

BLYTHE/COLE/BOURNE CATCHMENT MANAGEMENT PLAN CONSULTATION REPORT

JANUARY 1994



NRA

*National Rivers Authority
Severn-Trent Region*

BLYTHE/COLE/BOURNE CATCHMENT MANAGEMENT PLAN

Consultation Report

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*National Rivers Authority
Severn-Trent Region*

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**Blythe/Cole/Bourne Catchment Management Plan
Consultation Report**

December 1993

FOREWORD

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

This Consultation Report is the first stage in the catchment management planning process for the Blythe/Cole/Bourne Catchment which lies to the south east of Birmingham. It provides a vehicle for consultation and also a means of seeking commitment from those involved to realise the full environmental potential of the Catchment.

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

Tony Stanley
Area Manager
Upper Trent Area

BLYTHE/COLE/BOURNE CATCHMENT MANAGEMENT PLAN

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1 CONCEPT

The National Rivers Authority (NRA) is the major environmental agency responsible for safeguarding and improving the natural water environment of England and Wales. It's responsibilities are wide and include:-

- Control of pollution and improving the quality of rivers, canals, groundwaters and coastal waters.
- Flood defence, including the protection of people and property.
- Flood forecasting and flood warning.
- Effective management of water resources.
- Maintenance, development and improvement of fisheries.
- Promoting the conservation of the natural water environment.
- Promotion of water-based recreation.

A river catchment is a discrete geographical area which is drained by a single surface water system. The 21,600 km² covered by the Severn-Trent Region of the NRA consists, of only two principal catchments, the River Severn and River Trent. Because of their large surface area, they have been divided, for management purposes, into sub-catchments.

Catchment management assists the NRA in using its statutory powers, and through working with others, to ensure that rivers, lakes, coastal and underground waters are protected and, where possible, improved. Catchment Management Planning is the process by which the NRA co-ordinates all its activities within and between individual catchments and subcatchments.

The NRA works with Local Authorities, industry, farming and the general public to promote environmental awareness and to enforce appropriate environmental standards. This **draft** Catchment Management Plan forms the basis for consultation on the future of the natural water environment of the River Blythe, Cole and Bourne subcatchments.

The draft plan consolidates the policies, objectives and options for the integrated management of the Blythe/Cole/Bourne subcatchments and is drawn up as follows:-

1. **Catchment Overview.** This gives a brief description of the Catchment.
2. **Catchment Uses.** For each of the existing and potential water-related uses a general statement describes the nature of the activity. This is followed by a summary of the local perspective. Objectives for the maintenance and enhancement of the use are proposed.

3. **Current Status.** Objectives identified for individual uses, are compared with the current status of the catchment, so that shortfalls and conflicts of interest can be identified.
4. **Issues and Options.** The final section comprises a set of tables listing the options proposed by the NRA for the satisfactory resolution of each issue.

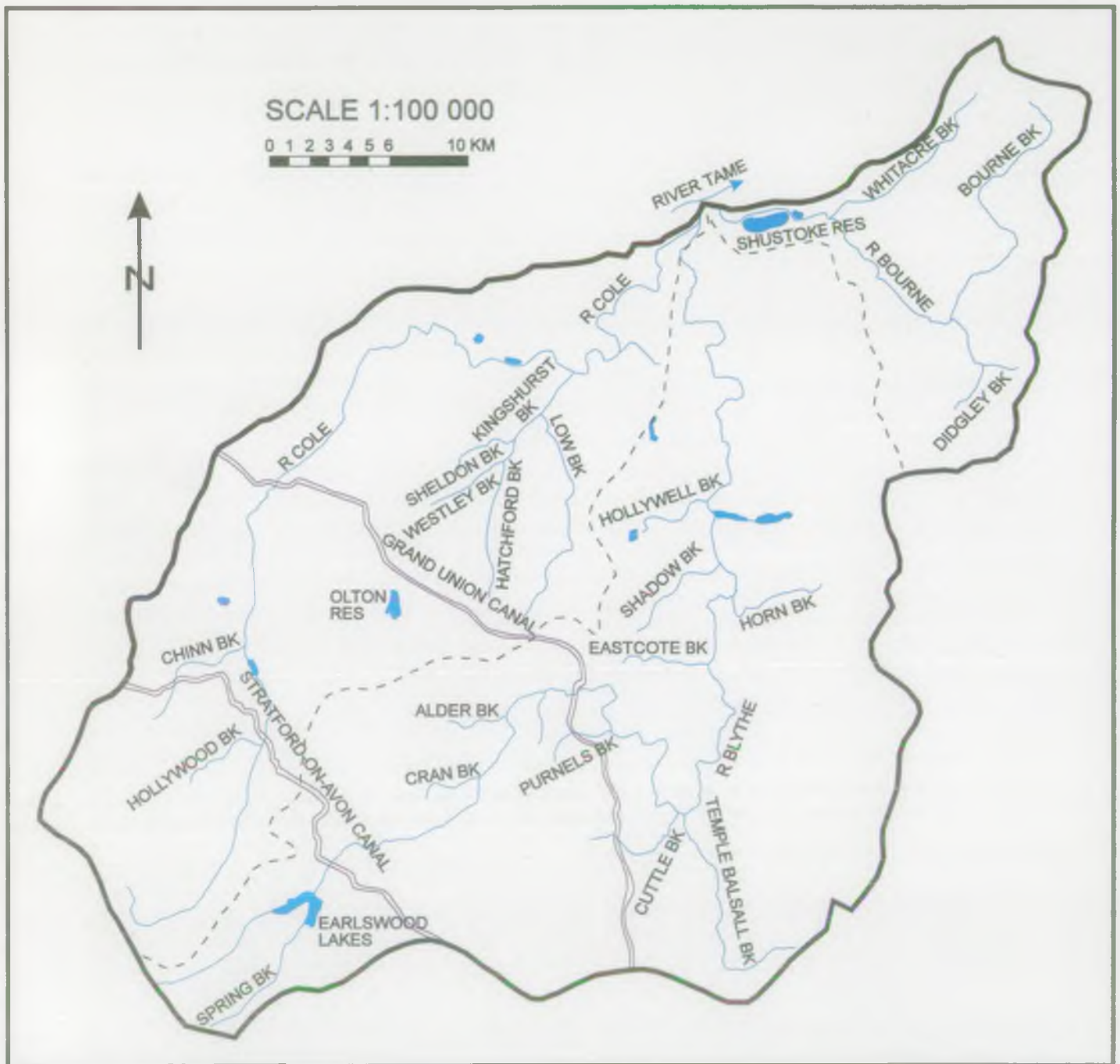
This document is now released for public consultation, before the Final Plan is produced. Comments are invited on the content of the plan and on the issues and management options which have been identified. These should be sent to:-

**Tony Stanley
Area Manager
National Rivers Authority
Severn Trent Region
Upper Trent Area
Sentinel House
Wellington Crescent
Fradley Park
Lichfield
Staffs WS13 8RR**

All contributions should be made before Friday 11th March 1994.

MAP 1

RIVER BLYTHE, COLE AND BOURNE CATCHMENT



key		CATCHMENT BOUNDARY				
		SUB CATCHMENT BOUNDARY				
		PRINCIPAL WATER COURSES				
		CANAL				

2 CATCHMENT OVERVIEW

Introduction

The Blythe, Cole, Bourne Catchment comprises 3 subcatchments: the River Blythe, of which the River Cole is the major tributary, and the River Bourne (Map 1). The Catchment has a surface area of 380 km² and is approximately 70% rural with the majority of the urban development affecting the Cole and to a lesser extent the Blythe. Farming in the catchment is evenly split between arable and pasture.

The Catchment is one of extremes ranging from tiny rural villages to the urban conurbation of Birmingham. Features within it include: Birmingham International Airport, the M42 and M6 motorways, underground oil pipelines, coal mining and one of the largest landfill sites in Europe.

The Blythe and Cole rise close to one another in the south west of the Catchment. The Blythe skirts the Birmingham conurbation, passing close to Solihull and is joined by the Cole close to its confluence with the River Tame. The Catchment has 2 canals crossing it, the Stratford upon Avon Canal and the Grand Union Canal. The headwaters of the Blythe feed the lakes at Earlswood which supply water to the canal system.

Storm sewage discharges and run-off from urban development, including housing and light industry, intermittently pollute the Cole which also receives run-off from Birmingham International Airport.

The Catchment has extensive drift deposits covering half of the area and consisting of sand and gravel beds with boulder clay and aluvium. Sand and gravel deposits are found and worked extensively in the middle and lower reaches of the Blythe subcatchment.

The geology of much of the central and western part of the Catchment is dominated by Mercia Mudstones. To the north and east there is much older strata of the Upper Carboniferous Series with sandstones, marls and extensive coal measures. The Bourne rises in this area close to Atherstone. This subcatchment is rural but receives mine discharges from Daw Mill, the only colliery in the Catchment.

.2.1 Surface Water System

Blythe

The Blythe drains a surface area of 333 km², within the West Midlands and Warwickshire, to the Tame confluence. Its major tributary, the Cole, joins 0.5 km before its confluence with the Tame.

The Blythe is approximately 45 km long from its source to its confluence with the Tame and the lower 40 km, downstream of Earlswood Lakes, is maintained by the NRA for flood protection purposes (Main River).

Cole

The Cole drains a surface area of 135 km² to the Blythe confluence within West Midlands and Warwickshire. The Cole rises in the Headley Heath area and flows through Birmingham and North Warwickshire to Coleshill where it joins the Blythe.

The Cole is some 37 km long from its source to its confluence with the Blythe. The lower 14 km is designated as Main River and from the head of Main River at Cole Hall Lane the river flows first through a corridor of public open space and then on through fields towards Coleshill. It runs through the northern limits of Coleshill before flowing down a new channel to its confluence with the Blythe.

Bourne

The Bourne drains a surface area of 47 km² and joins the Tame 0.4 km downstream of the Blythe/Tame confluence. It rises in the Ridge Lane area south of Atherstone where it is known as the Bourne Brook. It then runs in a south west direction to the B4098 where it joins the watercourse system draining the Fillongley area, and becomes the River Bourne.

Table 1 lists the total length of each watercourse and the length which is classified as Main River.

.2.2 Hydrology and Hydrogeology

The impermeable Mercia Mudstones form much of the underlying geology in the centre and west of the Catchment and are not a significant source of groundwater. However thick beds of Upper Carboniferous sandstones to the east of the Catchment yield sufficient groundwater for public water supply requirements from boreholes situated on the Catchment divide to the east of Meriden.

Sand and gravel deposits that overlie the Mercia Mudstone are highly permeable and have a large capacity for storage of groundwater especially in the Meriden/Packington area. Groundwater discharge from these deposits contributes very important baseflow to the Blythe and Cole, especially during dry weather.

Rainfall in the Catchment is lower than average for the region with an annual mean of 714mm. Evaporation rates are around 459mm, leaving about 255mm to run off into rivers and percolate through to groundwater.

Table 1

Total lengths of principal watercourses in the Catchment and lengths maintained for flood defence purposes (Main River).

Watercourse	Total (Km)	Length of Main River maintained by the NRA for flood protection (Km)
<u>River Blythe Subcatchment</u>		
River Blythe	45.00	40.47
Hollywell Brook	1.75	1.75
Shadow Brook	3.20	3.00
Horn Brook	4.00	–
Cuttle Brook	6.30	–
Temple Balsall Brook	4.35	–
Ravenshaw Brook	0.80	0.80
<u>River Cole Subcatchment</u>		
River Cole	37.00	14.11
Coleshill Hall Brook	1.00	1.00
Kingshurst Brook	1.50	1.50
Low Brook	6.50	2.00
Hatchford Brook	5.20	0.60
<u>River Bourne Subcatchment</u>		
River Bourne/Bourne Brook	17.62	4.10
Grand Union Canal	20.70	
Stratford upon Avon Canal	13.00	

2.3 Flood Defence

The floodplain remains largely intact apart from some localised encroachment in the Cole and Blythe subcatchments.

The Cole responds extremely quickly to rainfall due to urban run-off from Birmingham and the M42 motorway. The Blythe also receives run-off from the M42, M6 and increasingly from the urban development centred on Solihull. Surface water balancing systems have been installed on some new developments to overcome rapid high flows.

2.4 Fisheries, Conservation and Recreation

The Catchment includes a valuable fisheries and conservation resource, almost totally concentrated on the Blythe. The Blythe is designated a Site of Special Scientific Interest (SSSI) as a fine example of a lowland river. It is an excellent coarse fishery for much of its length with the middle reaches managed exclusively for trout. Angling is a major attraction and there are a large number of stillwater facilities available.

The Bourne and Cole support only sparse coarse fish populations, insufficient to encourage serious angling.

All river fisheries are monitored routinely, following a three year rolling programme.

The conservation value of the Catchment is reflected in the number of SSSI (8) and Sites of Importance for Nature Conservation (SINC) (211).

The Catchment has a number of sites of historical and archaeological interest and provides recreational activities including, walking, sailing and ornithology.

2.5 Water Quality

Water quality is variable throughout the Catchment. Both the Blythe and Bourne have a River Quality Objective (RQO) of Class 1B (Appendix 3), although the Blythe is currently in Class 2. The Cole has an RQO of 1B in the upper reaches and Class 2 for the remainder. It is currently Class 2 for all of its length. The rivers pass through rural areas for much of their length, although the Cole is more heavily urbanised. Robust pollution prevention measures are required to ensure the maintenance of water quality.

Water quality is an important factor in the Catchment as both the Blythe and Bourne are abstracted for public water supply by Severn Trent Water Ltd.

Currently 38 km (84%) of the Blythe and 6.5 km (28%) of the Cole fail to achieve the RQO.

2.6 Land Use

The Catchment is predominantly rural but with large concentrations of population in Solihull, South Birmingham and Coleshill. Total population in the Catchment is approximately 520,000.

The majority of the agricultural land within the Catchment is Grade 3, under the Ministry of Agriculture Fisheries and Food (MAFF) classification system (Appendix 1), although there are some Grade 4 areas adjoining the Blythe. Pasture and cereals are the most widespread agricultural land use.

There is considerable industrial development in the Cole subcatchment with Landrover and Birmingham International Airport being the largest industries. Around the Solihull area in the Blythe subcatchment are numerous business parks and office developments.

2.7 Infrastructure

The M42 and M6 serve the main population centres with many trunk roads linking towns. The Birmingham Northern Relief road will pass through the Catchment when constructed.

Rail transport consists of the main Birmingham to London line and suburban links to Leamington Spa, and Stratford upon Avon, with a proposal for a Channel Tunnel Terminal on the Hams Hall Power Station site, adjacent to the Blythe.

Underground oil pipelines cross the Catchment linking oil depots around the country.

2.8 Key Details

Catchment Details

Area	380 km ²
Population	Existing (1991) Predicted (2001)
	519,138 539,638

Topography

Ground levels Minimum level 70m Above Ordnance Datum (AOD).
Maximum level 160m AOD.

Administrative Details

County Councils	Hereford and Worcester County Council Warwickshire County Council
Unitary Authorities	Birmingham City Council Solihull Metropolitan Borough Council
District Councils	North Warwickshire Borough Council Warwick District Council Bromsgrove District Council Stratford upon Avon District Council
NRA	Severn Trent Region, Upper Trent Area
Water Companies	Severn Trent Water Ltd Sewage Treatment Works (15)
British Waterways	Grand Union Canal Stratford upon Avon Canal

Main Towns and Populations

87% of the population live in Birmingham (287,880) and Solihull (162,942) which comprises 30% of the Catchment area.

Water Quality

Length of river in National Water Council Class, comparing present quality with River Quality Objective (RQO).

		Present Quality (km)	RQO (km)
Class 1A	(Very Good)	None	None
Class 1B	(Good)	18.8	69.9
Class 2	(Fair)	114.9	66.3
Class 3	(Poor)	2.5	None
Class 4	(Bad)	None	None

Water Resources

Availability: Surface water from the Blythe Cole and Bourne subject to prescribed flows.
Groundwater - limited supplies.

Flood Protection

Length of Main River in Catchment 69.3 km.

Fisheries

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

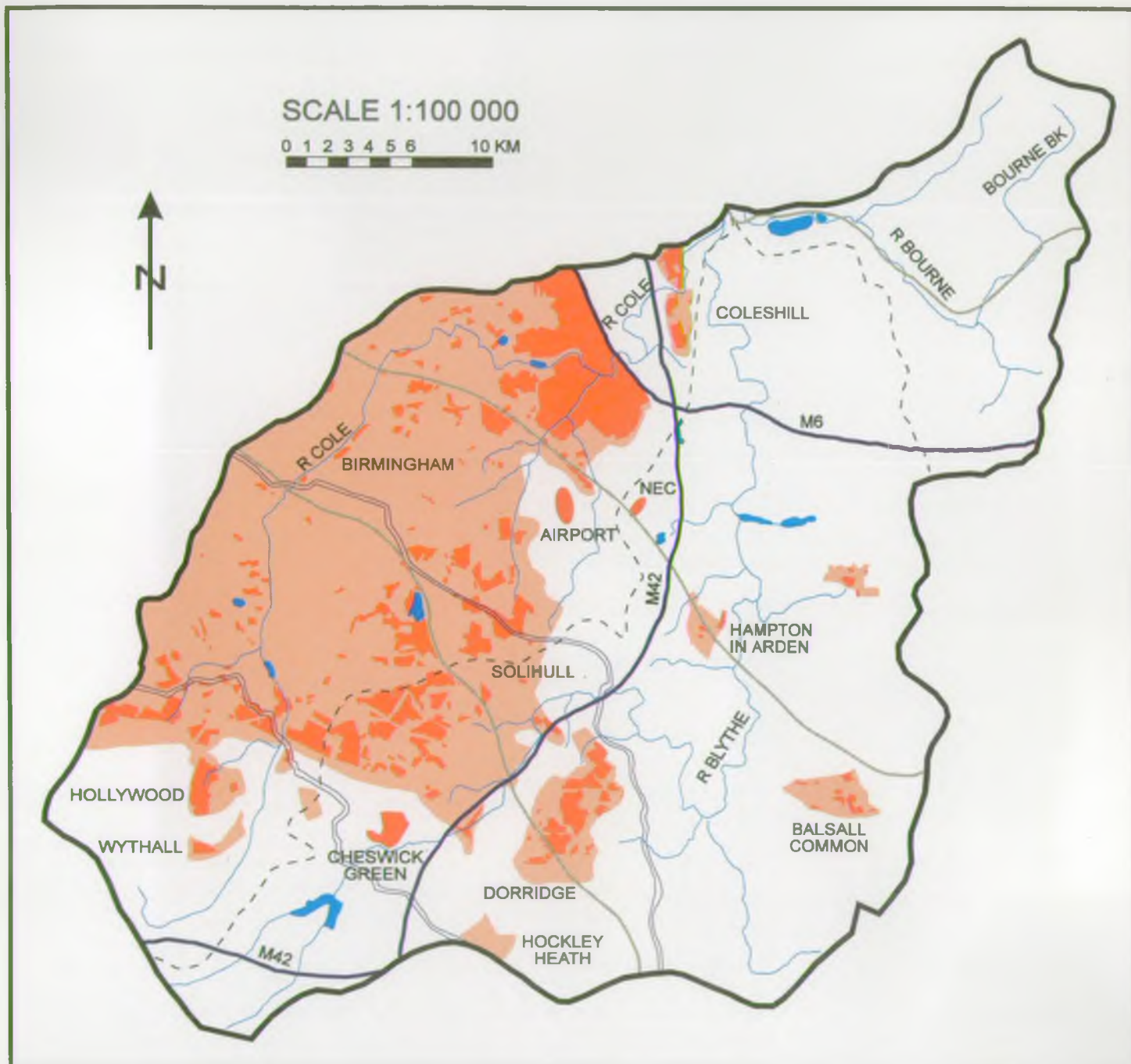
Salmonid	None.
Cyprinid	River 40.6 km. Canal 9.1 km.

