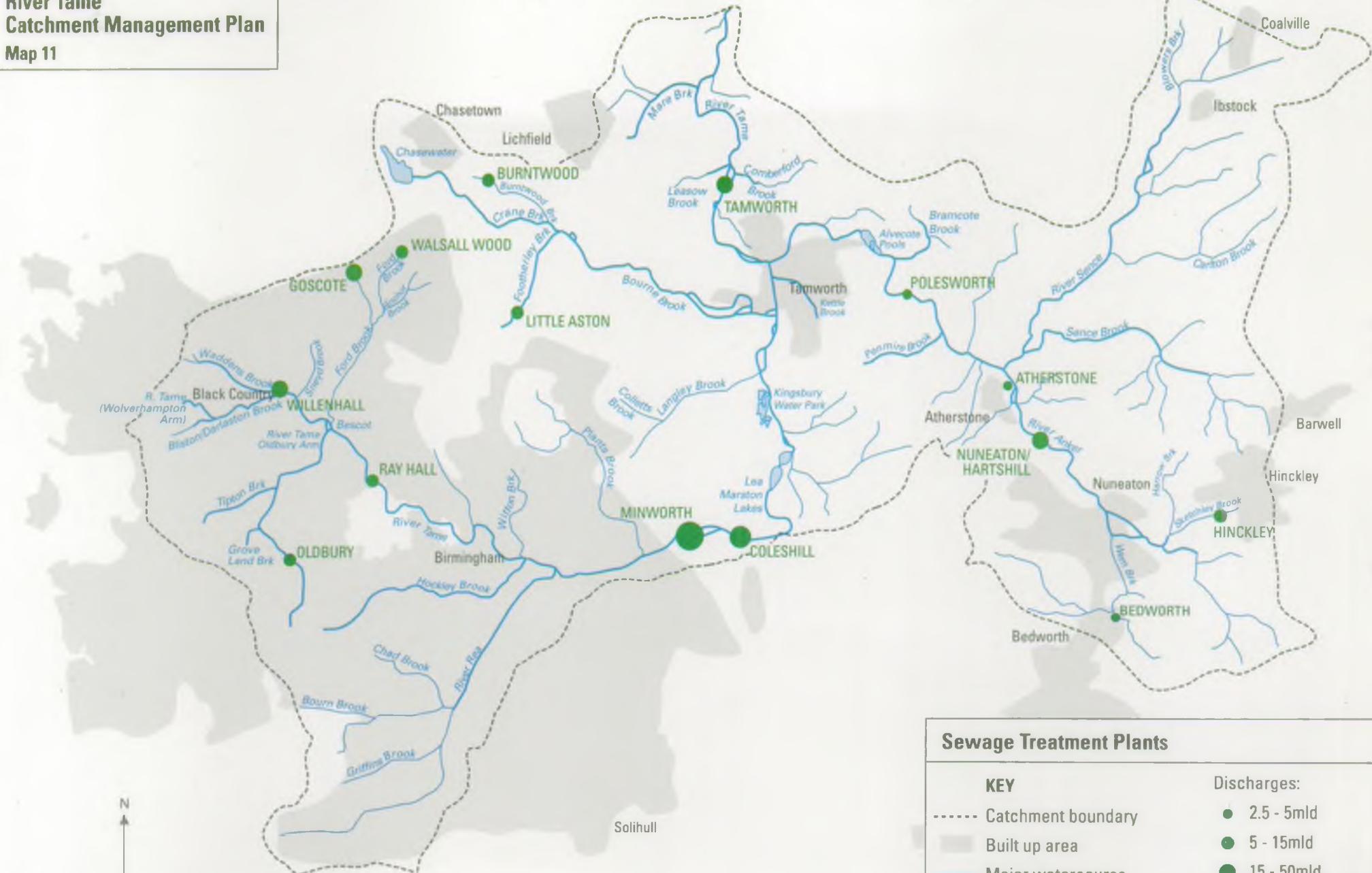
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Sewage Treatment Plants

KEY		Discharges:
-----	Catchment boundary	● 2.5 - 5mld
■	Built up area	● 5 - 15mld
—	Major watercourse	● 15 - 50mld
—	Minor watercourse	● 50 - 200mld
		● 200 + mld



5.6 Sewage and Trade Effluent Disposal

General

Most sewage discharges and all trade effluent discharges require a Discharge Consent from the NRA except on sites authorised by Her Majesty's Inspectorate of Pollution. The consent specifies the volume that may be discharged, and the parameters and concentrations with which it must comply. These conditions are based on 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 Effluent Discharges

In its upper reaches, the River Tame is predominantly of poor water quality (Rivers Ecosystem (RE) Class 5) and contains a high proportion of sewage effluent. Under storm conditions, it also receives large amounts of polluted run off from surrounding land, road and pavements (see Issue 1).

The Oldbury Arm of the River Tame rises at Rowley Regis and almost immediately receives effluent from Oldbury Sewage Treatment Plant (STP). In dry weather up to 90 percent of the flow in this arm is sewage effluent, plus a much smaller proportion of industrial effluent. The Wolverhampton Arm of the River Tame in dry weather consists mainly of sewage effluent, from Willenhall STP. The Ford Brook at Bescot contains a significant proportion of sewage effluent from Goscote STP and the much smaller Walsall Wood STP. In addition the abandoned Slacky Lane tip discharges high concentrations of nickel and copper into the River Tame via the Ford Brook.

Below Bescot there is a further major sewage effluent discharge into the Tame from Ray Hall STP, before it is joined, under the elevated M6 motorway by the River Rea. Between Birmingham and Lea Marston, the River Tame receives large amounts of sewage effluent from Minworth STP and Coleshill STP, the former being one of the largest inland sewage effluent discharges in the British Isles. The volume of the river in dry conditions increases by nearly half at this point. At Lea Marston the normal flow in the River Tame is 55 percent sewage effluent and industrial waste. During dry weather this can rise to 90 percent. Downstream of Lea Marston water quality is improved sufficiently to support a viable coarse fishery. The river is joined by the Bourne/Black Brook and the River Anker.

The Bourne/Black Brook which joins the Tame at Fazeley receives substantial discharges of sewage effluent from Little Aston and Burntwood STPs. Both these cause a reduction in river quality. The river does not meet its long term River Quality Objective. Self purification and dilution return the brook to a good quality downstream of Shenstone.

The River Anker receives sewage effluent from Bedworth, Bulkington and Hinckley via the

Wem and Sketchley Brooks. These discharges reduce water quality downstream to Nuneaton and include sometimes coloured sewage effluent from Hinckley sewage works, resulting from trade effluent discharges to the sewage works.

Water quality improves downstream of Nuneaton and recent, significant improvements to the Nuneaton (Hartshill) sewage works, have led to a good fishery becoming established in this part of the river. Dilution by the River Sence improves water quality in the River Anker below the confluence of the two rivers.

The discharge of treated sewage effluent from Tamworth STP has little effect on the quality of the River Tame and is the last major discharge into the river before its confluence with the River Trent.

Trade Effluent Discharges

Where adopted sewerage systems exist within the catchment, Severn Trent Water Ltd exercise formal control over discharges of trade effluents to these systems. Direct discharges to controlled waters are regulated by the NRA.

The majority of difficult trade effluents pass to a sewage treatment works for further treatment before discharge. Direct discharges routinely consist of either cooling water or contaminated surface water.

