RIVERS IDLE AND TORNE CATCHMENT MANAGEMENT PLAN CONSULTATION REPORT NOVEMBER 1995

NRA

National Rivers Authority
Severn-Trent Region

YOUR VIEWS

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

* comment on the Vision for the Catchment.

* comment on the issues and options identified in the report.

* suggest alternative options for resolving identified issues.

* raise additional issues not identified in the report.

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

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

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

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

Comments on the Consultation Report should be sent to:

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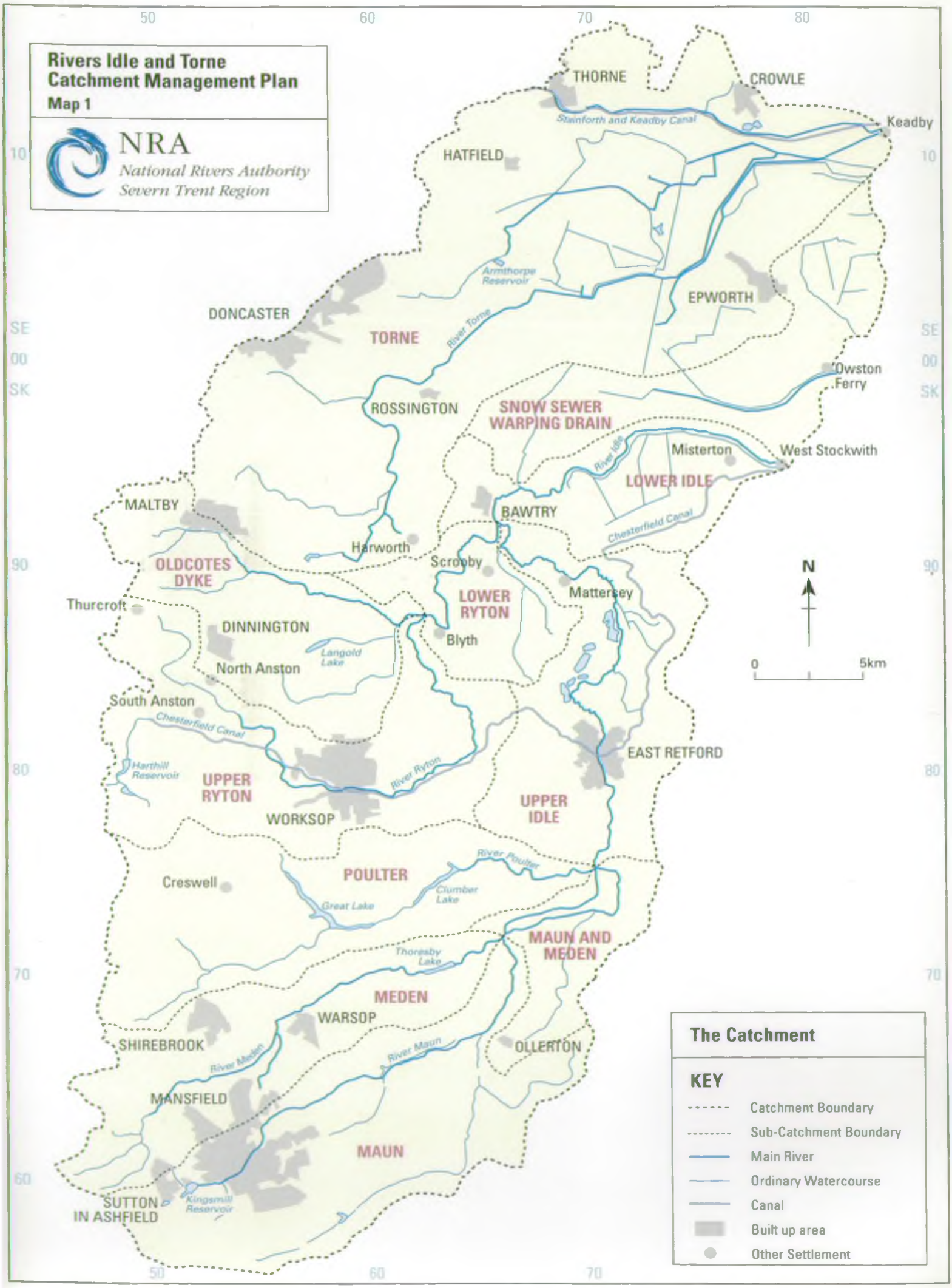
Lower Trent Area
Trentside Offices
Scarrington Road
West Bridgford
Nottingham NG2 5FA

All contributions should be made in writing by: 16 February 1996

If you or your organisation need further information, please contact Alison Fisher at the above address or by telephone on (0115) 945 5722 extension 3620.