Conservation

SSSI 8 - including 38 km of the Blythe.
SINC 211.

MAP 2

URBAN DEVELOPMENT



key

	CATCHMENT BOUNDARY		MOTORWAY		
	SUB CATCHMENT BOUNDARY		URBAN AREA		
	PRINCIPAL WATER COURSES		URBAN DEVELOPMENT SINCE 1955		
	CANAL		RAILWAYS		

3 CATCHMENT USES

3.1 Development - Housing, Industry and Commerce

General

Development for industrial, residential and commercial purposes is a fundamental consideration when planning for the enhancement of a river catchment. Although land use planning matters are the responsibility of the relevant local authorities, the NRA is a statutory consultee in the planning process. As such it has a key role in influencing proposals which may have an impact on Catchment matters.

The NRA Severn-Trent Region has produced 6 model policies (Appendix 2) which it seeks to have included in revisions of Local Authority Development Plans.

Local Perspective - Planning Matters

The major planning policy that has affected the pattern of development within the Catchment is the preservation of the Birmingham Green Belt, through which the Bourne and Blythe flow. The presence of the Green Belt for over 40 years has been a major factor in retaining the rural nature of much of the area. In spite of this the Catchment has been, and continues to be, subject to great pressure for development. As Map 2 indicates, population growth has continued with new built up areas at Marston Green and Monkspath

Solihull Metropolitan Borough has seen the resident population rise from 40,000 in 1931 to 205,000 in 1988. The countryside of the Green Belt is attractive, it is close to a major urban area and has very good transport links. Regional and National infrastructure projects have impacted on the Catchment.

The Solihull Metropolitan Borough Council Unitary Development Plan identifies a requirement for 7,500 dwellings to be built in the period 1988 - 2001. Existing housing sites with planning permission account for 2,900 dwellings, with a further 2,600 dwellings to be located on 'windfall' sites (normally small areas of land located within the existing urban area). The plan has identified land for 2,000 new dwellings. Major housing and commercial development include a new village at Dickens Heath (700 dwellings), a 148 acre Business Park at Marston Green and 100 acre site designated for commercial uses at Monkspath West, close to the junction of the M42 and the A34. This latter proposal incorporates land through which the Cran Brook, a tributary of the Blythe, flows.

In North Warwickshire, the Development Plan identifies a requirement for 3,000 dwellings to be built within the District over the period 1991-2001. New housing sites for 655 dwellings are specified in the plan, with 99 located in the catchment.

None of the major planning proposals in the North Warwickshire Local Plan will affect the Bourne or its tributaries.

Within those parts of the Districts of Stratford and Warwick that are located in the Catchment there are no allocated new housing or commercial sites. Within the catchment area of Bromsgrove District, sites for 150 new dwellings are allocated in the Local Plan. In Birmingham the city is almost completely urbanised with no proposals to build on existing designated open space.

Local Planning Authorities (LPA) concerned with the Catchment, have produced Development Plans on which the NRA has been consulted. Table 2.

Table 2

Local Planning Authorities and Development Plans.

Local Authority	Percentage of Area in Catchment	Development Plan
Birmingham City Council	16%	Birmingham Unitary Development Plan (July 1993)
Solihull Metropolitan Borough Council	44%	Solihull Unitary Development Plan (September 1990)
West Midlands	60%	Strategic Guidance for the West Midlands (PPG10 1988) now under review
North Warwickshire Borough Council	25%	Draft North Warwickshire Local Plan (December 1992). Inquiry set for 21 September.
Warwick District Council	4%	Draft Warwick Local Plan (September 1992)
Stratford upon Avon District Council	4%	Deposit Draft Stratford upon Avon Local Plan (March 1993)
Warwickshire	33%	Warwickshire Structure Plan (September 1991). Draft Warwickshire Minerals Local Plan (May 1992)
Bromsgrove District Council	7%	Draft Bromsgrove District Wide Local Plan (November 1991)
Hereford & Worcester	7%	Hereford and Worcester Structure Plan (July 1990) Hereford and Worcester Draft Minerals Local Plan (September 1992).

In total, land for approximately 6,000 dwellings will have to be provided for within the catchment up to the year 2001. This represents approximately 200ha.

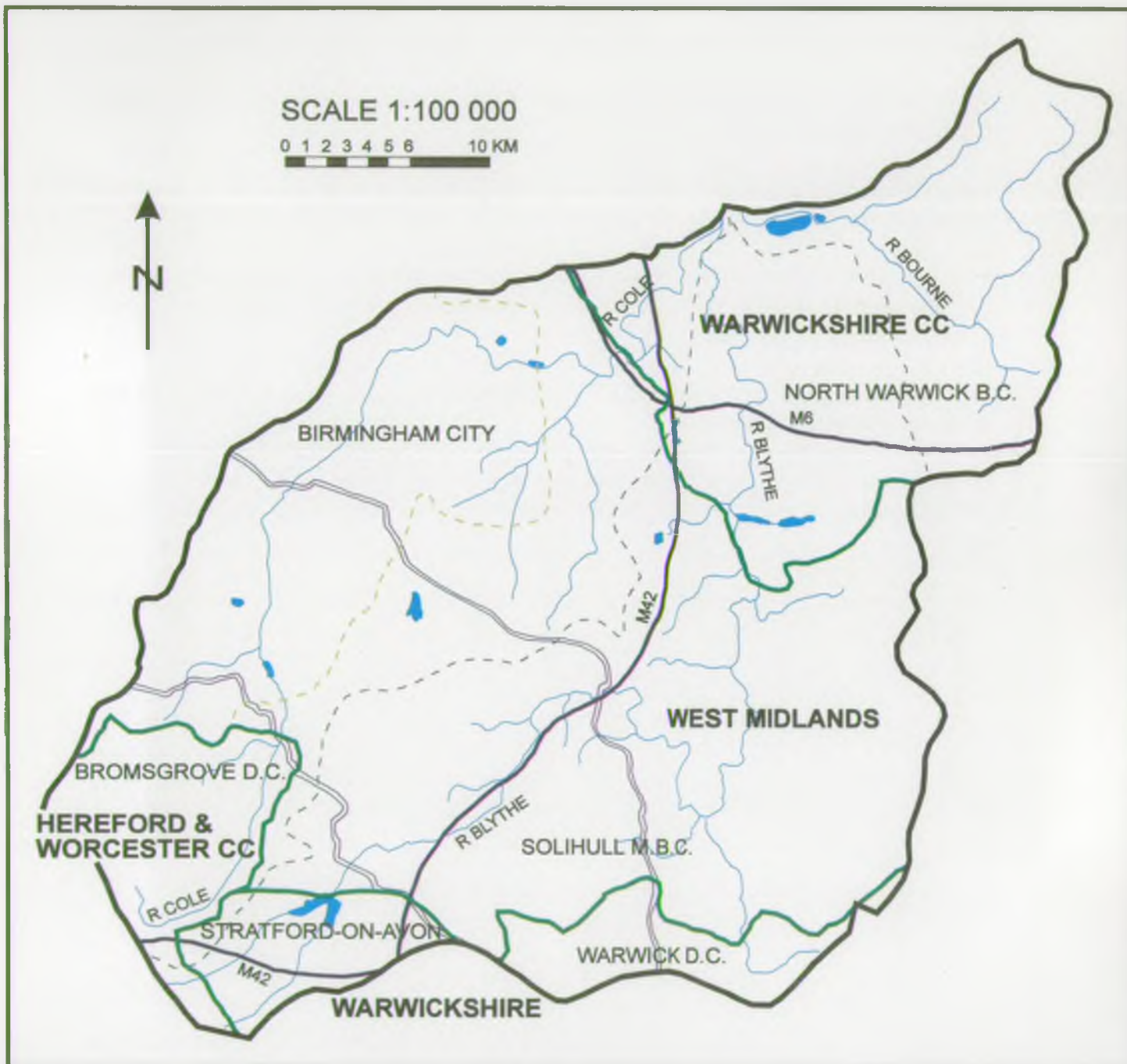
None of the developments highlighted above will have a direct impact on main river channels within the Catchment. However increased urbanisation in the rural areas is creating a 'flashier' type of run-off which is affecting the upper reaches of the Blythe from Cheswick Green to north of Knowle in particular and is contributing to the problem of low flows.

Objectives

- To seek the adoption of NRA model policies in Local Development Plans.
- To press LPA to resist any further release of Green Belt land, particularly within the Blythe subcatchment.
- On existing and allocated development sites, to support measures to regulate surface water run-off by the use of soakaways or water balancing facilities.
- For the NRA to use its status as a statutory consultee to influence any future development that will, in its opinion, compromise the activities of the other catchment users.
- To encourage environmental enhancement as part of urban development/redevelopment.
- Objectives relating to specific aspects of development, for example, water supply, effluent disposal and surface water drainage, are identified in subsequent sections.

MAP 3

COUNTY AND DISTRICT/COUNCIL BOUNDARIES



key		CATCHMENT BOUNDARY		MOTORWAY		
		SUB CATCHMENT BOUNDARY		COUNTY COUNCIL BOUNDARIES		
		PRINCIPAL WATER COURSES		DISTRICT/COUNCIL BOUNDARIES		
		CANAL				

3.2 Road, Rail and Airport Development

General

Such developments can increase the volumes of surface water run-off and reduce the time for rivers to reach their peak of flood flows. This rapid run-off can reduce the amount of groundwater recharge and ultimately, in certain circumstances, contribute to low flows. The first rainfall after a dry period on highway developments can lead to increased pollution, in the form of elevated zinc and lead levels as well as a high Biochemical Oxygen Demand (BOD). There may also be an increased risk of accidental spillage of pollutants.

Local Perspective

All three subcatchments in this study are affected by motorway run-off from the M6 and/or the M42. A number of watercourses were designated Main River specifically to include outfalls from the M42 following its construction in order to ensure an appropriate level of future maintenance and adequate control of development. These were lengths of the Coleshill Hall Brook, Hollywell Brook, Ravenshaw Brook and Shadow Brook.

In addition to motorways the A45 trunk road has a significant discharge to the Blythe in wet weather. Proposed improvements to this road at the Stonebridge island will incorporate a balancing pond primarily for water quality improvement purposes.

The Department of Transport (DTp) has long term plans for widening both the M6 and M42. Also the Birmingham Northern Relief Road (BNRR) is currently being designed to motorway standard. The NRA is seeking to protect the water environment under these road schemes by requesting balancing pools or settlement tanks. Such suggestions have generally been taken on board for the BNRR.

At Birmingham Airport urea and glycol were originally used on the runways as de-icers, the application of which has caused problems including sewage fungus in the Low Brook and to a lesser extent the Hatchford Brook. From December 1992 the application of urea and glycol ceased and a new proprietary product has been used which is less polluting. In addition, from May 1994 it is proposed that the first 10mm of rainfall falling on the Airport paved areas will be diverted to Coleshill Sewage Treatment Works. This should reduce the polluting impact on the rivers resulting in improved water quality.

Proposals for extensions to Birmingham Airport, including a lengthening of the main runway, are currently at the feasibility stage. If these come to fruition there will need to be either extensive culverting or a diversion of the Low Brook.

The proposed Birmingham Metro scheme is not expected to have any significant impact on the water environment of the Cole subcatchment.

Objectives

- **To minimise the impact of new road, rail and airport development on river flow regimes.**
- **To incorporate measures in new highway schemes and airport developments which limit the polluting effects of surface water run-off and provide protection against the accidental spillage of pollutants.**

3.3 Ground and Surface Water Abstraction

General

This use relates to the supply of water from ground and surface sources for public supply and for industrial and agricultural use. Groundwater abstraction constitutes supply from wells and boreholes drilled into underground permeable rocks, termed aquifers; surface water abstraction is direct from rivers, canals, lakes and reservoirs.

Abstraction, other than for small domestic use (<20m³ per day), is controlled by licence, under the Water Resources Act 1991, which stipulates the maximum daily and annual quantity allowable. Ground and surface water sources developed prior to the introduction of the 1963 Water Resources Act were granted Licences of Right. Subsequent licences have been issued only if abstraction would not cause derogation of existing ground and surface water uses. Licences may include restrictions to protect resources from over-commitment and safeguard environmentally sensitive areas such as wetlands.

There is considerable variation in water use between each of the three subcatchments and this is influenced to some extent by the availability or otherwise of groundwater. With few exceptions, the groundwater licences for agricultural purposes involve relatively shallow wells and boreholes. Spray irrigation from groundwater sources are generally confined to the upper reaches of the Blythe and Cole subcatchments where water is available but at great depth in the Bromsgrove Series of the Sherwood Sandstones.

Problems can occur when surface water is abstracted for spray irrigation as there is a large percentage loss due to evapotranspiration. This problem is compounded in the summer months when spray irrigation is needed as the flow is low at this time of year. To minimise the impact on the water resources and to protect existing rights when river flow falls below a certain threshold, restrictions are put into operation. Winter storage reservoirs are encouraged wherever practical.

Local Perspective

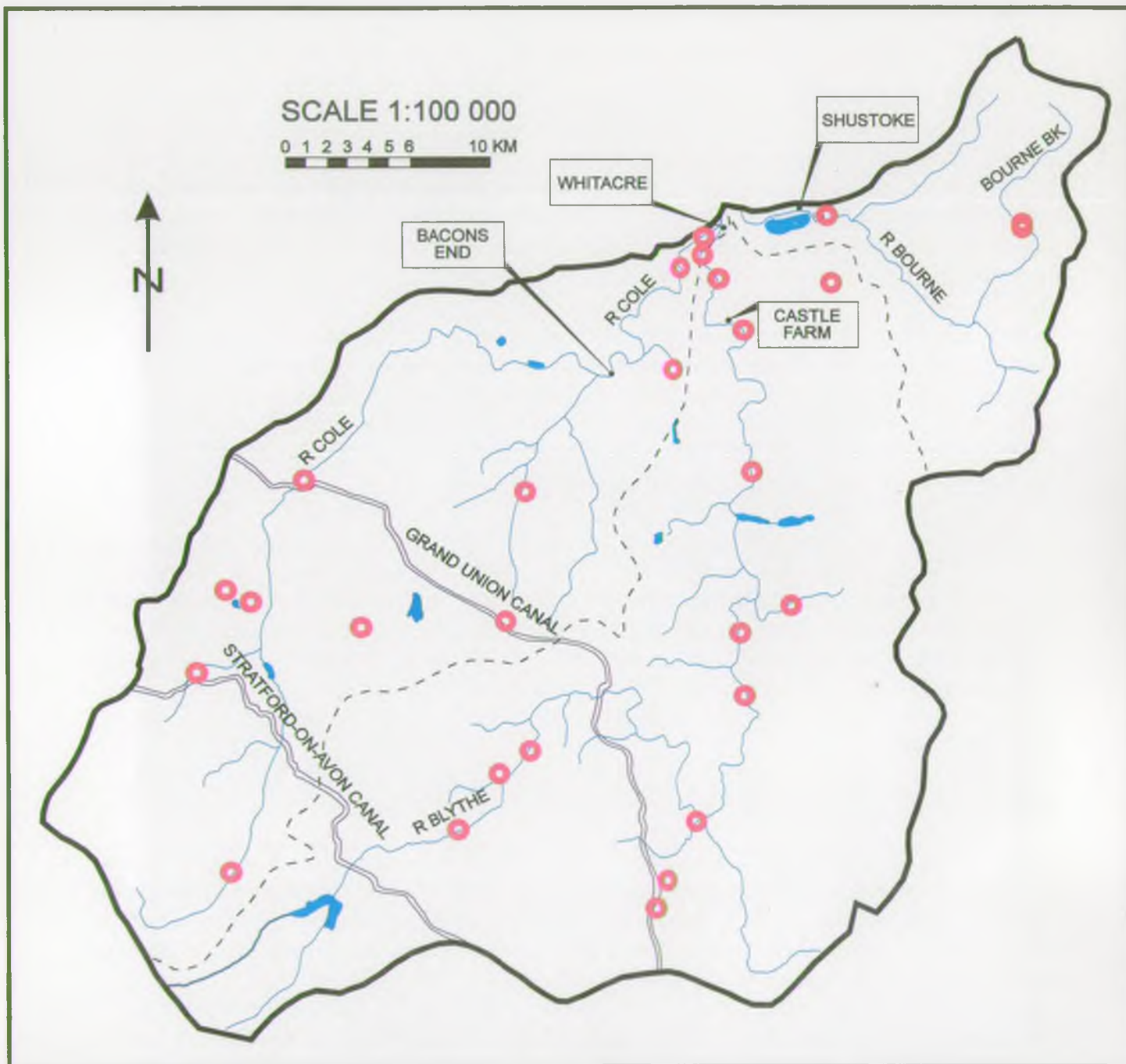
Blythe

Surface abstractions (Map 4) include water supply (70% by volume) and spray irrigation. Almost the whole flow of the Blythe during prolonged dry weather is abstracted for public water supply at Whitacre. Immediately downstream of the abstraction point the flow is supported by the entry of the Cole. Priority is given to protecting low flows in the Blythe and recent licences contain prescribed flow conditions.

The majority of the groundwater abstractions (Map 5) within the subcatchment are for agricultural purposes, (60 in total for only 4% by volume) and generally involve relatively shallow wells and boreholes. There are a few spray irrigators (4% by volume) but these do not significantly affect the resource. Sand and gravel operators account for 91% by volume of groundwater abstractions most of which is returned to source. In contrast five industrial licences account for less than 1% by volume of water abstracted, taken either from the alluvial gravels or Mercia Mudstones. These comprise building suppliers, garage operations, topping up of pools and commercial stables.