Within the Black Country the abundance of metal based industries leads to metal contaminated site drainage run off. Where necessary the containment of the first flush of run off and its subsequent disposal to foul sewer is encouraged although adequate sewer capacity is not always available (see Issue 1).

Oil contaminated site drainage from industrial sites is also a significant problem throughout the catchment and is addressed by encouraging the application of pollution prevention measures and provision of on site effluent treatment (oil interceptors).

The catchment also contains an extensive and complex canal system which is also classified as having poor water quality (Rivers Ecosystem (RE) Class 5). The causes of poor water quality within the Birmingham Canal Navigation system is discussed in Issue 3. There are no direct major sewage or trade effluent discharges to canals in the catchment.

5.7 Surface Water and Groundwater Abstraction

General

The NRA has duties to conserve, redistribute or augment water resources and to ensure proper use of these resources.

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 groundwater resources are not over licensed or over abstracted where possible.
- To actively enforce the conditions of abstraction licences to protect the rights of other abstractors and the aquatic environment.
- To develop and implement a clear licensing policy for abstractions in the catchment.
- 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

In general there are few resource problems in the west of the catchment. Licences (both surface and groundwater) are issued providing that there are no local derogation problems.

Further north and east the broad outcrop of Triassic Sherwood Sandstones between Sutton Park and Lichfield provides important supplies of groundwater for drinking water purposes. Studies have shown that overall abstraction rates are close to or in excess of the assessed recharge, with the imbalance most evident in the Lichfield Area. This has led to a progressive decline in groundwater levels and a consequent reduction of springflows, pool levels and baseflow support to watercourses (Issue 12). The only long term solution is to reduce the quantity of groundwater abstracted from the aquifer, to restore a sustainable balance between abstraction and recharge.

The Lichfield and Shenstone aquifer units are therefore considered closed to new or increased licences.

In the east of the catchment, in the areas drained by the Rivers Anker and Sence, surface water resources are also generally more scarce, with licences issued subject to restrictions or in some cases on the basis of winter abstraction only.

Rising groundwater

Water is available in the Birmingham area due to the decline in water being abstracted for industry. The recovery in water levels is causing particular problems in the Aston/Witton area where levels are close to ground level resulting in flooded cellars and basements. The main constraint on use of the resource is the quality of the water. Studies have shown that an additional 50 Ml/d is available. Groundwater abstraction is therefore encouraged from this area.

Drinking water supply

The NRA is not responsible for the quality of the raw water, or for the delivered, treated water. However, it does have a duty to protect water and will specify protection zones around groundwater sources in order 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 be identified as "Source Protection Zones" within which activities which threaten the source can be prohibited. (See Section 6.1.2 for further details).

Approximately 70 percent of the authorised volume is for groundwater. The four public water supply licences for South Staffordshire Water represent the greatest authorised volume. These are licences at Wheatmoor Farm, St George's Barracks, Trent Valley and Bourn Vale and can represent up to 77 per cent of the total groundwater licensed volume.

Industry

All abstractions for any industrial or commercial use must be authorised by a licence granted by the NRA. Industrial licences may be for a variety of uses: either general industrial, mineral washing or cooling water.

Industrial activity is concentrated in the West Midlands conurbation and accounts for 9% of the total licensed volume in the CMP area. The largest surface water volumes are licensed for circulation cooling water. This however is a relatively low loss purpose with most of the water abstracted returned to its source after use.

Agriculture

Agricultural abstractions can be for a variety of purposes and this may determine whether a licence is required.

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.

Spray irrigation licences represent the largest number of surface water licences and are located in the more rural east of the CMP area.

Other Abstractions

There are a variety of other uses for abstracted water. These include topping up of pools, and the transfer of water.

Some are licensed and others are exempt from licensing. When an abstraction licence application is received, its use must be considered together with the rights of all existing abstractors.

Impounding

Whenever a stream is dammed up to form a reservoir or pond then an Impounding Licence and a Land Drainage Consent 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 structural integrity of the retaining dam. This is the responsibility of the developer, owner or tenant.

5.8 Flood Water Storage and Flood Defence

General

The river network acts as a conveyor of surplus water from the land to the sea. Natural watercourses have limited capacity and when this is exceeded flooding occurs. 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 floodplain, which is as much a part of the river as the channel which carries normal flows. These natural floodplains provide 'on line' storage of flood water. If significant areas of floodplain 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 indicative standards of service detailed in section 6.3.4.

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

The strategic objectives for this category are:

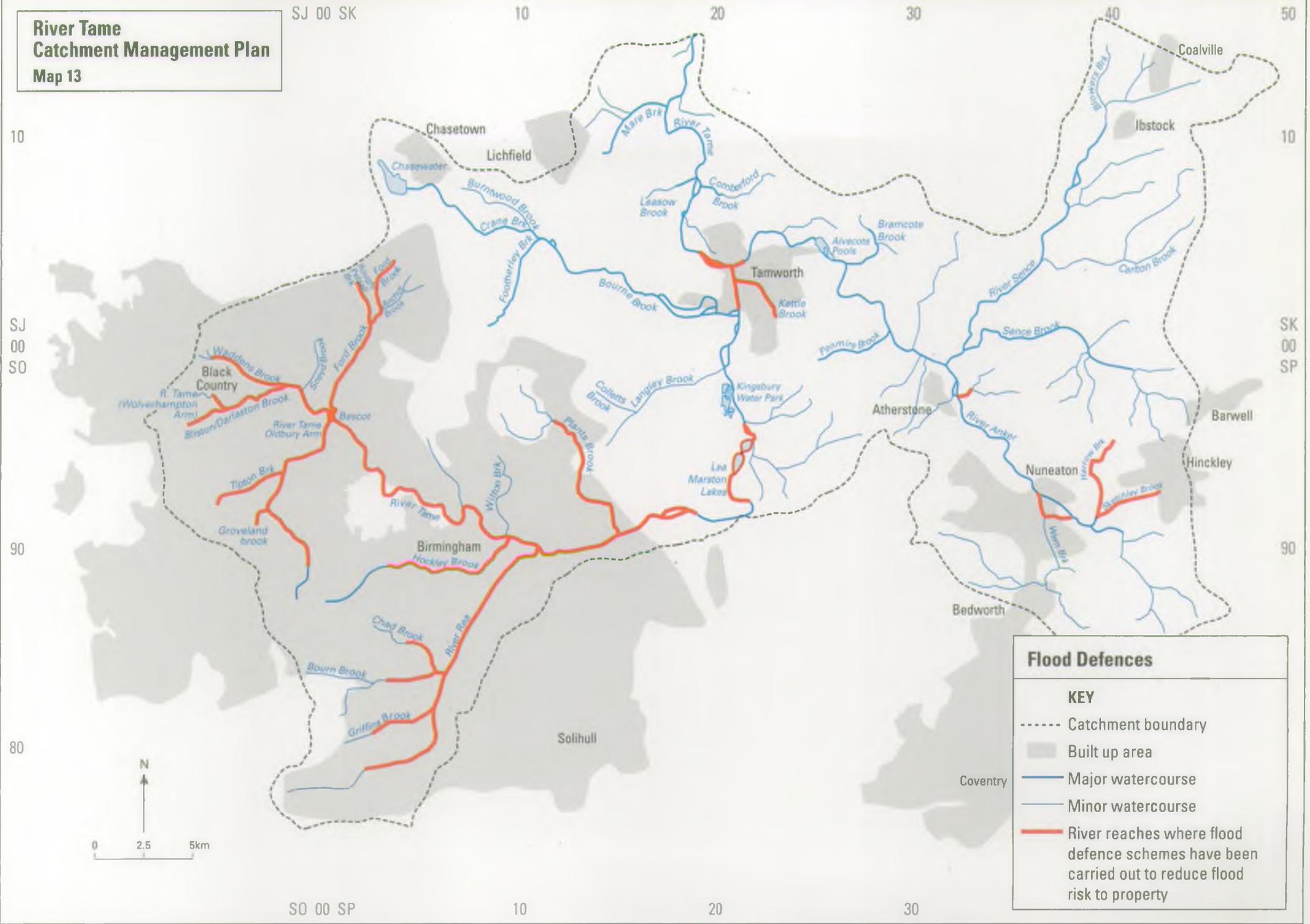
- To provide effective flood defences on main rivers to reduce the risk of flooding to people and the developed environment to a standard appropriate to the land use.
- To provide an adequate flood forecasting and flood warning service and to respond to flood events.
- To ensure that any works in rivers do not create undue restrictions to flood flows.
- To ensure where possible that the effectiveness of the floodplain to store and convey flood waters is not impaired.