Rivers Idle and Torne
Catchment Management Plan
Map 1
NRA
National Rivers Authority
Severn Trent Region
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80
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SE
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90
70
60
THORNE
CROWLE
Keadby
Stainforth and Keadby Canal
HATFIELD
Armthorpe Reservoir
EPWORTH
DONCASTER
TORNE
River Torne
Owston Ferry
ROSSINGTON
SNOW SEWER
WARPING DRAIN
River Idle
Misterton
West Stockwith
LOWER IDLE
MALTBY
BAWTRY
Chesterfield Canal
Harworth
Scrooby
OLDCOTES
DYKE
LOWER
RYTON
Mattersey
Thurcroft
DINNINGTON
Blyth
Langold Lake
North Anston
South Anston
Chesterfield Canal
EAST RETFORD
Harthill Reservoir
UPPER
RYTON
River Ryton
UPPER
IDLE
WORKSOP
River Poulter
POULTER
Creswell
Clumber Lake
Great Lake
MAUN AND
MEDEN
Thoresby Lake
MEDEN
WARSOP
SHIREBROOK
River Meden
River Maun
OLLERTON
MANSFIELD
MAUN
SUTTON
IN ASHFIELD
Kingsmill Reservoir
N
0
5km
The Catchment
KEY
Catchment Boundary
Sub-Catchment Boundary
Main River
Ordinary Watercourse
Canal
Built up area
Other Settlement

November 1995

FOREWORD

The National Rivers Authority was created in 1989 to protect the natural water environment and 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 Rivers Idle and Torne Catchment. It provides a framework for consultation and also a means of seeking commitment from those involved to realise the full environmental potential of the Catchment.

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

Brian Waters
Area Manager
Lower Trent Area

THE NRA's VISION FOR THE RIVERS IDLE AND TORNE CATCHMENT

The catchment of the Rivers Idle and Torne cover an area of 1307 km^2 within north Nottinghamshire and south Humberside and is home to about 625,000 people.

The presence of man has impacted on the catchments of the two rivers since medieval times. Consequently, the whole catchment area is rich in industrial and archaeological heritage. The heavily urbanised and industrial headwaters contrast sharply with the very flat, open and rural lower reaches nearer to the confluences with the River Trent. Here, man's influence is also apparent where drains have been cut and rivers re-routed and straightened to produce highly productive agricultural areas.

With the exception of the headwater areas, the catchment is predominantly rural. The River Idle and its tributaries flow through the heavily industrialised towns of Mansfield and Worksop, then through the rolling forested areas of Sherwood Forest and the Dukeries. The River Torne rises on the edge of Doncaster and flows through the flat areas of low land, characterised by the Isle of Axholme, Thorne and Hatfield Moors.

The NRA's vision for this catchment is to achieve sustainable management of the water resources within the catchment area, particularly in the lower reaches where water level management is of prime importance.

The key objectives of the plan are therefore to :

* Establish a balance between the demands of irrigation and abstraction and the needs of the environment

* Ensure that the quality of minewater discharged to the rivers is of a standard appropriate to the needs of downstream users.

* Initiate and promote proposals for the improvement of habitats for fisheries and conservation.

* Ensure that the standard of flood protection is appropriate to the needs of the adjacent land use, consistent with the vision.

The NRA cannot achieve this vision alone. This plan is intended to establish a single integrated reference source of information for the catchment. It depends on the committed and enthusiastic cooperation of others. Some objectives are common goals, while others may require a degree of compromise between differing demands on the resources of the catchment. The NRA can use Catchment Management Planning to manage the water environment. You can use it to air your views and help integrate your actions towards a common goal. To achieve a shared vision we need to work in partnership with local authorities and many other agencies, environmental groups, individuals and all those who have the interests of the catchment at heart.

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PART I

THE CATCHMENT REPORT

SECTION 1 THE CATCHMENT MANAGEMENT PLAN PROCESS

1.1 THE NATIONAL RIVERS AUTHORITY (NRA)

1.1.1 Status

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

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

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

1.1.2 Statutory Committees

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

1.1.3 Mission Statement

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

1.1.4 Aims

* Achieve a continuing overall improvement in the quality of rivers, estuaries and coastal waters through the control of pollution.

* Manage water resources to achieve the right balance between the needs of the environment and those of the abstractors.

* Provide effective defence for people and property against flooding from rivers and the sea.

* Provide adequate arrangements for flood forecasting and warning.

* Maintain, improve and develop fisheries.

* Develop the amenity and recreational potential of inland and coastal waters and associated lands.

* Conserve and enhance wildlife, landscape and archaeological features associated with inland and coastal waters of England and Wales.

* Improve and maintain inland waters and their facilities for use by the public where the NRA is the navigation authority.

* Ensure that dischargers pay the costs of the consequences of their discharges, and, as far as possible, to recover the costs of water environmental improvements from those who benefit.

* Improve public understanding of the water environment and the NRA's work.

* Improve efficiency in the exercise of the NRA's functions and to provide challenge and opportunity for employees and show concern for their welfare.