MAP 4

SURFACE WATER ABSTRACTION AND MONITORING



key		CATCHMENT BOUNDARY		FLOW STATIONS		
		SUB CATCHMENT BOUNDARY		ABSTRACTION POINT		
		PRINCIPAL WATER COURSES				
		CANAL				

Large volumes of water are abstracted from the Blythe at Whitacre for public supply purposes. The Blythe contains a significant artificial component in the form of treated sewage effluent from Barston Sewage Treatment Works. This discharge contributes on average 14 Megalitres per day (Ml/d) to the river which at this point has an average natural dry weather flow of 14 Ml/d giving a total flow of 28 Ml/d. Tributaries downstream enhance the dry weather flow at Whitacre to between 40 and 45 Ml/d. The dry weather flow for the Bourne is between 12 and 15 Ml/d. Severn Trent Water Ltd, however, hold a licence to abstract up to 100 Ml/d in total from the Blythe and the Bourne, but flows are such that this is rarely achieved. The NRA would not wish the water company to reduce flows from Barston STW as this would leave the Blythe critically short of water during dry weather conditions.

At Earlswood the Blythe is impounded by a series of reservoirs constructed in the 18th Century and presently owned and managed by British Waterways (BW). These reservoirs have the facility to collect all tributaries of the river within an 11.5 km² catchment area upstream. The discharge point in Reservoir Road, Earlswood effectively being the commencement of the Blythe proper. In theory, a cessation of flow from the main reservoir overflow could result in the river being dry. However the Spring Brook with an average daily dry weather flow of 0.3 Mld is diverted around the reservoir complex and enters the river channel immediately downstream of the main reservoir overflow. Although it is possible for this watercourse to be taken into the reservoir system should BW deem it necessary or prudent, in practice this has not occurred for many years. Algal activity in the reservoirs is such that the NRA would not wish to see the reservoir water entering the river system either in any quantity or for prolonged periods until the problem has been resolved.

Flows in the Blythe are influenced by various organisations and bodies with disparate interests. By Act of Parliament and in accordance with their general navigation powers, BW are entitled to divert any surface waters into their reservoirs or canals in whatever quantities and for however long as they deem appropriate to meet their statutory obligations. For instance the Cuttle Brook a major tributary of the Blythe is used to supply water to the Grand Union Canal at Norton Green near Knowle. Whilst Severn Trent Water Ltd are required to obtain a consent to discharge effluent to a watercourse the NRA has no powers to stop the company from reducing or ceasing discharges. Planning Authorities are under continuing pressure to provide more housing and business opportunities, creating further hardstanding areas and reducing still further the ability of the Blythe and Cole subcatchments to maintain base flows.

Cole

This subcatchment is partially urbanised and is therefore prone to variable water quality particularly during wet weather when contaminated run-off can occur. As a result there is very little surface water abstraction. The extent of impermeable surface results in rapid run-off followed by low flows during normal dry weather conditions. For this reason prescribed flows are attached to recently issued licences. Spray irrigation licences (9 accounting for 9% of total abstractions by volume) involving parks and gardens, golf courses and some agriculture are largely confined to the upper reaches of the river and its tributaries. Cooling water abstractions, though relatively high at 77% by volume, are returned to source. Various industrial uses account for the remaining 14%.

Industrial cooling water taken from deep wells and boreholes in the Sherwood Sandstones accounts for 90% of the total by volume abstracted from underground sources. Much of it is discharged to local watercourses or the sewerage system. Of the remainder, 9% is used for industrial uses, and only 1% for agriculture.

Bourn

Apart from the public water supply intake at Shustoke there are only two other surface water abstractions. These are spray irrigators and account for 0.1% of the total abstracted by volume.

Daw Mill Colliery takes 88% of the total groundwater abstracted by volume in the subcatchment. Shallow wells and boreholes provide the remaining 12% of water for a few agricultural licences and one spray irrigator.

Table 3

A summary of licences in the Catchment divided into 3 main groups.

Type of Abstraction	No of Licences	Actual Abstraction ML/d	Percent (By Volume) %
Public Consumption	4	50.68	70.62
Industrial	22	19.12	26.64
Agricultural	103	1.97	2.74

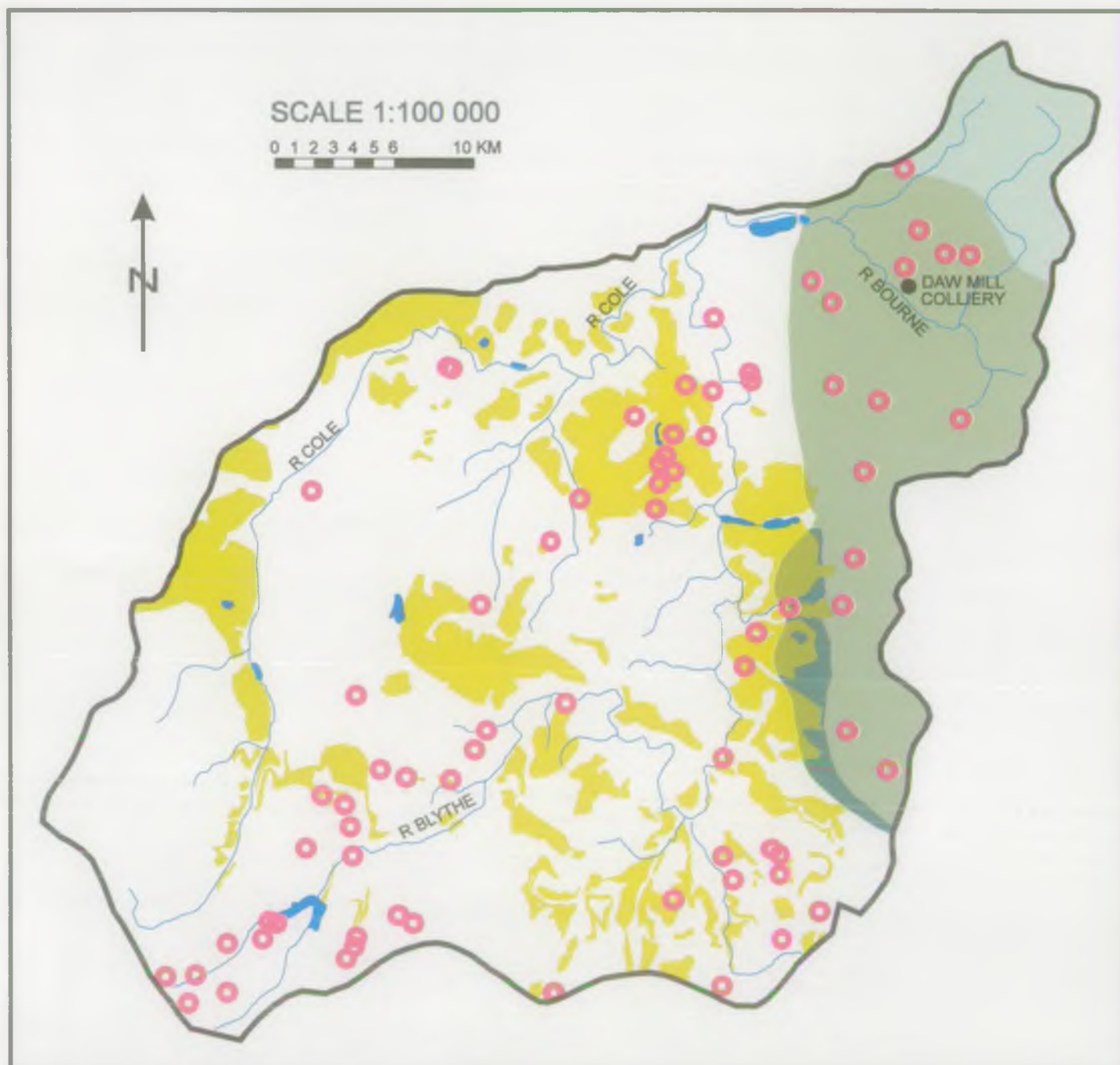
Objectives

The following objectives have been set for ground and surface water abstraction, with regard to the water resource of the three subcatchments.

- To continue to manage abstraction to long term sustainable levels.
- To encourage efficient water use and to optimise re-use.
- To encourage winter storage abstraction for summer use.
- To safeguard public supply abstraction sources with respect to water quality and quantity.
- To ensure the protection of groundwater, particularly river gravels, through the Groundwater Protection Policy, land use planning and other appropriate means.

MAP 5

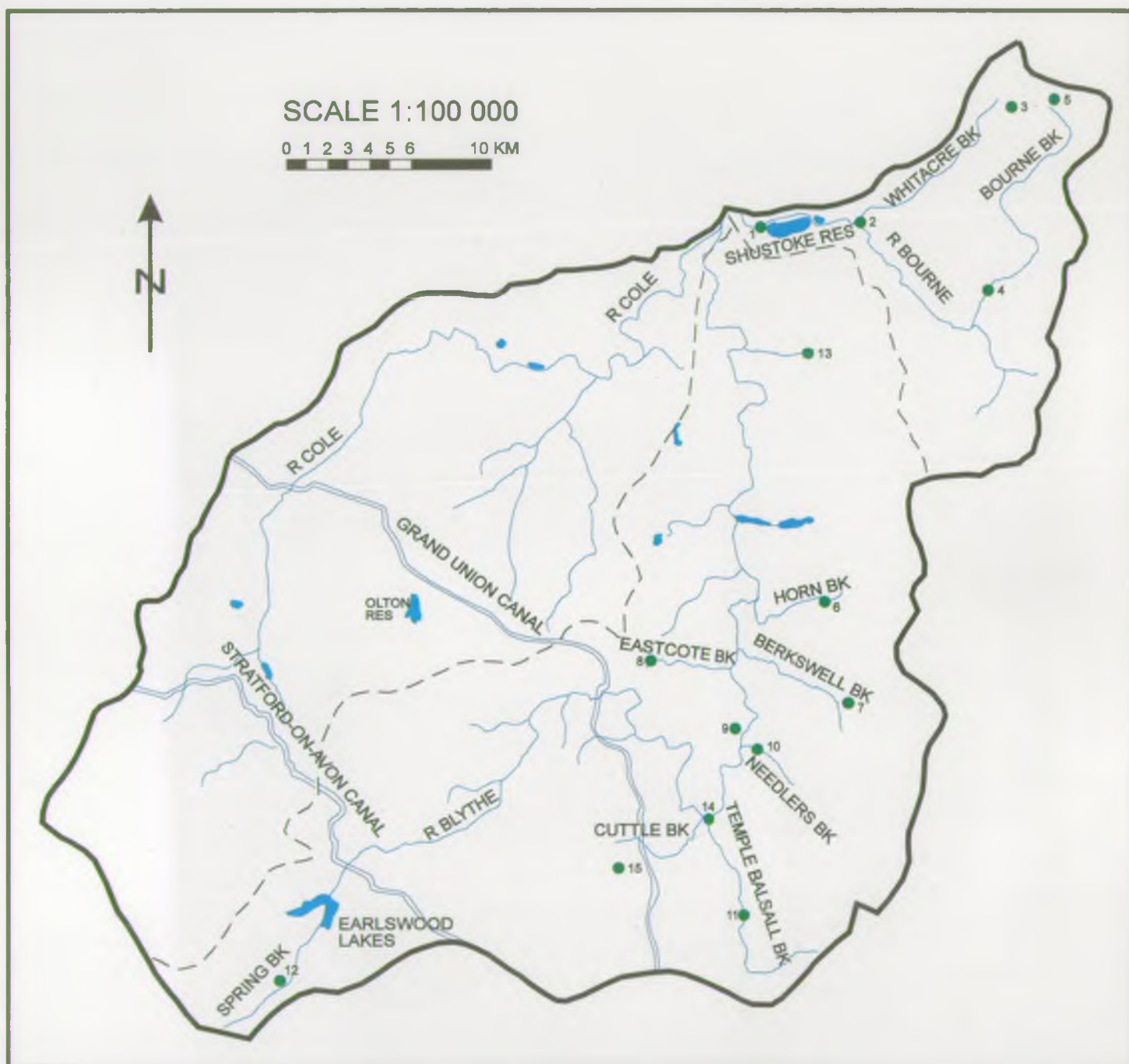
GROUNDWATER ABSTRACTION



key		CATCHMENT BOUNDARY		ABSTRACTION POINT		
		SUB CATCHMENT BOUNDARY		PERMO CARBONIFEROUS		
		PRINCIPAL WATER COURSES		MERIDEN AQUIFER		
		SAND AND GRAVEL DEPOSITS		COAL MEASURES		

MAP 6

SEVERN TRENT WATER LTD STW DISCHARGE



1 Shustoke
2 Furnace End
3 Birchley Heath
4 Arley
5 Ridge Lane

6 Meriden
7 Berkswell
8 Barston
9 Spinney
10 Balsall Common

11 Hanley
12 Earlswood
13 Maxstoke
14 Temple Balsall
15 Norton Green

key		CATCHMENT BOUNDARY		SEWAGE TREATMENT WORKS (STW)		
		SUB CATCHMENT BOUNDARY				
		PRINCIPAL WATER COURSES				
		CANAL				

3.4 Sewage and Industrial Effluent Disposal

General

Discharges to controlled waters require a consent, granted by the NRA under Schedule 10 of the Water Resources Act 1991. Consents are calculated taking into account upstream water quality and dilution available in the receiving watercourse. They are designed to ensure that downstream water quality remains acceptable for its many uses and compliant with prescribed water quality standards. (Appendix 6).

These water quality standards are called the River Quality Objectives (RQO) and are described in Appendix 3. When a stretch is classified under an EC Directive additional Environmental Quality standards apply (Appendix 6). All consented discharges are inspected by the NRA. The frequency of sampling is based on the volume of the discharge as outlined in Table 4 below.

Details of the results from our monitoring programme are available from the public register. Enquiries should be directed to the Regional Headquarters in Solihull, Telephone (021) 711 2324.

Table 4

Sampling frequencies for sewage and industrial discharges.

Number of Samples Taken Per Year*	Population Equivalent	Maximum Daily Discharge Volume (m³/d)
2	<20	<5
4	20-250	5-100
12	250-20,000	100-10,000
24	20,000-100,000	10,000-50,000
48	>100,000	>50,000

* These rates can be increased if the discharge is found to be causing a problem in the downstream water quality.

Local Perspective

Blythe

There are ten Sewage Treatment Works (STW) in the Blythe subcatchment operated by Severn Trent Water Ltd (Table 5 and Map 6). The largest input is from Barston STW which has a significant effect on the Blythe, causing ammonia RQO failures downstream of the discharge. To achieve RQO compliance greater nitrification is needed from Barston STW, and much tighter consent limits need to be set. In addition to the sewage discharges from Severn Trent Water STW, there are 43 similar discharges from private Sewage Treatment Plants (STP). These discharges are only permitted where access to the public foul sewer is not available. There are very few large STP and in general they are well maintained. Most problems with STP occur with smaller plants which are often overloaded and not well maintained.

Table 5

Discharge volumes from Severn Trent Water Sewage Treatment Works (4/92 to 3/93).

River	Place	Ml/d *
<u>Blythe</u>	Barston	14.86
	Norton Green	3.82
	Balsall Common	1.56
	Meriden	0.61
	Earlswood	0.69
	Honiley	0.09
	Berkswell	0.06
	Spinney	0.047
	Maxstoke	0.017
	Temple Balsall	0.017
<u>Bourne</u>	Arley	1.00
	Ridge Lane	0.07
	Shustoke	0.07
	Furnace End	0.03
	Birchley Heath	0.03

* (1Ml/d = 1000m³/day).

A number of industrial effluents produced in the subcatchment are not discharged directly to the river system, but to the foul sewer and treated by Severn Trent Water Ltd. There are however six consented industrial discharges which cause little problem. Surface water from urban areas can have an impact on water quality. Recent problems have arisen with the increasing number of housing and industrial estates where poor management as well as wrong sewer connections have resulted in pollution of the surface water sewers. This has led to intermittent pollution incidents in the Cran Brook and Purnells Brook. Developers and industrialists must be aware of this and provide adequate pollution prevention measures for the surface water disposal systems.

During periods of wet weather there are also a number of Storm Sewer Overflows (SSO) which can discharge into the river system. These discharges are permitted in order to prevent foul flooding of property when the sewers become overloaded. If the sewerage system is correctly designed and constructed, then overflows should only occur when the rivers themselves are in flood and any discharge will have a minimal impact on the watercourse. All SSO are in the process of being consented. They are not generally thought to be a problem in the Blythe subcatchment.

Cole

There are no STW operated by Severn Trent Water Ltd, although a number of small private STP exist on the headwaters. There are a number of SSO in the subcatchment, although the majority are not considered to cause serious water quality problems.

Urban run-off during rainfall does affect water quality. In dry weather a number of polluting discharges affecting short stretches of the Cole have been identified resulting from wrong connections into the public surface water sewerage system. There are on-going investigations to locate and correct these problems.

There are 10 consented industrial discharges into the subcatchment which cause little problem. The largest of these are from Birmingham Airport and Landrover where there are a number of large oil interceptors. Recent improvements have reduced the potential polluting impacts from these sites.

Bourne

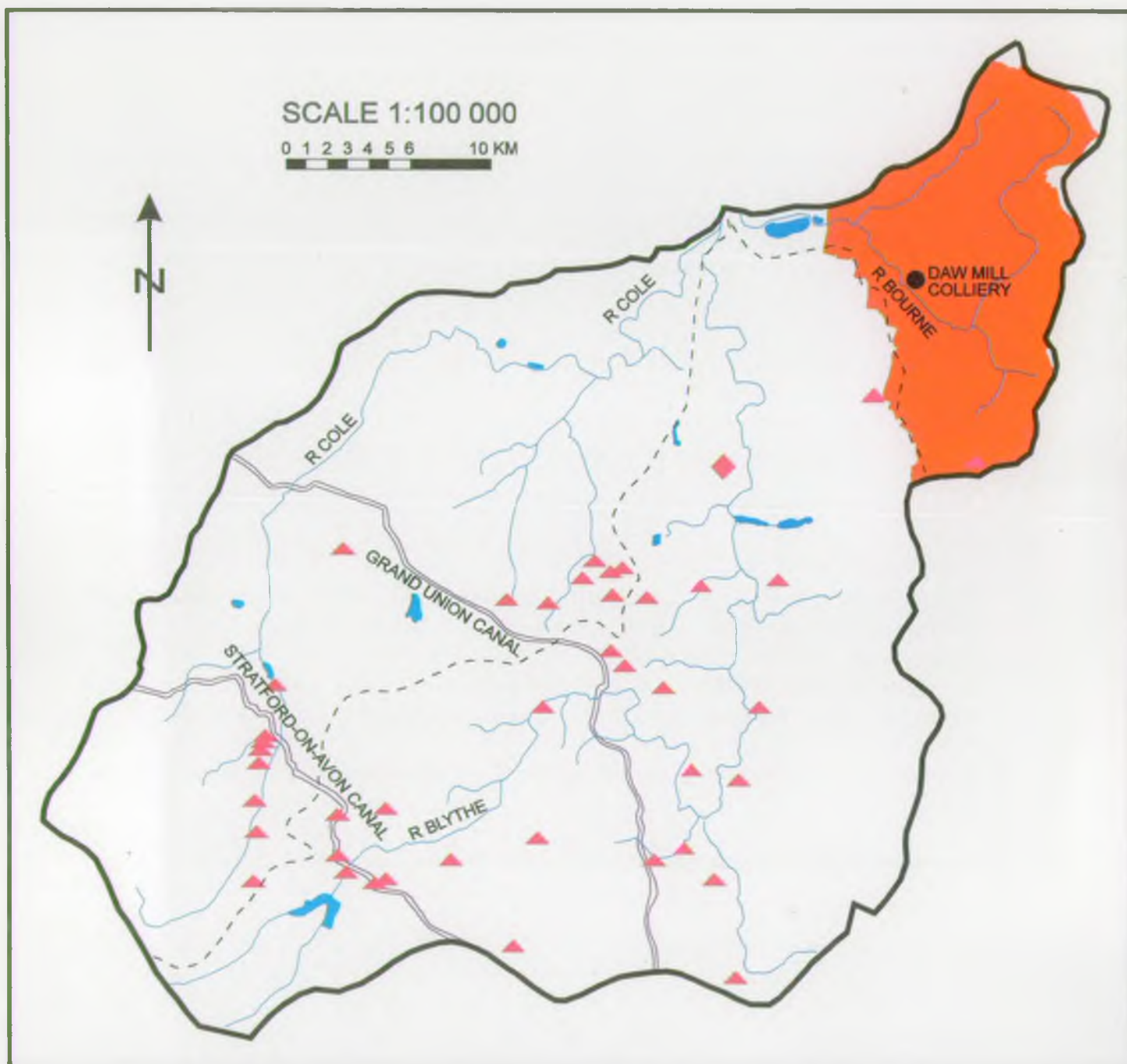
There are 5 Severn Trent Water Ltd STW (Table 5) in the subcatchment which cause little problem, and a few small private STP. Of 8 industrial discharges, the most significant are from Daw Mill Colliery and Whitacre Water Treatment Works. Currently the Daw Mill discharges are being improved as part of an ongoing project to minimise the polluting impact from the site.