Local Perspective

The upper reaches of the River Tame run through the West Midlands conurbation and their natural hydrological and hydraulic features were already slightly modified in the pre-industrial revolution days by well over 50 water mill sites. The river was drastically changed by the Industrial Revolution and subsequent urbanisation. This has resulted in a very rapid run-off response to rainfall and considerable encroachment into the floodplain by development with consequent reduction in the rivers' natural flood storage capacity.

Serious flooding in 1969 highlighted the inadequacy of land drainage in the conurbation and promoted the setting up of a working party consisting of local authorities, the Trent River Authority and the Ministry of Agriculture, Fisheries and Food. The working party reviewed the situation and formulated a programme of improvement works for the middle and upper reaches of the river.

**River Tame
Catchment Management Plan
Map 13**



Flood Defences

KEY

- Catchment boundary
- Built up area
- Major watercourse
- Minor watercourse
- River reaches where flood defence schemes have been carried out to reduce flood risk to property

The working party reported in 1971, setting out a scheme for enlarging the river system substantially, to convey along the channel all of the maximum flood flows arising from a 1 in 50 year storm event. Works commenced quickly following the 1971 Report, but in 1977 the scheme was revised by Severn Trent Water Authority (as successor to the Trent River Authority) with agreement by MAFF. This introduced the concept of retaining a part of the flood flows in a series of specially created storage lakes on the River Tame. The introduction of storage meant that smaller channels were required which reduced the impact of the works on the environment, achieved a considerable saving in cost, and created opportunities for the development of water related environmental and leisure interests.

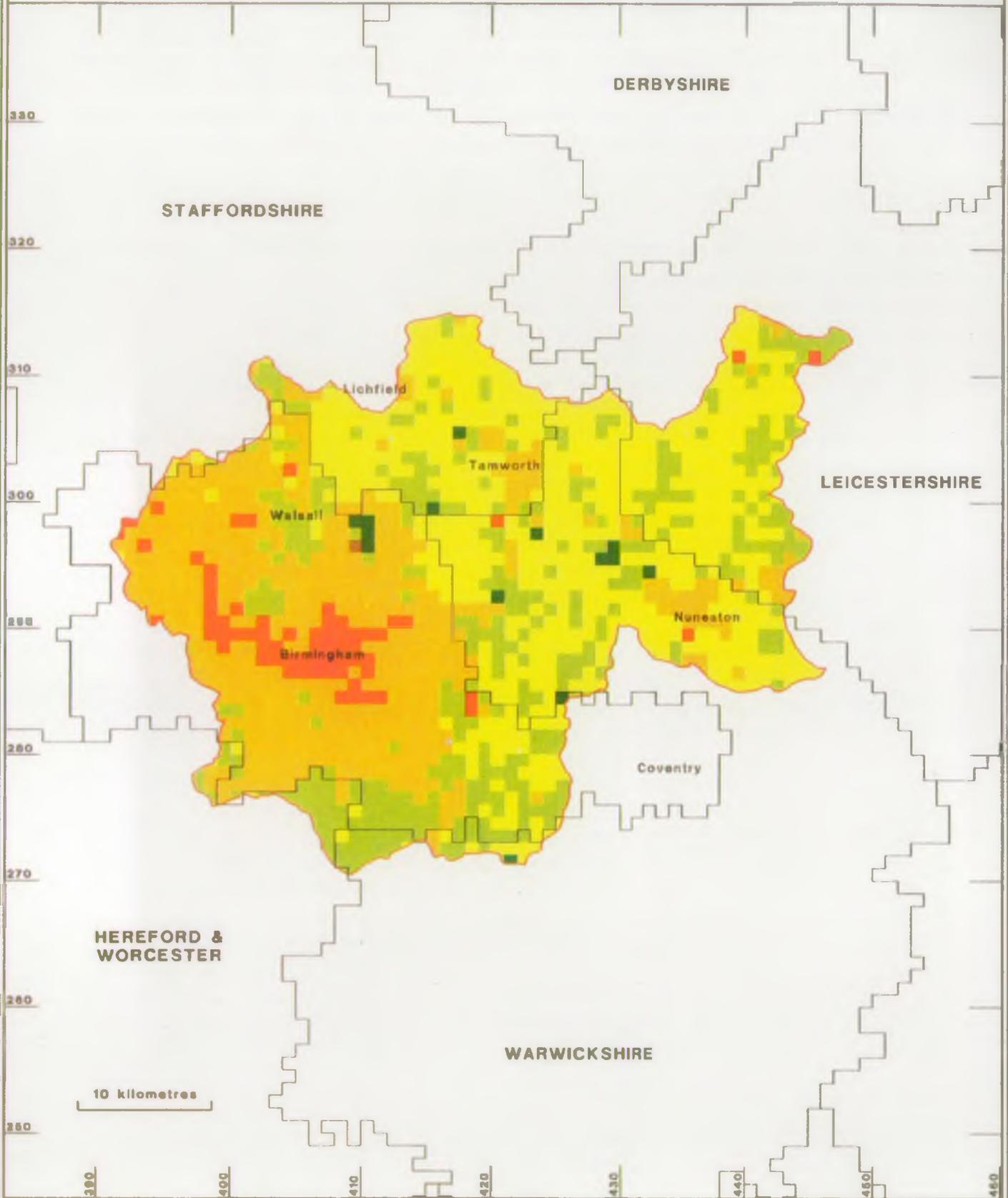
The revised proposals for the Middle Tame and Oldbury Arm required the construction of five flood balancing areas and approximately 18 miles of river channel improvement, including modifications to many of the 26 road, 9 canal and 14 railway crossings along the route. Construction work on these two reaches of the river started in 1978. The last contract was completed in 1991 by the National Rivers Authority as successor to Severn Trent Water Authority. The current cost of the completed works is £20 million.

The two other major urbanised areas of the catchment, Nuneaton and Tamworth, have suffered from major flooding problems as a consequence of encroachment into the floodplain. Following a series of major floods in Nuneaton, in 1947 and 1960, the River Anker flood relief channel was completed in the late 1970's to provide protection to numerous town centre properties. Tamworth being located at the confluence of the River Tame and River Anker, has a long history of catastrophic floods. In past centuries the historic Ladybridge Road crossing of the River Tame immediately downstream of the confluence has been swept away twice, while in 1955 over 200 properties were flooded. Following the 1955 flood, the Trent River Board constructed raised flood defences to protect Tamworth and Fazeley.