Objectives

- To ensure that Environmental Quality Standards are achieved and maintained and that requirements for discharge improvements are identified.
- To ensure consent conditions adequately safeguard water quality and prevent exceedance of EC Directives and Water Quality Objectives. (Appendix 4).
- To establish compliance of surface waters and discharges with standards by monitoring.
- To ensure the flow regime does not fall below that used in setting consents.

MAP 7

LANDFILL AND NITRATE CONTAMINATION



key		CATCHMENT BOUNDARY		LANDFILL SITES		
		SUB CATCHMENT BOUNDARY		NITRATE ADVISORY AREA		
		PRINCIPAL WATER COURSES		PACKINGTON LANDFILL SITE		
		CANAL				

3.5 Solid Waste Disposal and Contaminated Land

General

Land can become contaminated with significant levels of pollutants as a result of industrial and agricultural activities and through waste disposal. These pollutants can adversely affect surface and groundwater quality through run-off and percolation to underlying aquifers.

Prior to the mid 1970's there was no control over the types of waste tipped and the methods of operation relating to its disposal. Since 1976, waste disposal sites have required a licence to operate from the local Waste Regulation Authority (County or Unitary Borough Council), under the Control of Pollution Act 1974, Part 1. Disposal practices have evolved rapidly since licensing was introduced; modern landfills require complete containment of any polluting waste to minimise the impact on the water environment.

The NRA has published a Groundwater Protection Policy (Appendix 4) to advise planning authorities and others of the dangers of allowing certain types of development in areas where groundwater could be affected. It is designed to protect groundwater abstractions and resources in general from activities which could lead to contamination such as: waste disposal, sludge spreading and chemical storage and manufacture.

In some cases where groundwater resources have been affected by nitrates, Nitrate Sensitive Areas (NSA) have been created by Act of Parliament (Ministerial Order). Nationwide, 10 such NSA were originally set up each for a 5 year pilot study period during which MAFF provided financial incentives and advice in an attempt to limit land use practices which increased Nitrate leaching, in problem areas. Nitrate Advisory Areas (NAA) were also set up for a 5 year pilot study period to see what could be achieved through advice only.

Local Perspective – Waste Disposal

Despite Little Packington Landfill site being close to the Blythe, (Map 7) comprehensive monitoring of groundwater and surface water has not revealed any major problem with water quality, due to the engineering measures which have been implemented.

The distribution of currently licensed waste disposal sites across the Catchment is shown on Map 7. Some disused and previously unlicensed sites may still exist. The majority of landfills in this area are for relatively inert waste with little pollution potential. Scrap yards and on site waste storage facilities have only recently come under the control of waste disposal authorities. It is common to have soakaways on such sites with little regard for water protection.

Following mineral extraction, permission is often sought to use the resulting void as landfill. As the gravels are often in hydraulic continuity with the river this could result in significant contamination, unless adequate protection measures are in force.

In view of this the Blythe Gravels are protected under the Groundwater Protection Policy, where a zone has been defined within the river valley where the NRA would oppose tipping other than strictly inert materials.

Local Perspective – Contamination from Agricultural Practices

Whilst there are no NSA in the Catchment, a NAA was set up in 1990-91 for the Bourne which covers the whole of that subcatchment and applies to surface waters; there being only limited groundwater resources which could be affected. Samples are taken from the river and its tributaries at 12 fixed locations on a weekly basis, to monitor nitrate levels and assess the impact of any changes in farming practices.

Local Perspective – Industrial Land Use

The extent of land contamination as a result of industrial practices is not fully known, but is unlikely to be significant. Sites generally come to the attention of the NRA due to specific water quality problems and through redevelopment. Planning applications are assessed by the NRA and water protection measures are required on many sites to ensure minimal problems in the future.

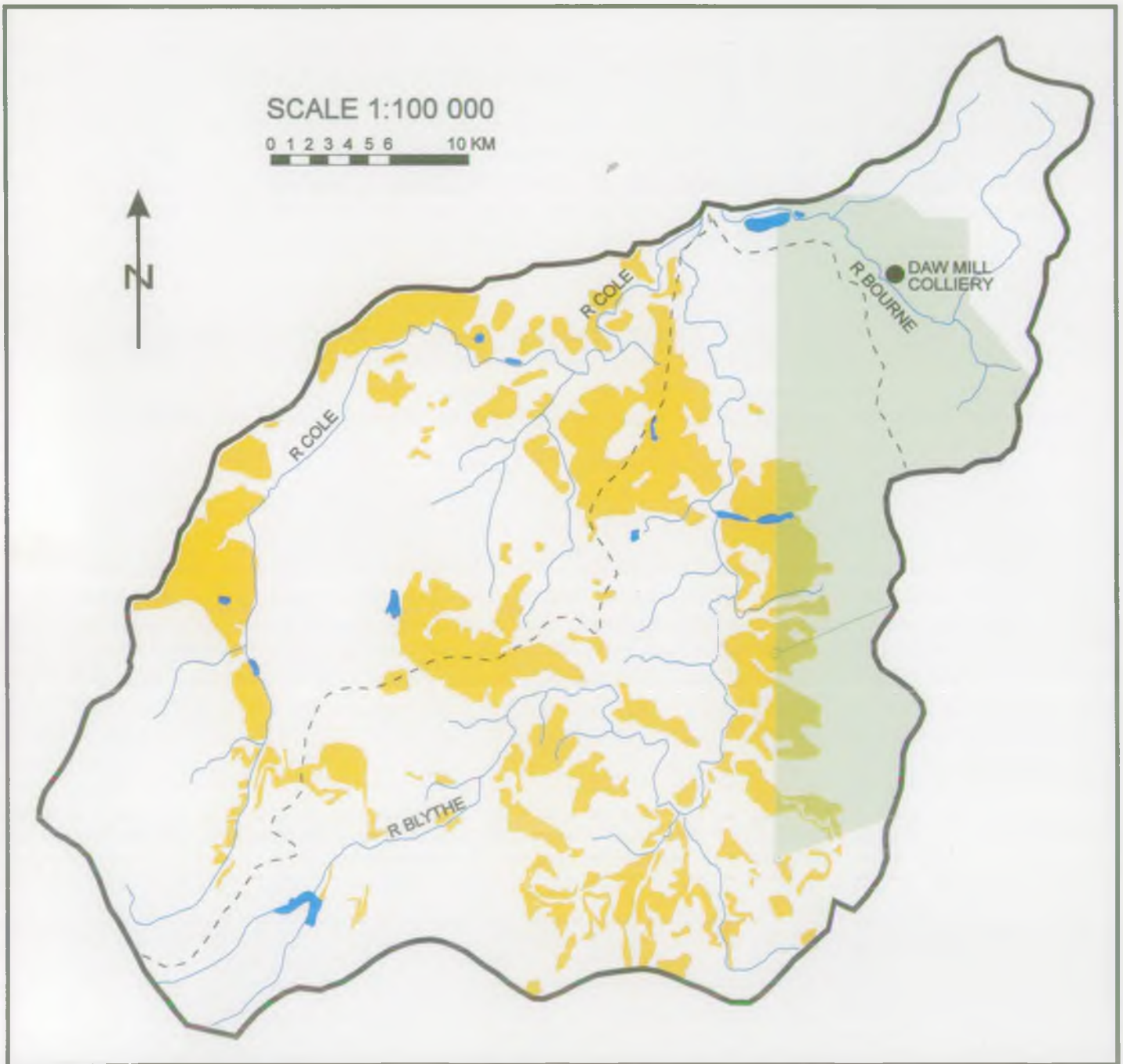
Objective

The objective relates to the effect of contaminated land on surface and groundwater quality:-

- **To seek to ensure that waste disposal does not compromise water quality or water resources, and is undertaken in accordance with advice given in the Policy and Practice for the Protection of Groundwater Document. (Available from National Rivers Authority, Newcastle upon Tyne NE85 4ET. Price £15).**

MAP 8

MINING WORKS AND MINERAL EXTRACTION



key

	CATCHMENT BOUNDARY		SAND AND GRAVEL DEPOSITS - POTENTIAL EXTRACTION AREAS		
	SUB CATCHMENT BOUNDARY				
	PRINCIPAL WATER COURSES				
	DAW MILL UNDERGROUND COAL MINING RESERVES				

3.5 Mineral Extraction

General

Mineral extraction operations can sometimes restrict the recharge of an aquifer and divert surface and groundwater flow. Where a site is in hydraulic continuity with the river and dewatered to enable extraction to take place, the water removed is often discharged to the river. Whilst this in itself is not a problem, it does reduce natural movement of water from the site to the river. When dewatering ceases there will be a short period when no water is entering the river from the site and surrounding areas. In the summer this can contribute to low river flows. In addition the extracted areas or voids, if used as landfill sites, effectively reduce the storage area for groundwater and affect the natural passage of this water to the river. If the voids are left as open areas of water, in the summer, a large proportion may be lost through evaporation.

Local Perspective

At the present time, mineral extraction is confined to the sand and gravel areas along the Blythe and Cole valleys together with coal mining in the Bourne subcatchment at Daw Mill (Map 8). The sand and gravel deposits have been worked for many years, but their variable depth is generally not suited to large scale extraction except in the Meriden, Lower Blythe and Lower Cole areas.

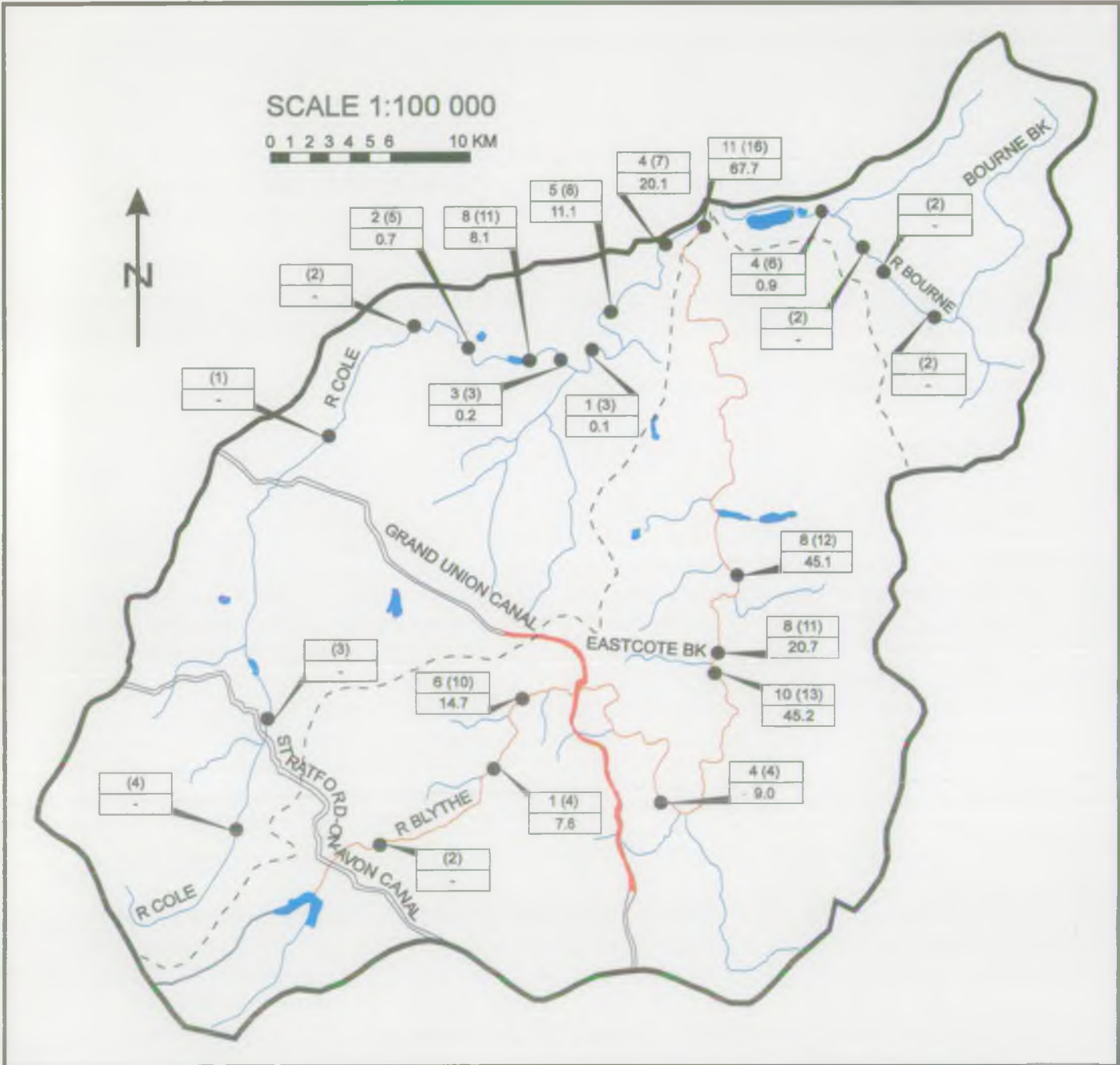
The Carboniferous Coal Measures to the north of the Catchment have been exploited for many years by British Coal at Daw Mill Colliery. Recently proposals have been made to extend the mining of coal seams to the south of Daw Mill Colliery and to the south west from Coventry Colliery (located outside the Catchment). The Daw Mill extension could influence groundwater movement in the Maxstoke area affecting the Bourne and the Lower Blythe. The proposed extension of the Coventry Colliery, should this proceed could affect water availability in the Upper Carboniferous Sandstones to the east of Meriden on the Catchment divide (Map 8). At present under British Coal ownership the Colliery is closed.



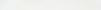
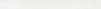

Objectives

- **To seek to ensure that mineral workings are operated within the guidance of the NRA Policy and Practice for the Protection of Groundwater.**
- **To protect the surface and groundwater systems from any detrimental effects of mineral extraction.**

MAP 9 FISHERIES STATUS

MAP 9 FISHERIES STATUS



key		CATCHMENT BOUNDARY		EC DESIGNATED FISHERY		
		SUB CATCHMENT BOUNDARY	5	NUMBER OF ANGLED SPECIES		
		PRINCIPAL WATER COURSES	(7)	TOTAL NUMBER OF SPECIES		
		CANAL	7.6	FISH DENSITY GRAMMES PER SQ. METRE		

3.6 Fisheries (Ecosystem)

General

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

Salmonids and cyprinids are protected under the EC Freshwater Fisheries Directive (78/659/EEC), which sets water quality criteria to protect fish life in designated freshwater reaches of inland watercourses.

The NRA has duties to maintain, improve and develop fisheries and to further the conservation of fish species. Fish populations are affected by water quality and the flow regime of the watercourse 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 Severn-Trent Region has documented its Fisheries Strategies for all appropriate river reaches. It will use its legislative powers, under the Water Resources Act 1991, and the Salmon and Freshwater Fisheries Act 1975, to ensure that the objectives for individual river reaches are achieved.

Local Perspective

Blythe

The water quality conditions are generally good and support prolific coarse fish populations, normally dominated by chub and dace. The more extreme upper reaches, however, are sparsely populated due to restricted habitat, but minor species (ie non-angled) are common or abundant. Extensive upstream migrations into this section are precluded by an impassable weir at Brueton Park.

Over much of the middle reaches, primarily within the Packington Estate, the river is managed for the preservation of trout, and coarse fish are removed annually. Coarse fish abundance is therefore held artificially low but outside the Estate the abundance expressed by weight of fish is high, frequently exceeding 40g/m² (Map 9). The trout population is largely confined to introduced fish, mostly rainbow trout, which rapidly disperse throughout the river.

The major source of organic pollution comes from effluent discharge from Barston STW which enters via the Eastcote Brook. Recent evidence suggests a significant decline in fish abundance immediately downstream of the confluence. The upper reaches are at continual risk of pollution as a result of spillage or run-off from the M42 motorway which crosses the river at several points. Upstream of Molands Bridge, the Horn Brook (Map 1) periodically contributes considerable quantities of inorganic solids whose origin remains unclear. While there is no discernible impact on coarse fish populations downstream, accumulated material could detrimentally influence the successful reproduction of brown trout which appear to have seriously declined or may be absent from the river.

Abstraction to Whitacre Water Treatment Works (WTW) downstream of Blythe Bridge causes a notable reduction in flow as far as the Cole confluence. These conditions nevertheless favour the existence of slow and still water species such as rudd, tench and carp with the result that there is a significant increase in diversity and abundance.

Major sections of the Blythe, between Earlswood Lakes and the Eastcote Brook confluence and between the Horn Brook confluence and the Cole confluence are designated cyprinid fisheries under EC Fisheries Directive (78/659/EEC).

Cole

In contrast the Cole flows extensively through an urban landscape and water quality is detrimentally influenced by sewage discharges and surface run-off. Consequently fish distribution is very restricted and largely confined to the lower reaches downstream of Babb's Mill Lake. The lake contributes some fish species to the river through overflow but these populations, mostly roach, perch and gudgeon are unstable and fluctuate widely. Stable populations are present only in the area of Coleshill and comprise largely chub, dace and gudgeon. Their upstream movement is impeded not only by poor water quality but also by the presence of two weirs. One of these is located immediately downstream of Cook's Lane, the other being the gauging weir at Moorend Avenue.

The extreme upper reaches of the river lie outside the main urbanised area and water quality is good. Minor species are present but available habitat is restricted. Recently stocks have been augmented by limited introductions of dace by the NRA.