The Bourne Brook improvement scheme carried out in the mid 1980's was one of the last aimed at providing better facilities for field drainage purposes to aid food production.

Where flood defence schemes exist, flooding is not entirely prevented, only the risks reduced to people and property. In addition there are a number of isolated undefended properties in the floodplain. The NRA operates a flood warning system to assist the people living in these properties, enabling them to take precautionary action when floods are threatened. Within the Tame Catchment the warning system currently operates on the reaches shown on Map 13. A network of wardens has been established by the County Emergency Planning Departments of both Warwickshire and Staffordshire County Councils. From September 1996 it is anticipated that the Environment Agency will take the leading role working closely with the County Emergency Planning Officers (CEPO) (Issue 17). Flood warden systems are currently in existence on the River Tame from Water Orton to Hopwas and on the River Anker from Polesworth to Tamworth.

Map 14 - Land Use and Agriculture



DOMINANT LAND COVER BY KM

- | | | | |
|---|----------|---|---------------------|
|  | Urban |  | Woodland |
|  | Suburban |  | Rough Grazing/Heath |
|  | Arable |  | Grassland |

Map produced by
Resource Planning Team, ADAS
Leeds Statutory Centre, 1995
Telephone - (0113) 261 1222



5.9 Agricultural Activity

General

The trend in agriculture has now changed to providing environmental protection and reducing the production of excess food. This should reduce the impact of agriculture on the water environment.

Over 80% of the land in England and Wales is used for agriculture and such a widespread use has a significant impact on the water environment. In some areas, intensive agriculture has caused water pollution, low river flows, increased risk of flooding and damage to fisheries and areas of conservation value.

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 agriculture.

The NRA uses other initiatives which include:

- Promoting the Codes of Good Agricultural Practice for the Protection of Water and Soil. (Available free from MAFF).
- Developing best practice to prevent pollution.
- Carrying out farm visit programmes.
- Working in collaboration with farming groups and organisations.
- Promoting free pollution prevention advice from ADAS.

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 ecology of the river corridor.

Local Perspective

Land uses in the catchment of the upper reaches of the River Tame are predominantly urban while the lower reaches below Lea Marston sustain a mixed farming environment. The catchment of the River Anker, River Sence and the Bourne/Black Brook are predominantly agricultural. The quality of agricultural land is below the average for England. Most land is classified Grade 3.

The amount of land in agricultural production has declined over the period 1983 - 1993 by about 7% with land being used for other purposes (ie new housing, roads and industry). The land is relatively low lying with the growing of crops being the major activity. Cereals comprise the largest cropped area but potatoes, sugar beet and horticultural crops including vegetables, fruit and hardy nursery stock are also grown over significant areas. The majority

of the horticultural crops are grown in the Lichfield and Tamworth areas where land quality is higher and markets are closer. The land in these areas is generally sandy and free draining and large areas rely on irrigation to ensure viable yields. Further east the main crops are cereals, oil seed and field beans.

Livestock farming is spread fairly evenly across the area. Beef herds and breeding ewe flocks have seen significant increases over the past 10 years with a general decrease in dairy cattle, pigs and poultry, the livestock sectors most commonly associated with pollution incidents. A continuing trend in this direction should bring about further decreases in silage and slurry related pollutions.

The relative percentage of land in arable production and put down to grass has remained roughly constant. Set-a-side now accounts for 7.5% of all agricultural land in the catchment. The number of farm holdings and the level of agricultural employment continues to decline. The numbers of those employed in agriculture in the catchment has also declined, by about 20% in the past 10 years.

There are no surface water supplies used for drinking water but groundwater contained in the Lichfield Aquifer is of particular importance as a drinking water supply source. The increased agricultural use of nitrate based fertilizers since 1940 has become a major contributor to rising nitrate levels in some of the South Staffordshire Water public supply boreholes using the Lichfield Aquifer (Issue 13).

The NRA has an involvement with two schemes operated by MAFF designed to combat the problem of rising levels of nitrate in groundwater where these are caused by agricultural practices. These are:-

i) Nitrate Vulnerable Zones

This is the scheme produced in line with the requirements of the EC Nitrate Directive 91/676/EEC. All member states must:-

- a) Designate as Nitrate Vulnerable Zones (NVZs) all known areas of land which drain into waters where the nitrate concentrations exceed, or are expected to exceed, 50 mg/l or where there is evidence of nitrate limited eutrophication.
- b) establish action programmes which will become compulsory in these zones at a date to be agreed between 1995 and 1999.
- c) Review the designation of NVZs at least every four years.

The scheme developed requires the NRA to assess which public water supply boreholes either exceed 50 mg/l at present or are likely to do so before the year 2010. For each of these, where the main cause of the high nitrate concentrations is considered to be agricultural, Nitrate Vulnerable Zones have been drawn. These are the areas in which any rain draining through the soils are thought to contribute to the water drawn from the borehole. The zones were put out for public consultation in 1994 and any comments received were answered or zones changed where this was appropriate. During the summer of 1995, any unresolved queries were assessed by an independent appeals panel whose review is now being awaited.

The measures to be taken in the NVZs ("the action plan") have not been announced but are likely to be in line with the Code of Good Agricultural Practice for the Protection of Water. As such, it is considered that there will be no loss of production resulting from these measures so no compensation will be given.

When the scheme is implemented by MAFF between now and December 1999, adherence to the action plan will be compulsory.