Bourne

Both salmonid and coarse fish populations in the Bourne are extremely sparse in spite of generally good water quality and available habitat. Major species are primarily confined downstream of Furnace End and comprise perch, roach and brown trout. These populations fail to proliferate possibly due to the stifling effect of periodic high suspended solid loads and fluctuations in water level as a result of abstraction operations at Shustoke reservoir. The upper reaches consist of a network of small tributaries which support minor species but there is no evidence of natural brown trout.

Canals

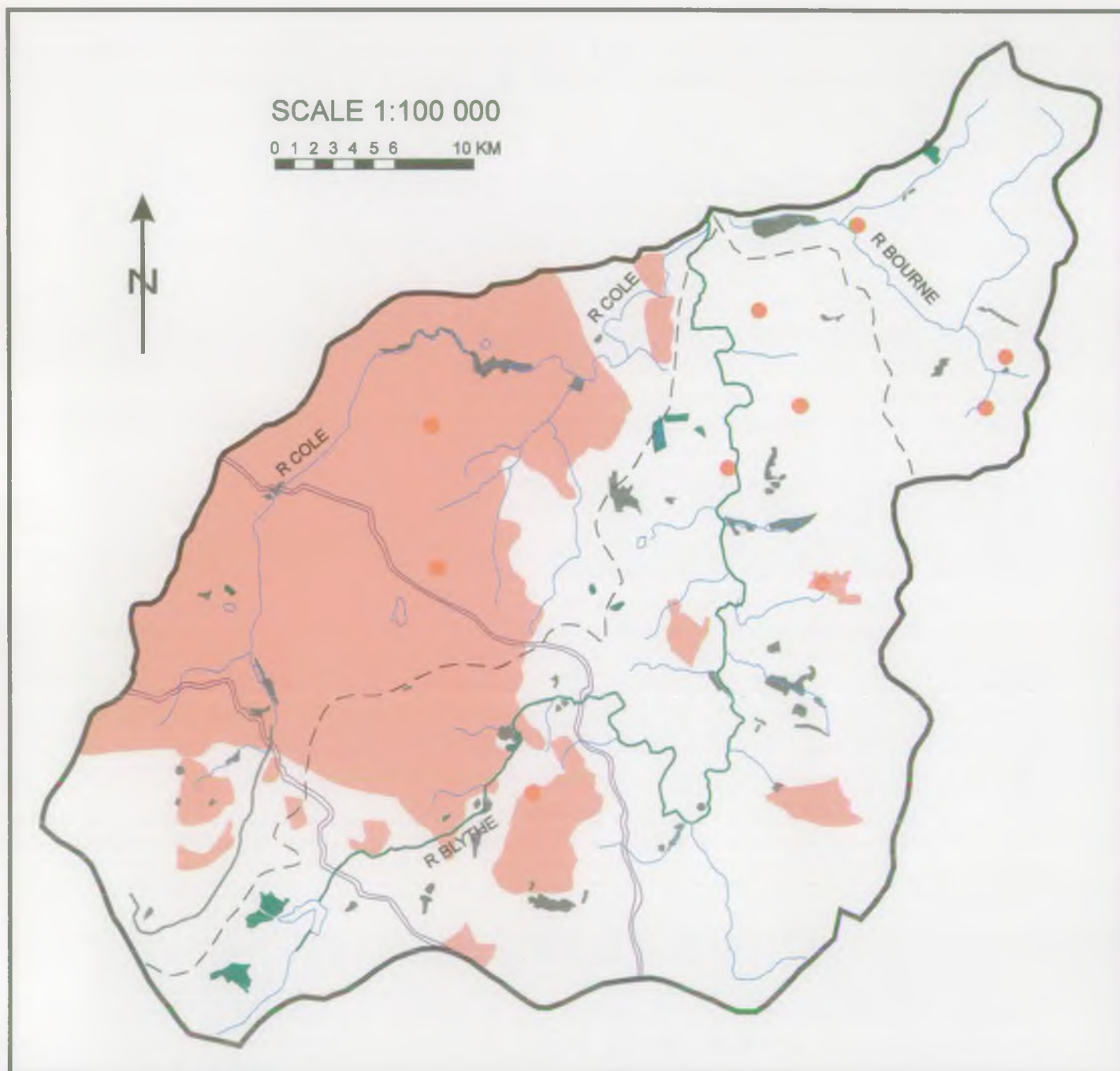
Two canals cross the Catchment, the Stratford upon Avon Canal and the Grand Union Canal, both supporting mixed coarse fish populations (Map 9). Within the Catchment a 9.1 km section of the Stratford upon Avon Canal between Elmdon Heath and Chessetts Wood is designated a cyprinid fishery under EC directive.

Objectives

- **To develop salmonid and coarse fish populations in order to provide fisheries of a quality appropriate to the existing physical and improving environmental characteristics of the Catchment.**
- **To maintain and improve water quality in the Blythe sufficient to allow the proliferation of coarse fish and the health and well being of native and introduced trout.**
- **To ensure watercourses designated under EC Directive (78/659/EEC) do not deteriorate below the limits specified.**
- **To ensure progressive improvements in water quality of the Cole to allow development and stabilization of coarse fish populations as far as possible.**
- **To identify underlying causes of poor fishery status in the Bourne.**
- **To ensure provision of a flow regime suitable to the physical habitat quality of the individual watercourses.**
- **To provide instream features to enhance fish habitat in the Cole.**
- **To remove or circumvent barriers to upstream migration in the Cole and Blythe.**
- **To provide refuge areas in the Cole to allow fish to escape temporary poor water quality resulting from run-off.**

MAP 10

CONSERVATION SITES



key		CATCHMENT BOUNDARY		URBAN AREA		
		SUB CATCHMENT BOUNDARY		SCHEDULE ANCIENT MONUMENTS (SAMS)		
		PRINCIPAL WATER COURSES		SITES OF SPECIAL SCIENTIFIC INTEREST (SSSIS)		
		CANAL		SITES OF IMPORTANCE FOR NATURE CONSERVATION (SINCS)		

3.7 Conservation - Ecology and Landscape

General

The NRA has a duty to further the conservation and enhancement of natural beauty and the conservation of flora, fauna and geological or physiographic features of special interest while carrying out any of its functions. This entails the protection of aquatic flora and fauna in the wider river corridor and on land associated with water. It also involves the protection of water bodies and water related areas outside river corridors.

Local Perspective

Blythe

From the railway bridge upstream of Springbrook Lane to its confluence with the Cole, the Blythe is designated as a Site of Special Scientific Interest (SSSI) as a particularly fine example of a lowland river on clay. It has a wide range of natural structural features such as riffles, pools, small cliffs and meanders. These features are combined with a high diversity of substrate types ranging from fine silt and clay in the lower reaches to sands and gravels in the upper and middle reaches and in the riffles. The structure of this river is very variable and its importance is increased because of the rarity of such examples in lowland Britain.

The diverse physical features of the Blythe are mirrored by its plant communities. The mean number of plant species found in any 1 km stretch is above average for a lowland river, as is the total number of species recorded for the whole length of the river. Botanically, the Blythe is one of the most species rich rivers in lowland England.

The river supports a diverse invertebrate community with a wide range of mollusc, oligochaetes and caddis flies. The most notable species is the pea-shell cockle (*Pisidium moitessierianum*) which is at the western edge of its range here. The dragonflies are also well represented with the Beautiful Demoiselle (*Calopteryx virgo*) being the least common of the species found. The high diversity of macrophytes and invertebrates is due, in large part, to past water quality and flow patterns. Their survival depends upon the continuation of these factors. Water quality is reduced by some discharges and by the effects of Brueton Park Lake where the large waterfowl population is thought to cause serious eutrophication. Flow patterns also appear to be altering as a result of the increased urbanisation of the subcatchment.

From Packington downstream the Blythe lies within an Area of Special Landscape Value.

A further six SSSI lie within the Blythe subcatchment. Of these, two (Berkswell Marsh and Coleshill and Bannerly Pools) are directly water related and one, (Monkspath Meadows) is water dependant to some extent. (Map 10).

There are 156 non-statutory Sites of Importance for Nature Conservation (SINC) including 4 Wildlife Trust Reserves. Many of these are water dependant including pools such as Earlswood Lakes, wetlands and wet meadows.

Cole

Within the urban area most of the conservation interest is associated with the floodplain, the only area which has escaped development. The river corridor therefore forms a very important "green wedge" into the conurbation and is thus very important in landscape as well as in conservation terms.

Moseley Bog, is the only SSSI within the subcatchment but there are 25 SINC of which 21 are wholly or partially water dependant. These include 6 separate stretches of the Cole totalling 15 km. However as a result of poor water quality and re-alignment of the river in the past, the Cole has limited conservation value. Many of the SINC are protected by Project Kingfisher - a joint Birmingham City Council and Solihull M B C project which warden the public open space along the Cole valley from the M6 upstream to the A45. Project Kingfisher is supported by the NRA who instigated and funded a management plan in 1991. Further upstream the river is protected by Project Millstream, a similar project funded by Birmingham City Council.

Bourne

There are only two SSSI, Hoar Park Wood and Bentley Park Wood both of which drain to the Whitacre Brook. Hoar Park Wood contains a small area of wet alder woodland and so is at least partially water dependant, but that part of Bentley Park Wood which lies within the Bourne subcatchment is largely independent of water influences. In addition there are 30 SINC within the subcatchment of which 6 are, at least partially, water dependant. These include Shustoke Reservoirs which at approximately 50 ha includes the largest open water body in the Catchment and as such is of importance for overwintering waterbirds.

The Bourne is important because of its relatively natural course and diverse physiographic features. Natural problems with suspended solids have reduced the conservation value because of the mobility of the river bed. Remedial action will be difficult.

Objectives

- **To protect and further the conservation of wetland SSSI and other wetland areas.**
- **To ensure that water quality in the Catchment is improved to meet its RQO.**
- **To reduce the detrimental influence of the large wildfowl population in Brueton Park lake on water quality in the Blythe.**
- **To protect the range of flows which reflect as natural a regime as possible.**

- **To protect those features within the river corridor or associated wetlands which contribute to the conservation interest.**
- **To encourage landowners to accept the normal processes of erosion and deposition, where this does not compromise flood defence requirements.**
- **To remove artificial bank reinforcements in the Cole Valley to allow a natural channel to develop.**

3.8 Archaeology

General

Rivers, canals and wetlands have often formed a focus for human activities, and many artifacts of earlier cultures - mills, bridges, navigational and fishing features - are preserved along river valleys. Under the Water Resources Act 1991, the NRA is obliged to have regard to the desirability of protecting and conserving buildings, sites and objects of archeological, architectural or historical interest.

Local Perspective

There are a number of archaeological sites within the catchment including seven Scheduled Ancient Monuments (SAM) and others on the Sites and Monument Record (SMR). Only Little Packington Bridge SAM on the Blythe and Furnace End Bridge SAM on the Bourne are directly water related, but other sites might be severely damaged by any lowering of the water table as this would affect buried remains.

Objectives

- **To encourage the protection of designated archaeological sites, associated with rivers.**
- **To ensure the water table is maintained at an appropriate level in wetland areas.**
- **To ensure where appropriate that archeological excavations are undertaken in advance of, or a watching brief be maintained during, the course of river engineering works.**

3.9 Recreation and Water Sports

General

Recreation relates to land based recreation activities which occur within the proximity of the river corridor, while water sports are those activities where there is intimate contact with water including bathing, canoeing, windsurfing and water skiing. Bathing in rivers and lakes is discouraged by the NRA because of the risk of drowning and the possibility of swimmers contracting water borne diseases.

Local Perspective

Blythe

The majority of the Blythe lies within the green belt but access to the river bank is generally poor. Sailing is carried out on one of the lakes at Earlswood but there are no other known water sports activities.

Cole

The Cole floodplain upstream of the M6 is almost entirely public open space managed by Project Kingfisher and Project Millstream. It has a well developed footpath network and is extensively used for recreation including birdwatching, cycling and orienteering. The provision of low protective fencing has reduced the problem of the illegal dumping of vehicles in the public open space.

Bourne

There are footpaths along much of the Bourne, many of which are well used. Sailing takes place on Shustoke reservoir.

Objectives

- **To improve water quality to its RQO level.**
- **To encourage the improvement of the footpath network in the Catchment. To improve access along stretches of the Blythe as appropriate. To encourage the creation of footpaths to link Project Kingfisher and Shustoke reservoir to the Tame Walkway and Warwickshire Way.**
- **To protect the range of flows which reflect as natural a river regime as possible.**
- **To encourage the provision of additional low protective fencing in the Cole valley to prevent the dumping of stolen cars.**

3.10 Angling

General

This relates specifically to the use of the Catchment for angling.

Local Perspective

Organised angling on rivers in the Catchment is currently confined to the Blythe downstream of the village of Barston. There is sporadic local angling activity in the lower reaches of the Cole and Bourne but the fish populations are generally too sparse to encourage any serious commitment.

A number of clubs holding tenancies on the middle reaches of the Blythe are dedicated to trout fishing and some stock annually, mostly with rainbow trout.

Downstream of the M6 bridge there is coarse fishing, most of which is on the Merevale Estate and is available on day ticket.

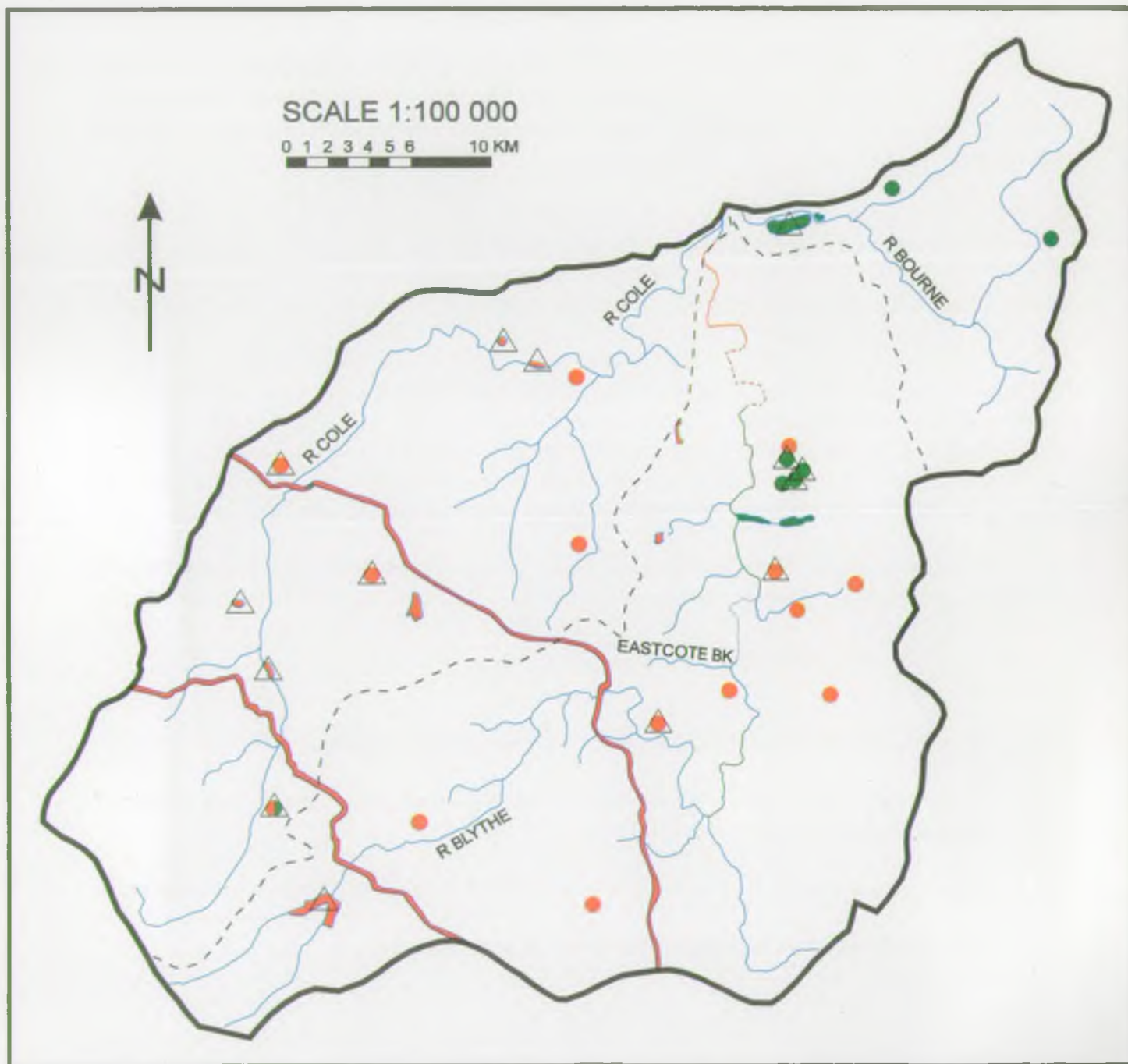
There are numerous still water fisheries within the Catchment, some offering day tickets for coarse and trout fishing (Map 11). In particular several pools are available for trout and coarse fishing on the Packington Estate, trout fishing at Shustoke Reservoir and coarse fishing at Earlswood and Eastcote Lakes. Day ticket coarse fisheries are also operated by Birmingham City Council within the conurbation (eg Trittiford Mill, Babbs Mill Lake).

Both the Stratford upon Avon and Grand Union canals are popular coarse fisheries and sections are leased by British Waterways to various clubs, some of which hold regular contests.

Objectives

- To promote suitable and safe conditions for successful angling.
- To maintain and improve water quality for the protection and enhancement of the watercourse for successful angling.
- To provide sufficient flow to maintain and improve the river system for angling.
- To facilitate access for anglers wherever appropriate.

ANGLING



key		CATCHMENT BOUNDARY		COARSE FISHING		DAY TICKET WATER
		SUB CATCHMENT BOUNDARY		TROUT FISHING		
		PRINCIPAL WATER COURSES		STILL WATER COARSE FISHING		
		CANAL		STILL WATER TROUT FISHING		

3.11 Surface Water Drainage and Flood Defence

General

The provision and maintenance of effective defences is required to protect people and property against flooding. Flood events, usually the consequence of extreme climatic conditions, are described in terms of the return period, eg 1 in 50 years. The effectiveness of flood defences is measured in similar terms. Different types of land use will require different levels of protection and this is reflected in the NRA's standards of service. (Appendix 5).

Where a watercourse has been designated Main River, the NRA has additional powers to carry out works or control the actions of others. Any proposal that could interfere with the bed or banks, or obstruct the flow in the river, requires the formal consent of the NRA.

The NRA also exercises control through seeking to obtain the co-operation and support of the Local Planning Authorities in restricting development which, if permitted, would be subject to flooding, and/or have an adverse effect on flooding elsewhere.

For properties which are at risk from flooding, the NRA operates a flood forecasting and warning service, and has an emergency workforce to ensure that flood defences are effective.