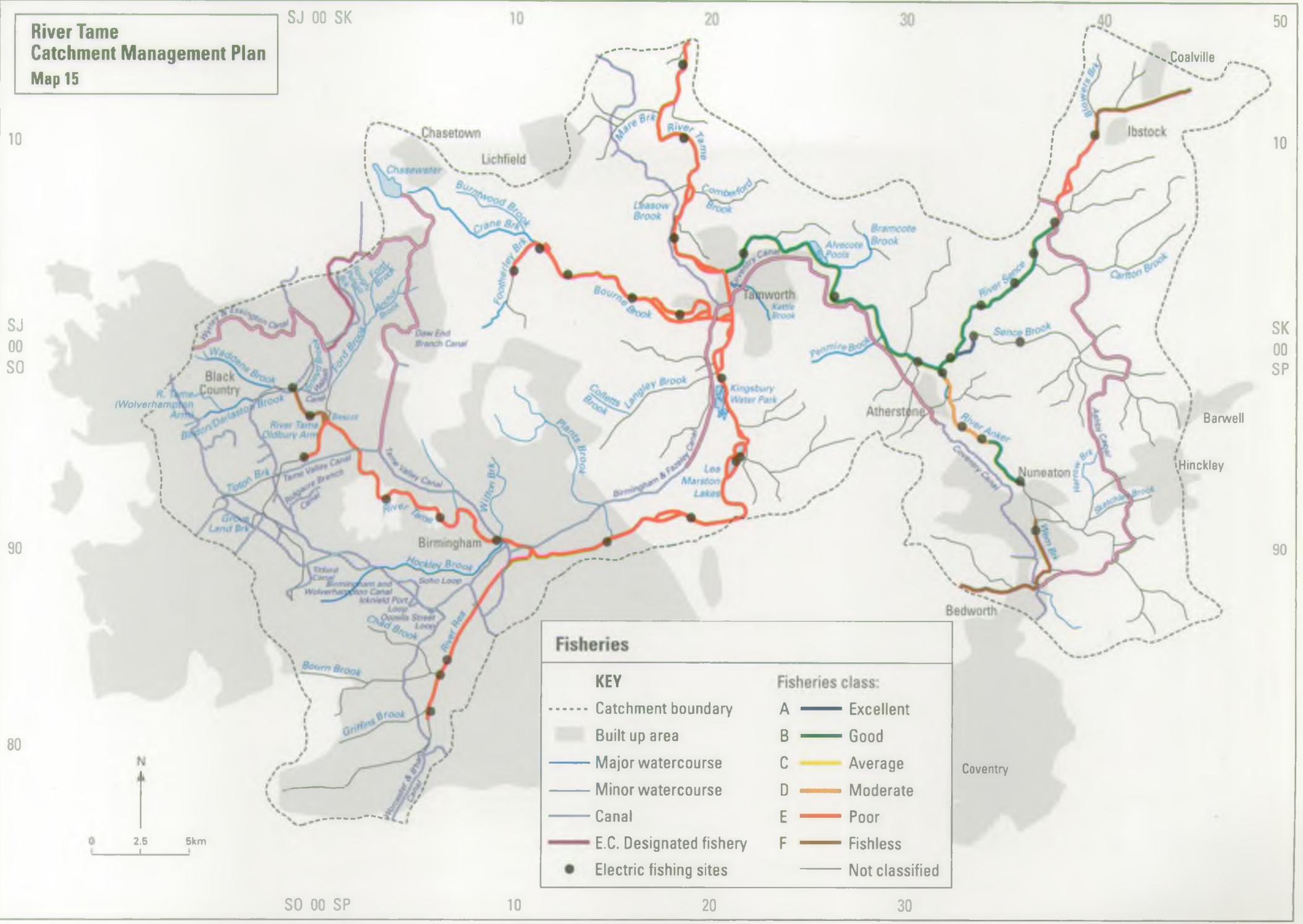
ii) Nitrate Sensitive Areas

The present Nitrate Sensitive Areas are designated as part of the EU Agri-Environment Regulations. Again the NRA produced maps of the areas contributing to the designated boreholes. Within these, farmers can voluntarily join the scheme and opt for one of a number of schemes of increasingly restrictive nitrate practices. In return, they receive compensation in line with the perceived reduction in yield. Farmers can join at any time from 1995 to 1999 and sign up for a period of 5 years.

Pollution Incidents

Farm pollution was the cause of seven significant pollution incidents in the River Sence catchment in 1994. No other subcatchments in the Tame CMP area suffered substantial agricultural pollution incidents in that year.

**River Tame
Catchment Management Plan
Map 15**



Fisheries	
KEY	Fisheries class:
----- Catchment boundary	A — Excellent
■ Built up area	B — Good
— Major watercourse	C — Average
— Minor watercourse	D — Moderate
— Canal	E — Poor
— E.C. Designated fishery	F — Fishless
● Electric fishing sites	— Not classified

5.10 Fisheries

General

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

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

The NRA Severn-Trent Region has a fisheries strategy 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 sustain a natural fish population appropriate to the catchment.
- To maintain, improve and develop fisheries
- To safeguard the quality and quantity of water sufficient for this resource.

Local objectives:

- To investigate methods by which fish populations in the Lower Tame may be protected from storm induced dissolved oxygen sags.
- To determine the success of restocking farmed coarse fish into the Bourne/Black Brook.
- To maintain and develop a stock assessment programme in order that changes in density and diversity can be readily determined.
- To sustain a viable mixed coarse fishery below Lea Marston River Purification Lakes.

Local Perspective

River Tame

In July 1995, a particularly active and localised thunderstorm close to the headwaters of the River Tame in Birmingham caused excessive storm discharges which severely polluted the river down to the River Trent confluence and beyond. Very extensive fish mortalities occurred throughout the length of the river and inevitably changed the status of the Tame fishery to a degree which is currently being assessed. The following account applies, therefore, to the situation which existed immediately prior to the incident.

The weirs downstream from Lake 1 at Lea Marston form an effective barrier to the upstream movement of coarse fish and mark the limit of sustainable populations. The reaches upstream of Lea Marston support only sporadic fish communities, derived either from the Rivers Blythe and Cole or from balancing lakes. Long stretches of the upper Tame remain

effectively fishless. The failure of fish populations to become established is related both to variable water quality and poor instream habitat which does not provide sufficient protection from the flashy nature of the flow regime.

Improved water quality in the lower Tame followed the commissioning of Lake 1. This encouraged recolonisation during the 1980's and the process has been augmented by extensive restocking and local habitat improvements. Roach, chub and dace are commonly found throughout this stretch of the river and barbel are present. The spatial distribution is patchy with the greatest densities frequently found in the vicinity of Lea Marston reflecting the urge for upstream penetration of the river.

There is evidence of localised shoaling, particularly in the case of roach and in the winter these local accumulations may involve large scale migrations. Recent investigations suggest that over the past six years, stocks have consolidated rather than improved with no consistent spatial or temporal pattern in biomass emerging although local variations may be considerable. The determination of population estimates is hampered by extreme fluctuations in flow during the winter and increasingly dense instream weed growth in summer.

River Anker

The River Anker is an important source of coarse fish for supplementing the main river stocks. Historically the river has held good stocks of roach, chub, dace and perch in its lower reaches and in recent years there have been significant developments in stock density and distribution. Good populations of chub, dace and gudgeon are now present at Weddington on the outskirts of Nuneaton but further upstream migration is restricted by an impassable weir in the centre of the town. The impact of Hartshill STW is evident in reduced diversity and biomass immediately downstream of the discharge. Recent improvements in water quality have led to a two fold increase in fish density (as g/m²) within the past five years. Downstream of Polesworth the river opens up into Alvecote Pools which support populations of still water species such as carp, tench and bream.

River Sence

The River Sence, close to the confluence with the River Anker, supports prolific mixed coarse fishing with dace and chub the dominant species. Upstream of Harris Bridge the water is preserved for trout and both brown trout and rainbow trout are stocked annually. Periodic coarse fish removals are carried out to accommodate this fishery. The upstream movement of coarse fish is limited by a number of low weirs but stocks are restricted in the upper reaches by habitat limitations and by periodic water quality problems caused by run-off from open cast mining, sewage effluents and industrial discharges.

Bourne/Black Brook

The brook is a significant tributary of the lower Tame, entering the main river just upstream of Tamworth. There is good instream habitat and formerly the watercourse was extensively stocked with brown trout. These stocks have now largely disappeared due to water quality problems resulting from upstream discharges but a programme of restocking with dace and chub has recently been implemented to restore the fishery status.

Still Waters

There are a number of enclosed still waters in the catchment. Most are artificial in origin, ie gravel pits, park pools, reservoirs etc and many are managed to a greater or lesser extent as fisheries. These waters support a wide range of still water fish with variable species composition and some are highly specialised, for example, carp fisheries. The introduction of some riverine species eg chub and barbell into still waters is a recent innovation. In contrast, very few still waters are open as salmonid fisheries and there are no native still water trout fisheries in the catchment.

Canals

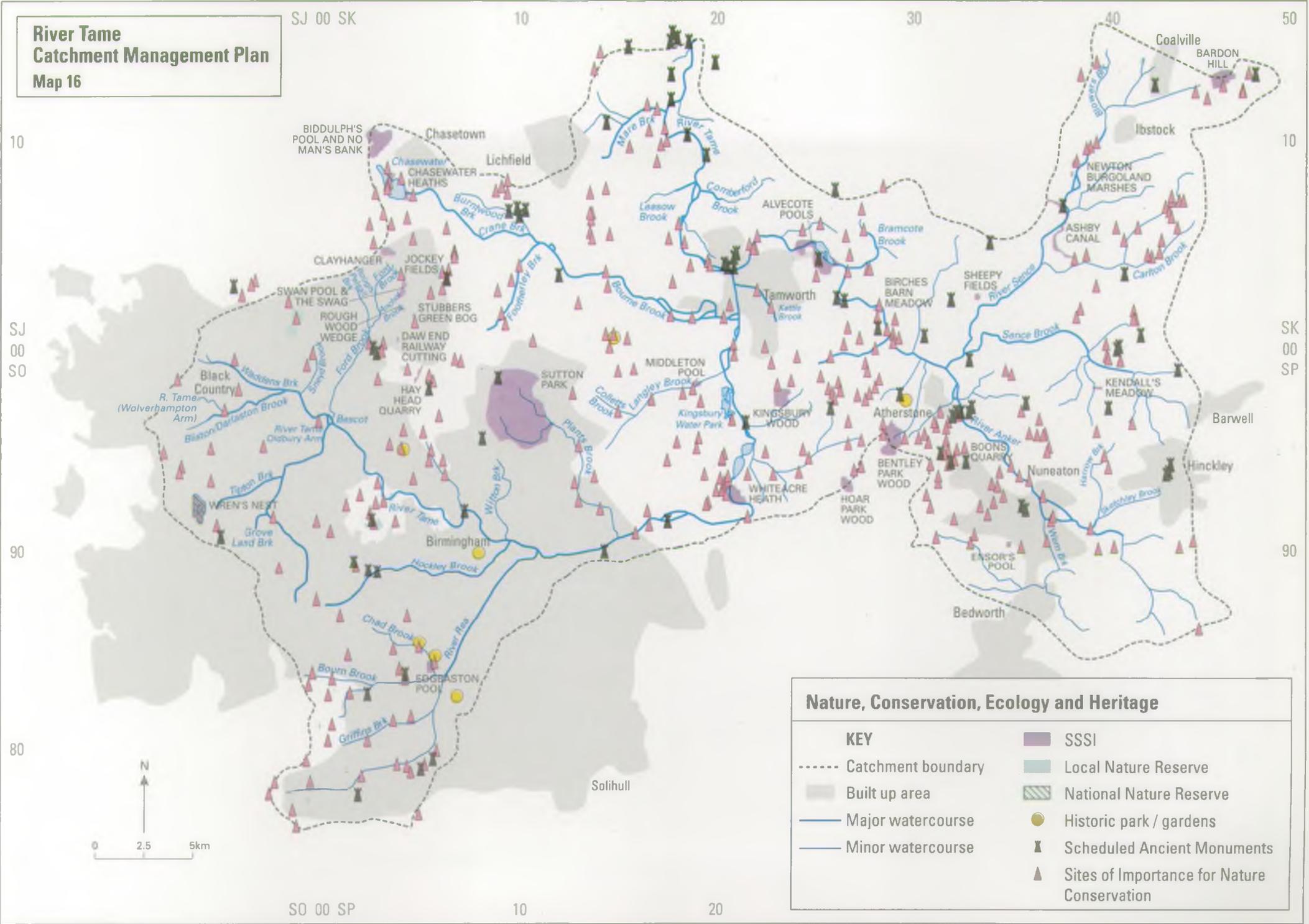
The network of canals in the West Midlands, known generically as the Birmingham Navigation, link via the Birmingham/Fazeley Canal with the Coventry Canal and Ashby Canals in the east of the catchment. Almost all of this system supports coarse fish populations to a greater or lesser extent and roach are the dominant species. Some sections, particularly the Tame Valley Canal, Rushall Canal, the Soho Loop of the Birmingham Canal and the Birmingham/Fazeley Canal are intensively fished and provide a wide range of still water species including carp and tench.

Zander have spread westwards via the Ashby and Coventry Canals and are now present in the Birmingham/Fazeley Canal, but not the Trent and Mersey Canal. In 1990 a breach of the Ashby Canal allowed access temporarily to the River Sence via the Carlton Brook. There is no evidence to date, however, that this species has proliferated in the River Sence/Anker system (Issue 29).

Cormorants

Cormorants are known to roost in large numbers at Kingsbury on the River Tame. They are fish eating and problems are perceived at Kingsbury Water Park and Catton Park (close to the River Tame/River Trent confluence). Cormorant predation of fish in lakes at these sites may have led to reductions in fish stocks. Owners can apply to MAFF for shooting licences where "serious damage" to a fishery can be shown. In such cases of proven damage, the NRA will support the granting of shooting licences.

**River Tame
Catchment Management Plan
Map 16**



Nature, Conservation, Ecology and Heritage

KEY	SSSI
----- Catchment boundary	Local Nature Reserve
■ Built up area	National Nature Reserve
— Major watercourse	● Historic park / gardens
— Minor watercourse	⊠ Scheduled Ancient Monuments
	▲ Sites of Importance for Nature Conservation

5.11 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 (SSSI).
- The protection of sites which, although valuable in ecological terms, are not formally protected, eg Sites of Importance to Nature Conservation.

The NRA Severn-Trent region has produced a Conservation Strategy for all main 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 resource are:

- To further the conservation 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.

The local objectives for this resource are:-

- To promote and improve the ecological and nature conservation value of river corridors in the built up areas of the catchment.
- To work with LPAs, gravel companies and others to realise the nature conservation value of worked out sand and gravel sites in the middle and lower Tame Valley.

Local Perspective

The upper reaches of the River Tame above Lea Marston have been modified by human activity over the past 200 years. Watercourses have usually been resectioned, dredged and straightened and the banks often lined with concrete or brick. Urbanisation, industrialisation and a growing urban population led to the need to dispose of large quantities of trade and

sewage effluent and to deal with urban run-off without leading to extensive flooding of residential and commercial property. Flood defence rather than conservation and amenity were the overriding objectives of river management in the West Midlands conurbation.

All the watercourses in the catchment have been modified at some time or other for flood defence or land drainage reasons. However the impact on the lower reaches of the River Tame and along much of the River Anker has been far less obvious where a more "natural" river regime exists.

Along some urban reaches the river channel is completely artificial and the establishment of flora and fauna is almost totally prevented. The impoverished nature of these watercourses is often exacerbated by the effects of industrial pollution.

In the more rural areas, rivers and streams form one of the links between important wildlife sites as well as being of conservation value in themselves. Despite past modifications the river corridor still supports many of the plants and animals typical of the Midlands. In the urban areas, rivers are the major, often the only, link between areas of wildlife importance. In these cases, even the most environmentally degraded stretches have an important role to play in maintaining the size and diversity of native populations.

Habitat

There are 27 SSSIs covering an area of 1,663 ha within the catchment. Of these, 14 have some wetland interest. Sutton Park is the largest SSSI with an area of 866 ha. Another SSSI of note is Ensors Pool, designated to protect its large freshwater crayfish population and this site has now been designated a Special Area of Conservation (SAC) under the EU Habitats Directive (see Appendix 3). Six SSSIs are of geological importance, including sites of international importance.