Local Perspective

Blythe

The subcatchment is predominantly rural and has an altitude range of 70 to 160 metres. Urbanisation and motorway run-off in the Solihull area have resulted in the principal watercourses responding very rapidly to rainfall, with artificially increased rates of flow. There are a number of surface water balancing systems which help smooth out the flashy response but the overall effect of the present and proposed urbanisation is to significantly alter the flow regime of the river at the upper end of the subcatchment. The natural river valley floor forming the floodplain is generally unaltered with relatively few occurrences of building encroachment.

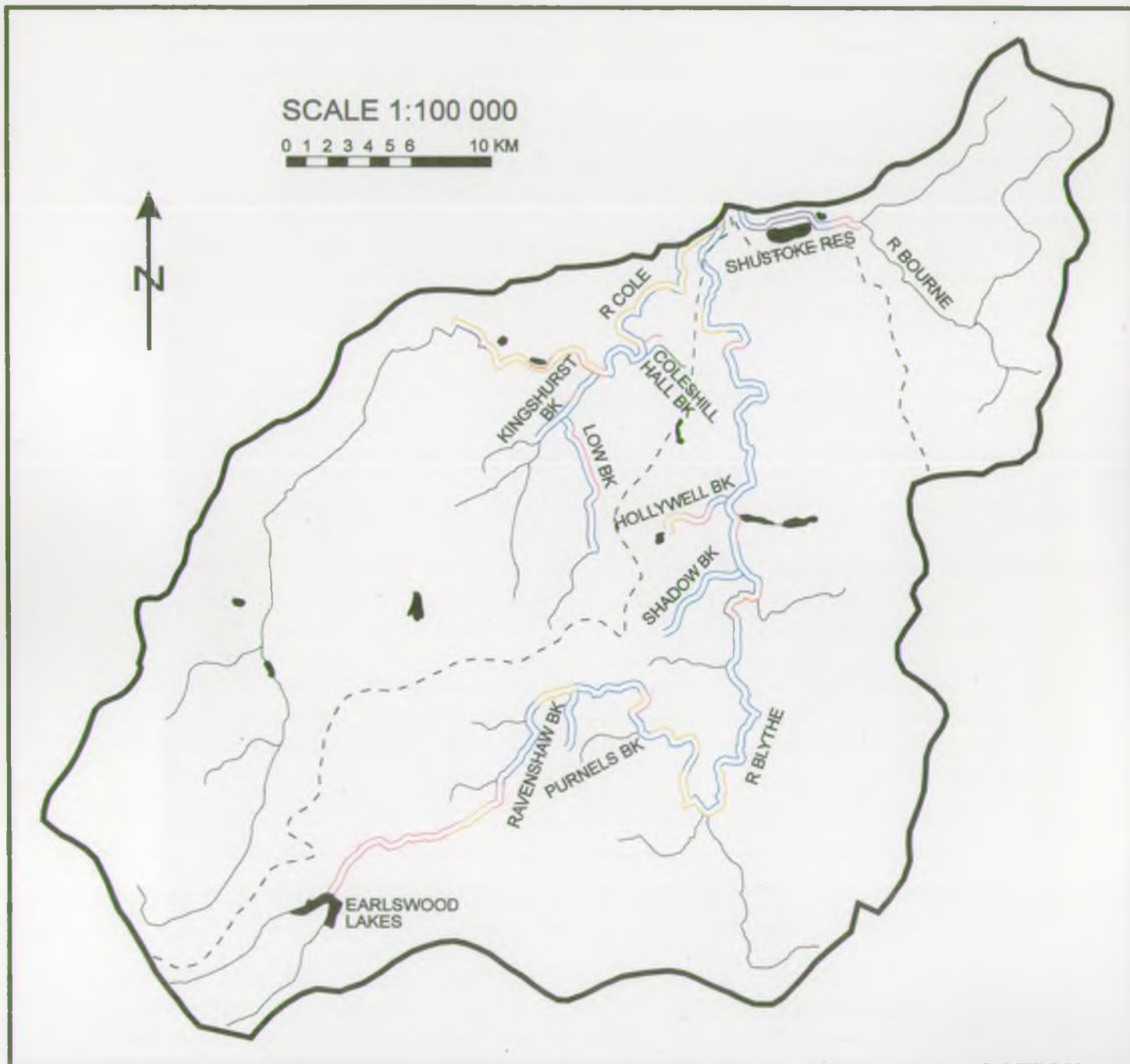
Cole


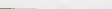


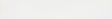



This subcatchment is extensively urbanised. The Cole drains the eastern area of the Birmingham/Solihull conurbation.

The river and its principal tributaries in the Birmingham area of the West Midlands Conurbation, with numerous surface water piped connections, respond very rapidly to rainfall with artificially increased rates of flow. There have been specific localised developments in the Cole floodplain but generally a corridor in the conurbation has been left, preserving the natural floodplain. There is a small amount of artificial surface water balancing throughout the subcatchment. The principal tributary is the Kingshurst Brook which drains an area including Birmingham International Airport. Run-off from the M42 drains to the head of the subcatchment.

MAP 12
FLOOD DEFENCE - LAND USE CLASSIFICATIONS
ON MAIN RIVER

FLOOD DEFENCE - LAND USE CLASSIFICATIONS ON MAIN RIVER



key		CATCHMENT BOUNDARY	LAND USE CLASSIFICATIONS ON MAIN RIVER			
		SUB CATCHMENT BOUNDARY		CLASS A		CLASS D
		ORDINARY WATERCOURSE		CLASS B		CLASS E
				CLASS C		

Bourne

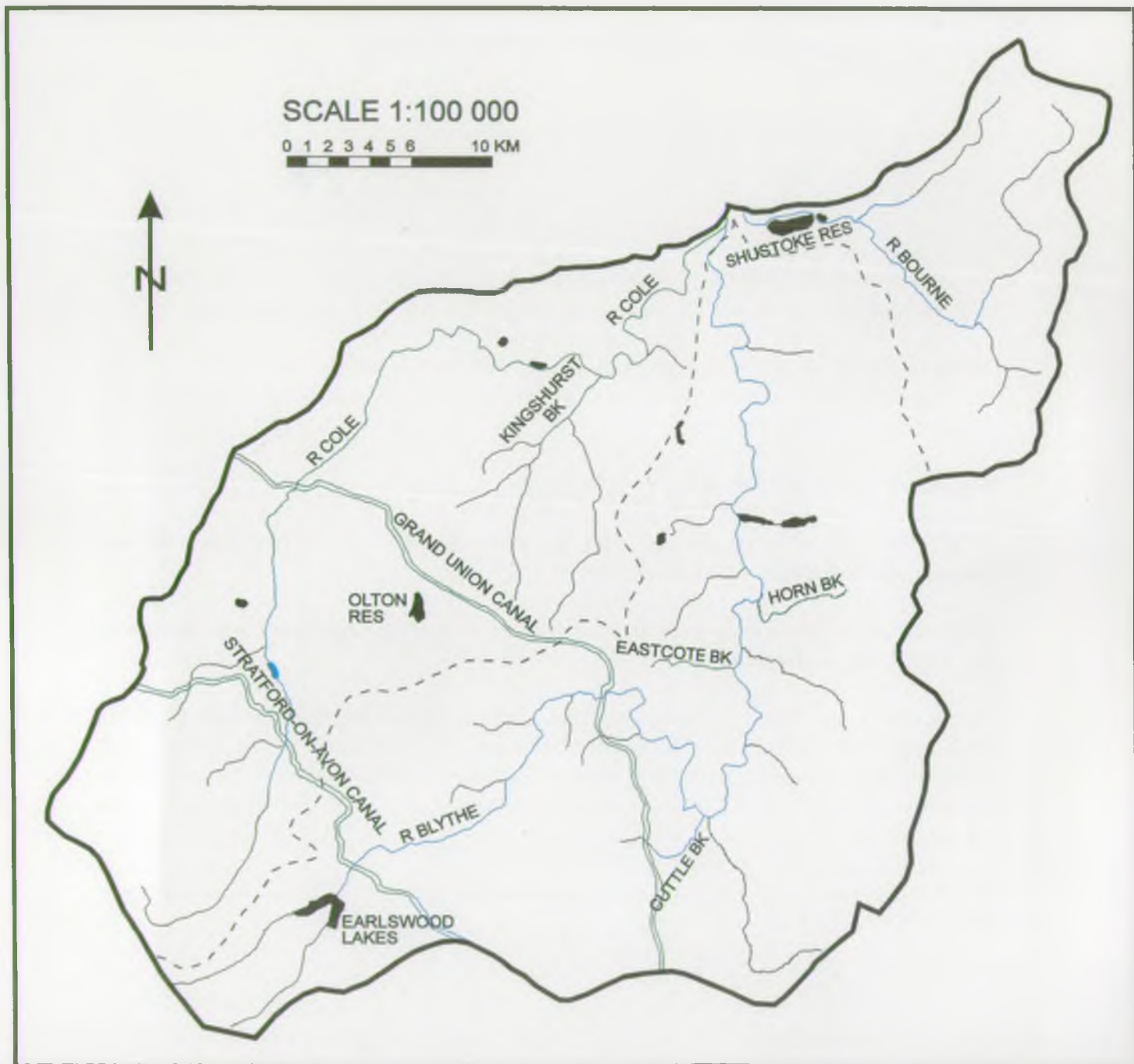
This subcatchment is essentially natural with only a very limited amount of urban development in the form of small village settlements. There is little encroachment into the floodplain with the exception of the off-line Shustoke Reservoir immediately upstream of the confluence with the Tame. Discharge to the subcatchment due to rainfall is increased by run-off from the M6 which drains to the Didgley Brook. Mining subsidence between Furnace End and the railway upstream of Shustoke Reservoir has marginally lowered the bed of the watercourse in this location.

A total of 69.3 km in the 3 subcatchments has been designated as Statutory Main River (Map 12).

Objectives

- ☐ To prevent the creation or extension of flooding risks by influencing control over new development and over surface water run-off from such developments.
- ☐ To maintain levels of service attributable to different land use bands. (Appendix 5). Map 12 indicates the appropriate categories for the Main River reaches in the Catchment.
- ☐ To operate existing flood defences effectively.
- ☐ To provide cost effective drainage for agricultural use in a way which does not impinge unreasonably upon other uses.
- ☐ To provide adequate arrangements for flood forecasting and flood warning, and for responding to flood events.
- ☐ To maintain the flood capacity in Main River watercourses through regular maintenance including obstruction/debris clearance, dredging, grass cutting and weed cutting. These activities will only be carried out after full consultation with riparian owners and taking conservation and fisheries interests into consideration.
- ☐ To maintain the monitoring of mining schemes to be alert to possible subsidence which could affect the river system.

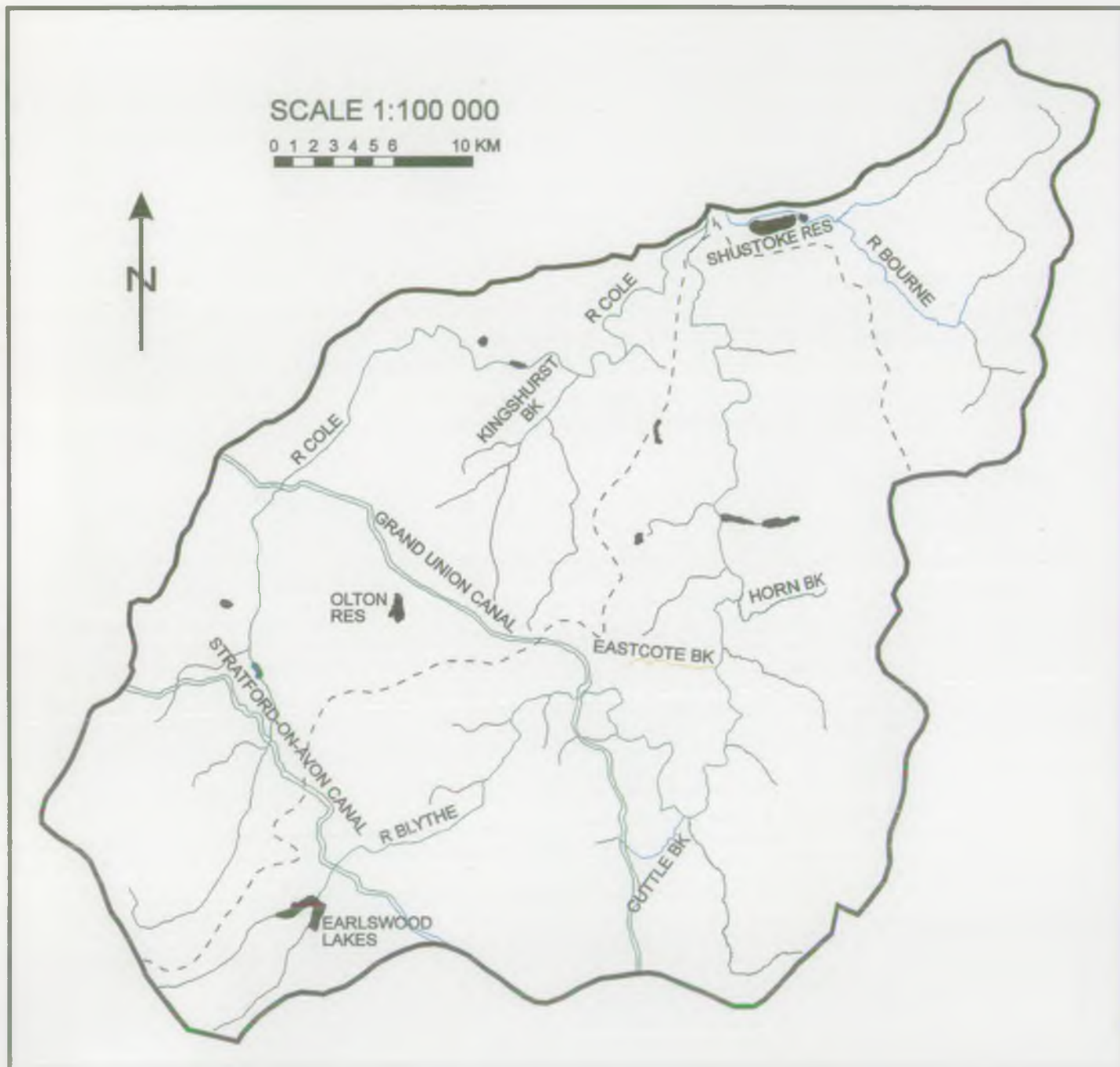
RIVER QUALITY OBJECTIVES



key		CATCHMENT BOUNDARY		CLASS 1B (GOOD)		
		SUB CATCHMENT BOUNDARY		CLASS 2 (FAIR)		
		UNCLASSIFIED WATER COURSES				
		CANAL				

MAP 14

CURRENT STATUS - SURFACE WATER QUALITY



key		CATCHMENT BOUNDARY		CLASS 1B (GOOD)		
		SUB CATCHMENT BOUNDARY		CLASS 2 (FAIR)		
		UNCLASSIFIED WATER COURSES		CLASS 3 (POOR)		
		CANAL				

4 STATE OF THE CATCHMENT

4.1 Water Quality

General

The state of the water quality is assessed against a number of targets outlined in Appendix 6. Routine chemical and biological sampling allows water quality to be monitored and any remedial action to be taken.

River Quality Objectives

Table 6 and Map 13 show the existing RQO for the designated watercourses in the Catchment, with Map 14 showing their current status. The existing legislation allows the Secretaries of State for the Environment and for Wales to set Statutory Water Objectives, acting on NRA advice. It is envisaged that the current RQO scheme will be replaced by a new framework of Statutory Water Quality Objectives related to use. The NRA will have a duty to ensure that these objectives are achieved.

Table 6

River Quality Objectives (1991).

Watercourse	Location of Reach From To		River Quality	River Quality Objective	Length (km)	EC Fish Designation
River Blythe	Earlswood Reservoir	Confluence with Eastcote Brook	2	1B	26.7	C*
	Outfall SP 114 742	SP 213 800				
	Confluence with Eastcote Brook	Confluence with Horn Brook	2	1B	2.5	
	SP 213 800	SP 220 819				
	Confluence with Horn Brook	Confluence with River Cole	2	1B	15	C*
	SP 220 819	SP 212 912				
	Confluence with River Cole	Confluence with River Tame	2	1B	0.4	
	SP 212 912	SP 212 915				
Cuttle Brook	A41 Road Bridge, Heronfield	Confluence with River Blythe	1B	1B	2	
	SP 192 751	SP 205 762				
Eastcote Brook	Barston WRW Outfall	Confluence with River Blythe	3	2	2.5	
	SP 191 800	SP 213 800				
Horn Brook	Meriden WRW Outfall	Confluence with River Blythe	2	2	3.1	
	SP 238 817	SP 220 819				
River Cole	Houndsfield Lane Bridge,	A34 Stratford Road Bridge,	2	1B	6.5	
	Whitlocks End	Sparkhill				
	SP 098 767	SP 099 828				
	A34 Stratford Road Bridge,	Confluence with River Blythe	2	2	22.5	
	Sparkhill	SP 211 911				
	SP 099 828					

Watercourse	Location of Reach		River Quality	River Quality Objective	Length (km)	EC Fish Designation
	From	To				
Hatchford Kingshurst Brook	Eastern Bridge SP 171 863	Low Brook Confluence SP 171 863	2	2	0.6	
	Hatchford Brook/Low Brook Confluence SP 171 863	Confluence with River Cole SP 179 874	2	2	1.5	
River Bourne	Arley WRW Access Road SP 278 878	B4114 Road Bridge, Furnace End SP 248 912	1B	1B	6.5	
	B4114 Road Bridge, Furnace End SP 248 912	Confluence with River Tame SP 215 915	1B	1B	4.1	
Whitacre Brook	Footbridge at Hall Farm, Whitacre Fields SP 259 918	Confluence with River Bourne SP 246 913	1B	1B	1.7	
Grand Union Canal	Bakers Lane Bridge, Chessetts Wood SP 192 741	Road Bridge at Elmdon Heath SP 161 807	2	2	9.1	C*
	Road Bridge at Elmdon Heath SP 161 808	Confluence with Birmingham and Fazeley Canal SP 097 900	2	2	14.4	
Stratford upon Avon Canal	Junction with Worcester and Birmingham Canal SP 053 794	Road Bridge, Ilshaw Heath SP 133 740	2	2	12.6	
	Road Bridge, Ilshaw Heath SP 133 740	Road Bridge, Lapworth SP 165 715	1B	1B	4.5	

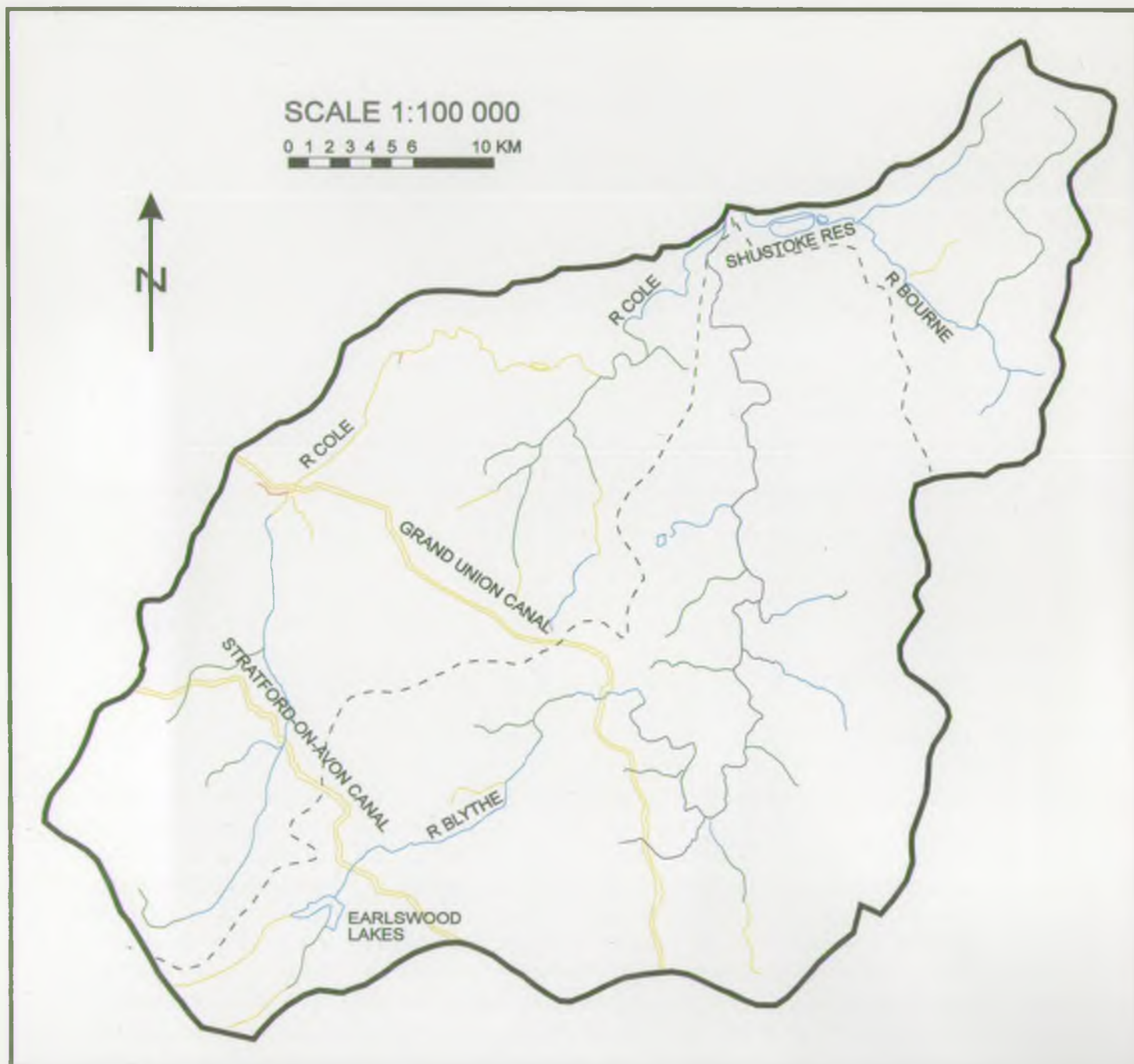
C* = Cyprinid (designated cyprinid fishery under EC Fisheries Directive(78/659/EEC)).

Of the 95.6 km of river with an RQO a total of 53.6 km (51%) failed to achieve the long term target class.

Biological Quality

The biological status of the Catchment is monitored regularly at routine sites, usually three times per annum. Some additional sites on minor tributaries have been sampled once to provide data for this report. All the samples were taken from the benthic macroinvertebrates (insects, shrimps, worms etc), the small animals inhabiting the bottom sediments of the rivers. Being unable to move far, the animals respond to changes in water conditions. An increase in organic pollution will firstly eliminate the most sensitive organisms, followed by the more tolerant ones as pollution levels increase. A reduction in species diversity may occur and the fauna become dominated by a few species able to withstand the pollutant. Toxic pollution, however, may eliminate all types of life and produce long term disruption to the natural community. Monitoring this response will reveal the effect of pollutants present at very low concentrations, those occurring intermittently and missed by routine chemical sampling and those for which chemical analysis is not performed.

BIOLOGICAL WATER QUALITY



key		CATCHMENT BOUNDARY	BIOLOGICAL QUALITY WITH TYPICAL BMWP SCORE RANGE			
		SUB CATCHMENT BOUNDARY		VERY GOOD 91 - 150		POOR 13 - 35
		CANAL		GOOD 66 - 90		VERY POOR 0 - 12
				MODERATE 36 - 65		

Samples are collected from routine river and canal monitoring sites using standardised NRA methods and analysed in the laboratory. The macroinvertebrates recorded at each site are related to the water quality using the Biological Monitoring Working Party (BMWP) scoring system. This is a simple means of assessing water quality and used widely within the NRA for biological reporting. A high BMWP score indicates good water quality.

The interpretation of the sampled data is depicted in Map 15 the reaches being coloured to indicate the inferred biological quality. These range from dark blue, indicative of clean water and supporting a pollution sensitive fauna of stonefly and mayfly nymphs and caddis larvae, to red, indicative of gross organic pollution and inhabited by only a few very tolerant species such as worms and midge larvae.

Blythe

Upstream of Earlswood Lakes the Blythe subcatchment is of poor or moderate biological quality with improvement downstream to good quality. Further downstream improvements result in a very good quality which extends to the Tame confluence. Particularly poor quality has been recorded from Cran Brook, passing through an industrial estate near Solihull, and the upper reach of Temple Balsall Brook. The remaining tributaries are typically of moderate or good quality.

The native crayfish, a protected species, has been recorded at three sites within the Blythe subcatchment.

Cole

The upper section of the Cole is of moderate quality but rapidly improves to good and remains this quality until reaching the Birmingham conurbation. Two tributaries upstream of the urbanised areas are of moderate quality and have no noticeable effect on the main river. Once the Cole reaches the industrialised area of south-east Birmingham, the quality deteriorates rapidly. It also receives water from two small but highly polluted tributaries, Spark and Flaxley Brooks, both serving industrial areas. Low Brook, a tributary of the Kingshurst Brook, originates as good quality upstream of Birmingham International Airport but becomes polluted within the airport to poor quality before recovering downstream. The remainder of the Kingshurst Brook system is mostly of moderate quality and leads to an improvement in the Cole downstream of the confluence. Further natural downstream recovery leads to good biological quality before the Blythe confluence.

Bourne

The Bourne Brook and the upper reach of Whitacre Brook are both of moderate quality. Apart from a minor tributary of poor quality, the remainder of the Bourne subcatchment is of good quality.

The canals within the Catchment are typically of poor quality but the macrofauna may also be influenced by the lack of suitable habitat.

Pollution Incidents

Even when the underlying quality of a river is acceptable a single pollution incident can adversely affect one or more of its legitimate uses.

Table 7 below summarises the pollution incidents investigated by the NRA in the Catchment from January to December 1992 and the principal activities which suffered as a result of these individual incidents. One incident may affect one or more activities. In addition there were 63 reported incidents which on investigation could not be substantiated.

Table 7

Pollution Incidents.

Pollution Type	Total	Abstraction and Public Water Supply	Conservation	Fisheries	Amenity	Other
Chemical	3	—	—	3	—	—
Oil	45	10	15	—	32	12
Sewage	36	2	2	—	29	4
Food Processing Waste	1	—	—	—	1	—
Suspended Solids	16	3	3	—	13	—
Farm Waste	12	5	2	—	4	6
Colour	4	—	1	—	3	1
Foam	1	—	—	—	1	—
Other	23	4	6	6	15	1
Total	141	24	29	9	98	24

Several issues have been identified with respect to water quality as follows:-

- **Blythe - Earlswood Lakes to Cole confluence.** This stretch is affected by algal activity originating from the overflow at Earlswood Lakes. (Issue 1).
- **Blythe - Eastcote Brook to Cole confluence.** Barston STW discharges effluent with high levels of ammonia which has a detrimental effect on the Blythe. Refurbishment of the STW in 1992 has resulted in marginal improvement in river water quality. However further improvements in quality will be required to ensure compliance with the RQO. (Issue 2).

- **Blythe - Earlswood Lakes to Cole confluence. Significant levels of pesticides have been detected throughout the subcatchment and have caused a derogation of the EC Drinking Water Directive. (Issue 3).**
- **Blythe - Cran Brook - Contaminated discharges from surface water sewers causing water quality problems. (Issue 4).**
- **Blythe - Brueton Park. Large numbers of wildfowl, particularly Canada Geese, are attracted to the park and their activities contribute organic solids to the lake. It is likely that this input is responsible for some deterioration in water quality in the Blythe downstream of the Park. (Issue 10).**
- **Blythe - Temple Balsall Brook - Poor biological quality. (Issue 20).**
- **Kingshurst/Hatchford Brook - Eastern Bridge to Cole and Low Brook. Run-off from Birmingham International Airport following applications of deicers has caused problems with water quality. (Issue 13).**
- **Cole - Upstream of Trittiford Mill to Colehall Lane. This stretch has variable water quality with high BOD and unionised ammonia. It is considered that a major contributor of pollutants in this stretch, are foul drainage connections to the Surface Water Sewerage System. (Issue 12).**
- **Bourne - Spring Hill to upstream Shustoke Reservoir - High concentrations of nitrates in the water abstracted for public supply compromise compliance with the EC Drinking Water Directive. (Issue 17).**

4.2 Water Quantity

Several issues have been identified with respect to water quantity as follows:-

- **Blythe - Headwaters.** Controlled by British Waterways (BW) to a great extent. The flows below Earlswood Lakes would be adversely affected if the Spring Brook was diverted into the lakes on a more or less permanent basis. To protect flows in the long term will require agreement with BW over the operation of releases from the lakes and or river regulation. (Issue 7).
- **Blythe - Cuttle Brook.** Reduced flows to the Blythe as a result of its operation as a canal feeder. (Issue 8).
- **Blythe and Cole.** Continuing urbanisation within the Blythe and Cole subcatchments is gradually eroding the base flows in both river systems. Base flows can only be protected if the catchment area forming the headwaters of both the Blythe and Cole is restricted as to its use. (Issue 18).

4.3 Physical Features

General

Objectives and targets have been set for a range of physical features identified for individual uses. Fishery, Conservation and Recreational matters, and Flood Defence works are dealt with under this heading.

Several Issues have been identified:

- **Blythe - Cheswick Green.** The residential area, has encroached into the floodplain and there is a risk of flooding to some properties. (Issue 6).
- **Blythe - Blythe Mill weir.** Is in poor condition and in danger of collapse. (Issue 11).
- **Blythe - Horn Brook.** The periodic introduction of large quantities of inorganic solids into the Blythe from the Horn Brook may result in excessive deposition on gravel beds and interfere with successful spawning activity of salmonid fish. (Issue 19).
- **Blythe - Brueton Park.** The weir at Brueton Park is an impassable barrier to the upstream migration of fish. (Issue 9).
- **Blythe and Cole.** Information on the areas at risk of flooding in the Catchment is currently based on limited records. Detailed surveying and the development of mathematical computer models are required, to determine more precisely the extent of the floodplain at risk for various frequencies of flooding.

There has been an increase in urbanisation in the Catchment over the last 20 years, and an associated increase in surface water balancing systems. As a result of this, there is scope for increased surface water control from urban areas in the upper reaches of the Blythe subcatchment. The development of a mathematical model should help to determine the impact of these balancing systems. (Issues 5 & 18).

- **Cole - Coleshill.** Possible flooding of Station Road Industrial Estate, Coleshill caused by encroachment of development into the Cole floodplain. (Issue 14).
- **Cole - Impassable weirs at Cook's Lane and Moorend Avenue** impede upstream movement of coarse fish and will prevent recolonisation of the middle reaches of the river when water quality conditions are amenable. (Issue 15).
- **Bourne - Fish populations** fail to proliferate even though water quality and habitat diversity are favourable. Investigations of the factors limiting the development of the fishery will need to be undertaken before remedial measures can be instigated. (Issue 16).

5 ISSUES AND OPTIONS

General

This section of the plan considers options to address the issues that have been raised in the preceding section. The options as 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.

The tables of issues and options that follow, are not in a priority order.

OPTIONS	RESPONSIBILITY	ADVANTAGES	DISADVANTAGES
ISSUE No. 1	Failure of the Blythe to meet RQO standard for BOD from Earlswood Lakes to confluence with the Cole due to algae originating from Earlswood Lakes.		
Increased monitoring of the Blythe and flow from Earlswood Lakes.	NRA.	Establish scale of problem to be tackled.	Time and resource commitment. Cost unknown.
Investigation of methods to control blue-green algae.	BW/NRA.	Improved water quality in the Blythe. Improve amenity value of lakes for angling and sailing.	None other than cost implications.
Negotiation with BW to control discharge from Earlswood Lakes.	NRA/BW.	Improve water quality.	Reduces water quantity.
ISSUE No. 2	Barston STW current consent results in RQO failure downstream for ammonia.		
Negotiation with Severn Trent Water Ltd. to tighten consent.	Severn Trent Water Ltd/NRA.	Improved water quality downstream of Eastcote Brook confluence.	Cost to Severn Trent Water Ltd.
ISSUE No. 3	Levels of pesticides in the Blythe can compromise the EC drinking water directive.		
Investigate, identify and eliminate illegal source of inputs.	NRA.	To bring pesticide levels within the EC requirements.	Manpower resource implications and increased analysis costs.
Negotiate with landowners and dischargers to reduce pesticides by adopting good farming practices.	NRA/MAFF.	To bring pesticide levels within the EC requirements.	None.

OPTIONS	RESPONSIBILITY	ADVANTAGES	DISADVANTAGES
ISSUE No. 4	Contaminated discharges from surface water sewers to the Cran Brook.		
Continuing investigation of wrong surface water sewer connections and instigation of remedial works.	Severn Trent Water Ltd and Solihull MBC as agents.	Improve water quality.	Cost of reconnection to foul sewer.
ISSUE No. 5	There has been a proliferation of surface water balancing systems in Solihull area resulting in a possible enhancement of flood levels on the Blythe.		
Undertake a mathematical modelling exercise to determine the flood levels at various points in the subcatchment.	NRA.	Reduce potential flooding problems.	Flood prevention works may need to be considered.
ISSUE No. 6	Potential flooding of a housing development at Cheswick Green from the Blythe.		
Construction of Flood Defences.	NRA.	Protection of property to 1 in 100 year event.	Cost to NRA.
ISSUE No. 7	There is the potential for the disruption of the flow of the Blythe by BW under their legal powers, by diversion of the headwaters into Earlswood Lakes.		
Discuss management with BW.	NRA/BW	Increased control over flow of river.	Continuation of algal problems.
Investigate other resources to augment flows	NRA/BW	Protection of SSSI. Maintenance of river flow to sustain existing abstractions.	Cost of investigation.

OPTIONS	RESPONSIBILITY	ADVANTAGES	DISADVANTAGES
ISSUE No. 8	Reduction of flow to the Blythe due to diversion of Cuttle Brook to the Canal system by BW under statutory powers.		
Discuss management agreement with BW.	NRA/BW.	Maintenance of river flow to sustain existing abstractions. Protection of SSSI. Dilution of Barston STW effluent.	Potential cost to BW.
ISSUE No. 9	Sandals Weir Brueton Park, Solihull, presents an obstruction to the upstream movement of fish in the Blythe.		
Consider modification of weir using rock chute to allow passage of fish.	NRA/Solihull MBC.	Upstream movement of fish and recolonisation.	Cost.
Diversion of river around Brueton Park pool to by-pass weir.	NRA/Solihull MBC.	Upstream movement and recolonisation of fish.	Cost.
ISSUE No. 10	Wildfowl on Brueton Park Pool cause increased pollution of the Blythe.		
Confirm extent of problem.	NRA/Solihull MBC.	Determine appropriate course of action.	Cost.
Divert water around pool.	NRA/Solihull MBC.	Improved water quality in the river.	Cost.
ISSUE No. 11	Restoration of Blythe Mill weir.		
NRA to negotiate with owners to make good the weir structure.	Owner.	Maintain water level upstream and protect SSSI and fishery.	Cost to owner.
ISSUE No. 12	Foul drainage connections to the surface water sewerage system entering the Cole at Trittiford Mill and Hay Barn Recreation Ground.		
Investigate and reconnect to foul sewer.	Severn Trent Water Ltd and Householders.	Improve water quality.	Cost.

OPTIONS	RESPONSIBILITY	ADVANTAGES	DISADVANTAGES
ISSUE No. 13	Severe de-icer pollution problems to a tributary of the Cole resulting from Birmingham Airport run-off.		
Divert first flush drainage to public foul sewer.	Birmingham International Airport (BIA).	Reduced polluting run-off and improved water quality.	Cost to BIA.
ISSUE No. 14	Possible flooding of Station Road Industrial Estate, Coleshill caused by encroachment of development into the Cole floodplain.		
Increase and maintain channel capacity of the Cole by periodic channel dredging or construct flood defence system.	NRA	Reduces flooding problem.	Cost to Land Drainage revenue expenditure or capital expenditure.
Extension of existing Flood Warning System to include Station Road.	NRA/Warwickshire County Council Emergency Planning Officer.	Flood warning facility for properties at risk.	No prevention of flooding.
ISSUE No. 15	Prevention of upstream movement of fish in the Cole by weirs at Cooks Lane and Moorend Avenue.		
Determine the possibility of circumventing the gauging weir at Moorend Avenue.	NRA.	Recolonisation of fish stocks in upper reaches.	Possible interference with flow gauging.
At Cooks Lane weir, construct fish chute to allow passage of fish upstream.	NRA.	Recolonisation of fish stocks in upper reaches.	Cost.
ISSUE No. 16	Poor fishery in the Bourne, due possibly to unstable river bed conditions.		
Carry out a study of the river structure.	NRA.	Remedial measures might be taken to improve fishery.	Cost.

OPTIONS	RESPONSIBILITY	ADVANTAGES	DISADVANTAGES
ISSUE No. 17	The Water Quality in the Bourne exceeds the EC Drinking Water Directive for nitrate and the subcatchment has been designated a Nitrate Advisory Area.		
Reduce application of nitrogen fertilizers by encouraging farmers to adopt alternative practices.	MAFF.	Meet EC drinking water directive.	
ISSUE No. 18	Impact of urban development on all aspects of the water environment, specifically through:- i) increased effluent loading of STW. ii) contaminated land. iii) increased demand for public water supply and private abstractions. iv) encroachment of development on floodplain and headwaters of the Catchment.		
Direct influence in planning process by seeking adoption of NRA model policies in Development Plans.	NRA.	New development/ redevelopments would have regard for constraints aimed at preserving the water environment.	
Encourage LPA not to release Green Belt land for development.	NRA/LPA.	Long term protection of base flows.	Limitation on development.
Encourage environmental enhancement as part of development/ redevelopment.	Developers.	As above.	Potential cost to developers.