Important habitat types include a range of wetlands with alder and willow carr, fen, reedbed, damp flushes, wet pasture and open water. Of particular importance in the Anker catchment is unimproved grassland which has a high conservation value. Much of this is dependant upon the maintenance of the water table.

In addition to SSSIs there are 344 Sites of Importance for Nature Conservation (SINCs), of which 128 have wetland interest. There is one national nature reserve at Newton Gorse, nine local nature reserves and a RSPB reserve in Sandwell Valley. Of the non-scheduled sites of conservation interest, a series of worked out gravel pits offers major opportunities for improved wildlife habitats.

5.12 Conservation - Landscape & Archaeology

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 and Scheduled Ancient Monuments.
- 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 these resources are:-

- To protect the landscape, archaeological, architectural and historical features associated with rivers in the catchment and 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.

The local objectives for these resources are:-

- To work with Local Authorities, riparian owners and other interested parties to improve degraded landscapes particularly within the West Midlands Conurbation.
- To co-operate with local authorities and gravel companies to develop a planned management programme for the middle Tame, particularly the restoration of gravel pits.
- To seek to improve the character of urban river corridors by working with local authorities, the urban trust and others to develop programmes of tree planting and landscape enhancement. To promote the value of the river corridor in landscape terms and to open up and de-culvert rivers wherever possible.
- To highlight the importance of the Bourne/Black Brook and to promote measures with landowners and others to enhance the landscape and nature conservation value of this watercourse.

Local Perspective

Landscape

The landscape of the catchment has a varied history and character, which is described below, starting from the head of the river and continuing down to the confluence with the Trent.

The urban area of the West Midlands surrounds the upper reaches of the River Tame and its tributaries; this is known as the Birmingham plateau and it forms the watershed between the Severn and the Trent. The river corridors and their floodplains have typically been used as open spaces within the conurbation. The character of the open spaces varies from mown grassland and playing fields, to remnant fragments of semi natural countryside reflecting the original landscape of the area. Although the corridors are fragmented, and inaccessible in places, they are a valuable resource which may be restored or enhanced by the creation of greenways or green wedges following the rivers.

Major areas of open space within the conurbation include Sutton Park and Sandwell Valley, each having its own distinctive character. The highest ground in the catchment is at Barr Beacon, which affords commanding views of the city set against a foreground of fields and hedgerows. The elevated wooded heathland character of Barr Beacon and Sutton Park was once part of the extensive medieval Royal Forest of Cannock, which included the present day Cannock Chase.

Elsewhere in the conurbation, industry and housing have encroached on the floodplain leaving the river in many cases without any floodplain. In extreme cases the rivers have been culverted. This is particularly true of the lower reaches of the River Rea and Hockley Brook.

The green belt between Birmingham and Lichfield is a landscape of rolling hills and large arable fields, interspersed with areas of mature woodland and conifer plantations. The landscape between Sutton Coldfield, Tamworth and Shenstone is of particularly fine quality; the high ground north of Sutton Coldfield providing distant views of the Trent and Tame Valleys. There are many large farmed estates and historic parklands, for example at the Belfry and Canwell. These create the impression of a well managed estate landscape, with a strong framework of woodlands, hedgerows and hedgerow trees. The valley of the Bourne Brook between Weeford and Mile Oak is a good example of this character type.

The Arden landscape of the middle Tame and its tributaries, is characterised by ancient woodlands, hedgerows, hedgerow oaks and a dispersed settlement pattern. Traditionally regarded as the land between the River Tame and River Avon in Warwickshire, the medieval "Forest of Arden" has many associations with the Heart of England, and it remains one of the more wooded parts of the Midlands.

The alluvial deposits of the Tame Valley between Hams Hall and Tamworth have been exploited for sand and gravel on a large scale. The resulting landscape is highly modified, and contains numerous artificial lakes and wetlands with associated scrubby woodland. Below Tamworth, and towards the confluence with the Trent, the countryside is inaccessible, and has a rather remote vacant appearance, with mainly enlarged arable fields. Historically, the area suffered a long period of depopulation dating from the 14th to the 17th century, affecting the settlements of Comberford and Fisherwick, amongst others.

The Mease lowlands character area covers the catchment of the Rivers Anker and Sence and their tributaries. This is a rolling, well ordered arable landscape, characterised by small rural villages, with some larger settlements, mainly along the Anker Valley. The areas affected by the coalfield have been modified by the presence of coal mines, spoil heaps, and more recent industrial development.

Archaeology

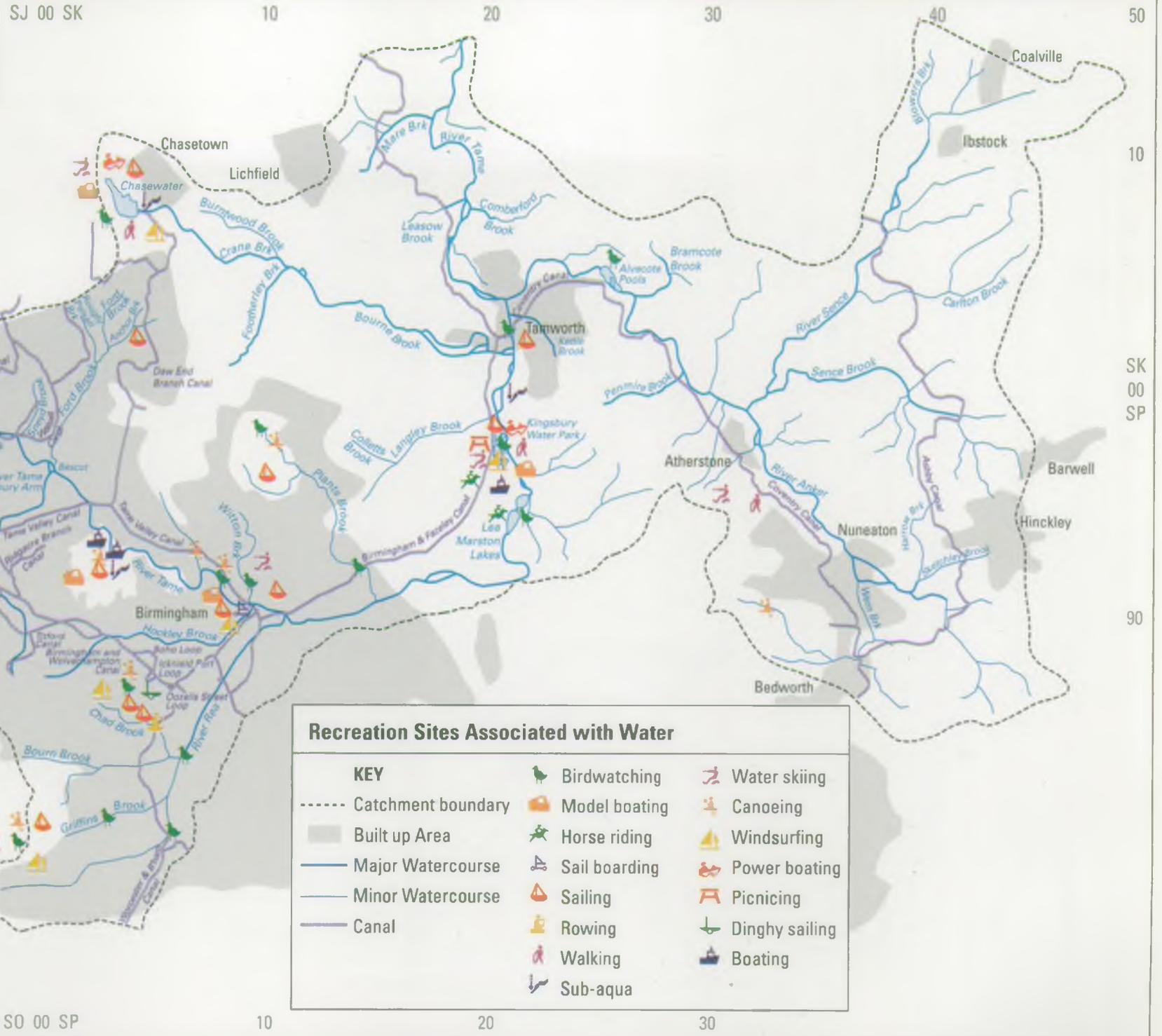
There are 72 Scheduled Ancient Monuments (SAMs) within the catchment. These are thinly spread across the area but with concentrations in the historic towns of Tamworth and Atherstone. In addition there are several thousand listed buildings and structures. Of those related to water, many are associated with the canal network.