OPTIONS	RESPONSIBILITY	ADVANTAGES	DISADVANTAGES
ISSUE No. 19	Periodic discharge of high levels of inorganic solids into the Blythe from Horn Brook.		
Investigate origin of solids and causes of release.	NRA.	Determine possibility of reducing or controlling solids releases and thereby diminish the risk of smothering gravel beds for spawning salmonids.	Cost of investigation.
ISSUE No. 20	Poor water quality in the Temple Balsall Brook, indicated by Biological Score.		
Investigate source of problem.	NRA.	Improved water quality.	Cost of investigation.

APPENDIX 1 - Glossary

Agricultural Land	<p>Grade 3: MAFF Agricultural Land Classification System. Land with moderate limitations due to the soil, relief or climate, or some combination of these factors which restrict choice of crops, timing of cultivations, or level of yield.</p> <p>The range of cropping is comparatively restricted on land in this grade. Only the less demanding horticultural crops can be grown and arable root crops are limited to forage crops. Grass and cereals are thus the principal crops. Some of the best quality permanent grassland may be placed in this Grade where the physical characteristics of the land make arable cropping inadvisable.</p> <p>Grade 4: MAFF Agricultural Land Classification System. Land with severe limitations due to adverse soil, relief or climate, or a combination of these. Land in this Grade is generally only suitable for low output enterprises. A high proportion of it will be under grass, with occasional fields of oats, barley or forage crops.</p>
Algae	Microscopic (sometimes larger) plants. Algae occur in water and are often discussed in the context of eutrophication.
Ammonia	A chemical compound found in water often as a result of pollution by sewage effluents. It is widely used to determine water quality. Ammonia detrimentally affects fish.
Aquifer	A rock layer which will absorb water and allow it to pass freely through.
Area of Special Landscape Value (ASLV)	Areas of Special/Great Landscape Value. Designated by local authorities and shown in Development Plans.
Base Flow	The flow in a river derived from groundwater sources.
BOD	Biochemical Oxygen Demand. A measure of the amount of oxygen consumed in water (over 5 days), usually by organic pollution. Oxygen is vital for life so the measurement of the BOD tests whether pollution could affect aquatic animals.
Cyprinid Fish	Coarse fish belonging to the carp family, like roach, dace and bream.
Derogation	The permitted relaxation of water quality standards where the target class for one or more standards is not achievable because of natural conditions.
Discharge Consent	A statutory document issued by the NRA which defines the legal limits and conditions on the discharge quality and volume of an effluent to a water.
DO	Dissolved Oxygen. The amount of oxygen dissolved in water. Oxygen is vital for life so this measurement is a test of the health of a river.
EC Directive	A type of legislation issued by the European Community which is binding on Member States in terms of the results to be achieved but which leaves to Member States the choice of methods.
Ecosystem	A functioning, interacting system composed of one or more living organisms and their effective environment, in biological, chemical and physical sense.
Environmental Quality Standard (EQS)	That concentration of a substance which must not be exceeded if a specified use of the aquatic environment is to be maintained.
Eutrophication	The process of nutrient enrichment of waters. This enrichment can cause unsightly growths of algae and other biological changes in the water environment.
Eutrophic	A description of water which is rich in nutrients. Such waters are sometimes beset with dense growths of algae.
Evapotranspiration	Water lost by evaporation and water taken up and lost by plant.
Floodplain	Land adjacent to a watercourse that is subject to flooding.

Hydraulic Continuity	The degree of interconnection between two potential sources of water, eg a river and an aquifer or two clearly defined aquifers.
Macrofauna	The invertebrate fauna large enough to be seen without the aid of a microscope.
Macrophytes	Plants clearly visible without the aid of a microscope but excluding fungi, lichens, mosses and algae.
Main River	The watercourses shown on the statutory 'Main River maps' held by NRA and MAFF. The NRA has permissive powers to carry out works of maintenance and improvement on these rivers.
Management Units	Administrative sub-divisions of aquifers, defined on geological and hydrogeological criteria, which form the basis for groundwater resource management and licensing policy decisions.
Mercia Mudstone	A thick sequence of relatively impermeable red-brown mudstones of Triassic age, with interbedded thin siltstones and sandstones which can provide limited supplies of groundwater.
Nitrification	The conversion of ammonia to nitrate by bacteria.
Nutrient	A chemical essential for life. If present in excess nutrients can produce the effects of eutrophication. In this report the term, nutrient, implies plant nutrients, primarily, nitrate and phosphate.
Oligochaetes	Aquatic worms.
Ordinary Watercourse	Means a watercourse that does not form part of a main river.
95 Percentile	A level of water quality, usually a concentration which is exceeded for 5 percent of the time.
Physiographic	Pertaining to the physical structure of the river and surrounding land.
Quality Standard	A level of a substance or any calculated value of a measure of water quality which must be achieved. The pairing of a specific concentration or level of a substance with a summary statistic like a percentile.
River Quality Objective	The statement or category of water quality that a body of water should match, usually in order to be satisfactory for use as a fishery or water supply etc.
Salmonid Fish	Game fish of the Salmon Family, eg trout and salmon.
SAM	Scheduled Ancient Monuments. Designated by the Department of National Heritage on advice from English Heritage or by the Secretary of State for Wales on advice from Cadw. Statutory - Ancient Monuments and Archaeological Act 1979.
Sherwood Sandstones	A thick sequence of poorly cemented red-brown sandstones with interbedded marls and conglomerates deposited during the Triassic era, and constituting one of the main aquifers in the British Isles.
SINC	Site of Importance for Nature Conservation. Also known as Prime Sites, Key Sites, Special Wildlife Sites. Designated by County Conservation/Wildlife Trusts and in some cases English Nature and Local Authorities. Non-statutory.
SSSI	Sites of Special Scientific Interest. Designated by English Nature or the Countryside Council for Wales for their biological interest of at least regional importance or their earth science interest of at least national importance. Statutory - set up under National Parks and National Heritage or advice from English Heritage or by the Access to the Countryside Act 1949 and Wildlife and Countryside Act 1981.
STW	Sewage Treatment Works.
Statutory Water Quality Objective (SWQO)	A Quality Objective given a statutory basis by Regulations made under the Water Resources Act 1991.
Upper Carboniferous	Clays, marls, sandstones and coal seams deposited during the period 325-280 million years ago.

APPENDIX 2 -Model Policies For Use In Development Plans;

The NRA has a wide range of direct powers to prevent and control water related problems and where appropriate will use them. However, these are not always adequate to protect against all of the potential problems surrounding development, and rarely offer preventative measures. Many of these measures are material to Town and Country Planning and it is for this reason that the NRA is involved in the planning process. When consulted on Draft Plans the NRA will comment on issues related to specific sites but for the process to be fully effective it is important that policies which cover NRA interests are incorporated in Development Plans. Model policies have been prepared, as set out below, but it is appreciated that to meet individual Plan styles the exact format may need to be modified.

Policy 1 - Flood Defence

The Council recognises the importance of the natural watercourse system for providing essential drainage of land and will protect that function against adverse forms of development, specifically to prevent:-

- i) Development in areas liable to flooding.
- ii) The loss of access to watercourses for future maintenance.
- iii) The loss of natural floodplain except in exceptional circumstances and when compensatory measures are provided as agreed with the Local Planning Authority.
- iv) Drainage from development giving rise to substantial changes in the characteristics of surface water run-off unless adequate off-site works can be provided.
- v) Adverse effects upon the integrity of tidal and fluvial defences.

These policies are necessary to ensure new development is itself not at risk from flooding and also does not put other areas at risk, endangering both life and property. Floodplains and areas of low lying land adjacent to a watercourse are by their very nature liable to flood under certain conditions. These areas also provide for storage of flood water and consequently not only are people and property at risk but development also reduces the capacity of the floodplain, impedes the flow of water and increases the risk of flooding elsewhere. Development in upper parts of a catchment can also have a significant impact upon others downstream by increasing surface run-off. An obligation to provide suitable mitigating measures is therefore necessary where this applies. A guarantee of future access to watercourses is required. However, the NRA's own powers under Land Drainage legislation extend only to designated Main Rivers and, even where these exist, are in practical terms very limited when development has proceeded in accordance with Local Plan policy.

Policy 2 - Registered Contaminated Land

The Council will only allow development on recognised contaminated land where it can be demonstrated that it will not cause or increase pollution of watercourses and groundwater resources.

The disturbance of contaminated land can mobilise pollutants and either cause first time pollution or exacerbate existing problems. Leachates and drainage from contaminated land sites pose serious risks of major pollution to both rivers and groundwaters.

Policy 3 - Groundwater Protection

The Council will have regard to the NRA's "Policy and Practice for the Protection of Groundwater" and will not allow development which could damage groundwater resources and prevent use of those resources.

Groundwater resources are a vital component of the potable water supplies but once polluted the damage is invariably irrevocable. It is essential therefore that development which threatens these resources is prevented.

Policy 4 - Water Pollution Prevention

The Council recognises the importance of maintaining the quality of the water based environment and will not permit development which could damage the quality and ecology of watercourses, or compromise statutory quality objectives. The Council will ensure that all development is served by satisfactory arrangements for disposal of foul sewage, trade effluent and surface water and specifically:-

- i) For the development sites where connection to existing main sewerage is practicable, the Council will oppose any development incorporating independent sewage treatment facilities;
- ii) The Council will seek to promote and co-ordinate public sewage disposal facilities or require developers to demonstrate that the multiple use of individual facilities such as septic tanks is feasible especially where there is a potential for high density infill without causing a public health nuisance and possible water pollution.
- iii) The Council will ensure that where increased sewerage and/or sewage treatment capacity is required development will not be allowed to be occupied in advance of the completion of the improved facilities.

- iv) The Council will ensure that no development involving the storage of oils and chemicals shall take place unless adequate measures have been taken to prevent discharge to watercourses in the event of spillages and/or leaks.

These policies seek to ensure the most environmentally effective means of disposal of foul sewage, contaminated surface water and trade effluents is used for any development. The Authority would wherever possible wish to see sewage and trade effluents disposed of via a recognised water reclamation facility where capacity exists. Alternatively the Council could promote the necessary infrastructure, together with the utilities companies, where there would otherwise be multiple use of small treatment plants. It is often in practical terms difficult to guarantee a consistent quality of effluent from small privately operated treatment plants and the problems are often then compounded by having many units in close proximity giving rise to environmental health nuisance as well as potential water pollution problems.

With increasing population and water use, sewerage systems and treatment works become overloaded. Where development is allowed to continue despite overloading, pollution of watercourses will occur. The Authority has powers to control the standards of effluent from treatment works, with the ultimate sanction of prosecution. However, this may be too late to prevent damage and a reasonable approach would be to phase development to coincide with increased treatment capacity.

Equally, there are circumstances where development cannot be achieved without detriment to quality or ecology and the Authority will seek refusal of planning consent on principle in such cases.

Policy 5 - Water Environment

The Council recognises the importance of the natural watercourse system and wetland areas as valuable wildlife habitats and for their amenity interests and will:-

- i) Protect those interests against adverse forms of development.
- ii) Encourage the development of water based recreation and public access whenever appropriate and where it will not conflict with the ecological value of the area.

The Water Resources Act 1991 (Section 16) places upon the Authority a duty not only to further the conservation of landscape, flora, fauna and geological features but also to take measures to enhance it as far as any of its functions are concerned. It also has duties to promote recreation and to have regard to the conservation of historic and archaeological features. Clearly, developments can severely threaten these interests.

Policy 6 - Water Resources

The Council will not allow development to proceed prior to the availability of the necessary water resources, the use of which has no detrimental effect on the environment.

The development of water resources for public water supply is becoming increasingly difficult in some areas. The Authority has a duty to ensure that providing water for new development does not have a detrimental impact on existing users, nature conservation or recreation.

APPENDIX 3 - River Quality Objectives

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

Notes

- a) Under extreme weather conditions (eg flood, drought, freeze up), or when dominated by plant growth, or by aquatic plant decay, rivers usually in Classes 1, 2 and 3 may have BOD and dissolved oxygen levels, or ammonia content outside the stated levels, those Classes. When this occurs the cause should be stated along with analytical results.
- b) The BOD determinations refer to 5 day carbonaceous BOD(ATU). Ammonia figures are expressed as NH_4 .
- * This may not apply if there is a high degree of reaeration.
- ** EEC category A2 and A3 requirements are those specified in the EEC Council Directive of 16 June 1975 concerning the Quality of Surface Water intended for Abstraction of Drinking Water in the Member States.
- c) In most instances the chemical classification given above will be suitable. However the basis of the classification is restricted to a finite number of chemical determinands and there may be a few cases where the presence of a chemical substance other than those used in the classification markedly reduces the quality of the water. In such cases, the quality classification of the water should be downgraded on the basis of the biota actually present, and the reasons stated.
- d) EIFAC (European Inland Fisheries Advisory Commission) limits should be expressed as 95% percentile limits.

APPENDIX 4 - Groundwater Protection

Groundwater Protection

The NRA published its "Policy and Practice for the Protection of Groundwater" in December 1992. Groundwater is a vital natural resource and under particular threat from the effects of human activity. Once polluted, groundwater is often difficult and very expensive to recover. Therefore preventing groundwater contamination is a major objective for the NRA. The Authority would like this policy to be viewed by all those whose activities may compromise groundwater quality as a guide to assist and influence future planning and strategy decisions. The document outlines the concept of vulnerability, that is the designation of areas of land where certain activities can have an appreciable effect on groundwater quality in an aquifer system and where pollution could quickly enter groundwater. It deals in particular with:-

- i) waste disposal to land
- ii) disposal of slurries and sludge to land
- iii) physical disturbance of aquifers affecting quality and quantity
- iv) contaminated land
- v) diffuse pollution.

and unacceptable activities in high risk areas.

Extension of the Groundwater Protection Policy to River Catchments

In certain circumstances it is advisable to develop a modification of the Groundwater Protection Policy for the catchment areas of water supply rivers. This is most relevant where the surface water is in hydraulic continuity with the strata through which it flows. Such a modification has been applied to the subcatchment of the Blythe because the development of landfill sites in sand and gravel excavations is considered an undesirable threat to the quality of that resource. This is a unique case in the Severn-Trent Region. The minerals planning and waste regulation authorities in the affected areas have been formally alerted to the NRA attitude which is reproduced below.

Where situations merit, similar approaches may be taken for other areas.

Blythe, Pollution Prevention - Landfill Requirements

The Blythe is fully utilised as a source of public water supply. The geology of the valley is such that highly permeable sand and gravel deposits overlie Mercia Mudstone strata. Towards the middle and lower reaches of the river extraction of these deposits is economically viable. Planning permission for extraction is rarely given today without stipulating that the void created is backfilled. Such excavations are therefore ideal landfill sites and, bearing in mind their location between two major urban and industrial areas, the extraction created substantial pressure to use potentially polluting wastes as an infill medium. The sand and gravel deposits are largely in hydraulic continuity with the river and its tributaries. If unrestricted, or poorly engineered landfilling were to occur on a large scale, significant contamination of the Blythe could result.

There is current interest in substantial extraction in the middle reaches of the valley and the NRA has been approached regarding its attitude towards waste disposal. It was thought appropriate, in view of the fairly unique situation, that guidelines should be drawn up for the aid of County Planning Officers and prospective applicants setting out the NRA's attitude.

The Blythe will therefore be protected by defining a zone within the river valley where in future, tipping other than strictly inert materials, would be opposed by the NRA.

- a) Landfill sites situated within 1 kilometre of the Blythe and which are considered to be in hydraulic continuity with it, or its tributaries, would normally be restricted to materials of an inert nature only.
- b) Landfill sites situated at distances greater than 1 kilometre from the Blythe, within the sand and gravel deposits, but not in hydraulic continuity with surface watercourses, may be acceptable provided adequate engineering measures can be agreed to minimise leachate generation and migration, and consequent groundwater pollution.
- c) At landfill sites greater than 1 kilometre from the Blythe, but where sand and gravel deposits are in hydraulic continuity with tributary streams, similar restrictions would be imposed as in (a) above. However, if the statutory construction and operation of an engineered test cell, designed on a containment basis, can be demonstrated, consideration may be given to the infilling of such areas with domestic and similar wastes.
- d) In most instances the chemical classification given above will be suitable. However the basis of the classification is restricted to a finite number of chemical determinands and there may be a few cases where the presence of a chemical substance other than those used in the classification markedly reduces the quality of the water. In such cases, the quality classification of the water should be downgraded on the basis of the biota actually present, and the reasons stated.
- e) EIFAC (European Inland Fisheries Advisory Commission) limits should be expressed as 95% percentile limits.

APPENDIX 5 - Standards of Service for Flood Defence and Land Drainage;

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

APPENDIX 6 - Water Quality Targets

Water quality is assessed against a number of control measures:

- i) Compliance with River Quality Objectives (RQO) based on the National Water Council (NWC) target classes.
- ii) Biological target classes.
- iii) Compliance with relevant EC Directives.
- iv) Compliance with Proposed Statutory Water Quality Objectives (SWQO).

River Quality Objectives are based upon water quality requirements for different river uses. The standards relating to the most sensitive use in a given stretch apply.

The NRA currently reports on the quality of rivers, canals and estuaries to the Department of the Environment on the basis of the National Water Council target classes (Appendix 5). These are based upon a limited range of chemical criteria, eg BOD, dissolved oxygen and ammonia. Rivers and canals are ranked in order of decreasing water quality as 1A (very good), 1B (good), 2 (fair), 3 (poor) and 4 (bad).

Biological assessment of the presence and abundance of aquatic invertebrates, in conjunction with sampling and analysis for some chemical parameters, provides a comprehensive indication of water quality.

As well as the RQO classification, European Commission (EC) Directives are also used to set quality targets for both ground and surface water.

- a) the 78/659/EEC Fisheries Directive defines standards necessary to ensure that water quality is suitable for supporting fish populations.
- b) the 76/464/EEC Dangerous Substances Directive deals with the discharge of substances considered harmful to the aquatic environment.

N.B. The Fisheries Directive applies only to designated stretches, whereas the Dangerous Substances Directive applies to all waters.

- c) the Surface Water Abstraction Directive (75/440/EEC) must also be considered when setting consent conditions in the catchment, as the Blythe and Bourne are both heavily abstracted for drinking water.
- d) the Nitrate Directive deals with the problem of nitrate pollution in surface and groundwaters for any designated areas. These are due to be specified in December 1993.
- e) the Urban Waste Water Directive may be applied to the catchment if any stretch is designated a sensitive area in the future.

During 1994, the NRA will be producing a series of proposed Statutory Water Quality Objectives (SWQO's). These objectives encompass all the above control measures and provide a clear indication of the desired use-related water quality in a given length of watercourse. Excluding natural features, the degree to which each watercourse complies with its objectives could be regarded as a measure of the effectiveness of the NRA in controlling pollution.

When a stretch is classified under an EC Directive additional Environmental Quality Standards apply.