A number of the rivers and streams in the catchment were modified from the late Saxon period onwards to provide waterpower for mills for agricultural and later for industrial uses. At least 50 mills are known to have operated in the Tame catchment upstream of Witton. These provided much of the power for the early industrial revolution and left a legacy of numerous mill lodes and pools.



The Birmingham & Wolverhampton Canal

**River Tame
Catchment Management Plan
Map 17**



Recreation Sites Associated with Water

KEY			
-----	Catchment boundary		
■	Built up Area		
—	Major Watercourse		
—	Minor Watercourse		
—	Canal		
🦅	Birdwatching	🏂	Water skiing
🚤	Model boating	🚣	Canoeing
🐎	Horse riding	🏄	Windsurfing
🚶	Walking	🚤	Power boating
🚴	Bicycle riding	🍷	Picnicking
🚣	Sail boarding	🚤	Dinghy sailing
🚤	Sailing	🚤	Boating
🚣	Rowing		
🤿	Sub-aqua		

5.13 Recreation and Amenity (including Angling)

General

This use deals with a broad range of recreational pursuits including angling, watersports and land based activities within the river corridor. The NRA has a general duty to promote the use of waters and land associated with such waters for the purposes of recreation to the extent that it deems desirable.

Angling

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 5.10.

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.

Watersports

Watersports include canoeing, boating, windsurfing, waterskiing and sailing on canals, lakes and rivers. The use of the canal system for navigation is considered in Section 5.13.

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 safeguard the quality and quantity of the water sufficient for this use.
- To ensure that works on river channels do not prejudice these activities as far as is practicable and, where appropriate, take opportunities to enhance recreational facilities.
- To promote recreational use of the water for boating and canoeing commensurate with the interests of other users.

Land Based Activities

Land based activities of relevance to water include walking, cycling, horse riding, picnicking and birdwatching near water bodies. The main areas of concern are access, public safety and the general aesthetic acceptability of the water environment.

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

**River Tame
Catchment Management Plan
Map 18**

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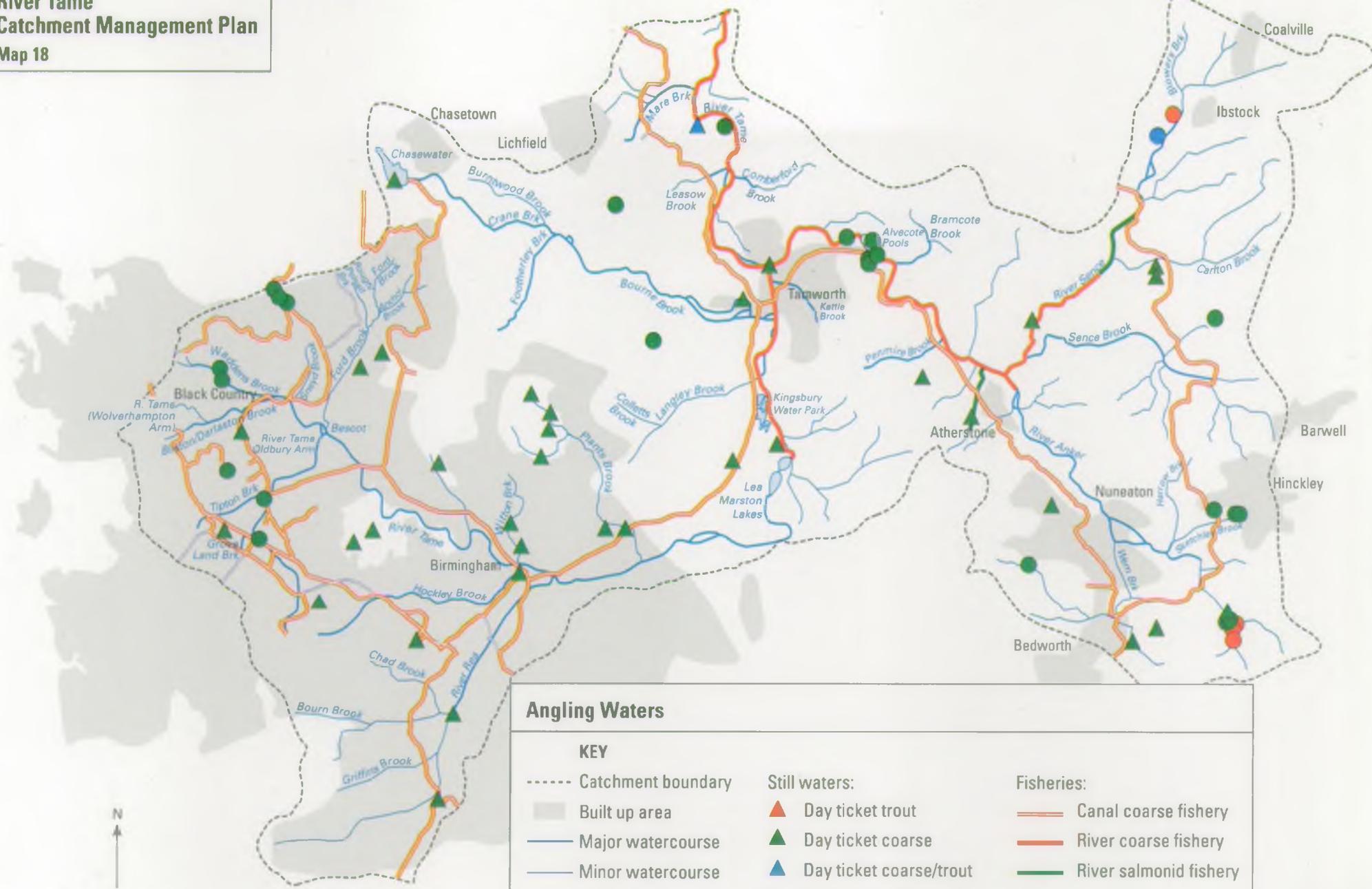
SP

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Angling Waters

KEY

- Catchment boundary
- Built up area
- Major watercourse
- Minor watercourse
- Canal

Still waters:

- ▲ Day ticket trout
- ▲ Day ticket coarse
- ▲ Day ticket coarse/trout
- Member only trout
- Member only coarse
- Member only coarse/trout

Fisheries:

- Canal coarse fishery
- River coarse fishery
- River salmonid fishery