1.1.5 The Operational Activities of the NRA

The Severn-Trent Region is divided into four Areas, each headed by a locally based Area Manager. This allows an integrated approach to management which gives a responsive service to customers.

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

For pollution control, the most important task is to monitor the aquatic environment and any discharges to it. Water quality is continuously assessed against the aim of achieving compliance with national and european legislation. The pollution of water is a criminal offence and the NRA will prosecute when necessary.

The responsibilities for water resources include licensing, covering licence determination, charging, policing and enforcement. Through these responsibilities an integrated approach is taken that aims to strike a balance between the needs of abstractors and the environment.

Flood Defence activities cover regulation and enforcement, maintenance and emergency

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

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

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

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

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

1.2 THE CATCHMENT MANAGEMENT PLAN

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

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

The CMPs set out the NRA's vision for the future of individual river catchments. A river catchment is a discrete geographical area which is drained by a single surface water system. The 21,600 square kilometres covered by the Severn-Trent Region of the NRA consists of only two principal catchments, the River Severn and the River Trent. Due to their large surface area, they have been divided for management purposes into 17 sub-catchments.

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

CMP STAGES

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

PART I **The Catchment Report**: This section gives a brief description of the Catchment and presents a range of management issues with suggested options for solution. The bodies responsible for the suggested options are identified.

PART II **Supporting Information**: This section provides background information to Part I. A description of each use of the water environment and its impact in the catchment is included. Targets are given for water quality, water quantity and physical features. These are assessed against the current state of the Catchment.

The **second** stage of the CMP process is the production of the Action Plan. The Action Plan details areas of work and investment proposed by the NRA and others. It will explain how comments from the Consultation process have affected the issues and options in the CMP.

Further consultation will be held with those involved in the actions to seek their commitment prior to publication of the Action Plan. Timescales, targets and estimated costs will be added at this stage.

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

SECTION 2 AN OVERVIEW OF THE CATCHMENT

2.1 CATCHMENT DESCRIPTION

2.1.1 Introduction

The area covered by the catchment plan comprises widely varying landscapes from the flat land of the Isle of Axholme and Hatfield Chase in the north east, to the rolling, wooded Dukeries and heavily urbanised headwater areas around Mansfield and Doncaster. This diversity is reflected in the choice of cover photos for the plan. No one photograph can truly sum up the whole catchment area.

The Rivers Idle and Torne rise between Nottingham and Doncaster and flow in a generally north - easterly direction to join the River Trent at large land drainage pumping stations at West Stockwith and Keadby respectively. Major tributaries of the Idle are the Rivers Ryton, Meden, Maun and Poulter. The catchment of the Snow Sewer, also known as the Warping Drain has also been included in this catchment plan and flows into the River Trent at Owston Ferry. Most of the land in the lower reaches of the catchment lies below the River Trent high tide level and is protected by an extensive system of floodbanks.

The history of fenland drainage within the Isle of Axholme is a reminder of man's struggle to produce food from land which, left to the forces of nature alone, would be submerged beneath an inland sea. From medieval times, drains have been dug to control flooding. In the 17th Century, King Charles I engaged a Dutchman, Cornelius Vermuyden to implement large scale land drainage improvements in these low lying areas. These works have continued and the early gravity drainage has been replaced by a comprehensive system of pumped drainage. This supports high grade agricultural land within the catchment area.

Major settlements in the catchment include Sutton in Ashfield, Mansfield, Worksop, East Retford and a small portion of the suburbs of Doncaster and Rotherham. With the exception of Worksop and East Retford, all the major urban conurbations in the catchment are located on the headwaters of the catchment's rivers. In the twelfth century, Bawtry was a thriving port. The Pilgrim Father movement began in the villages of Babworth and Scrooby. Epworth was the birthplace of the Wesley brothers, founders of the Wesleyan Church. The catchment has been extensively mined for coal in the past and several working collieries remain.

Remnants of the old Royal Forest of Sherwood survive, including the Major Oak of Robin Hood fame. This forest once stretched the 20 miles from Nottingham to Worksop and was up to 8 miles wide. Over the centuries much of the land became part of large private estates. The Dukeries, comprising once large privately owned farm estates such as Welbeck Abbey, Thoresby Hall and Clumber Park, were and are, managed according to traditional patterns of landscape enhancement, sporting and productive woodland, mainly concentrated around the main house and associated parkland. Although large areas were converted to agriculture,

woodland is still a major feature of this part of the catchment.

2.1.2 Topography and Landscape

The general topography of the area is shown on Map 2. The highest land in the catchment rises to about 200m AOD in the south west, falling to sea level in the north east, where much of the land is very flat.

The River Torne flows through mainly flat agricultural land with the headwaters situated in Sandbeck Hall Lake. It flows past the settlements of Tickhill, Rossington, Auckley, Wroot and Sandtoft. The farmed landscape is geometric with isolated hedgerows and woodlands. Industrial structures, such as colliery spoil tips and pylons dominate parts of the catchment. The river tends to be insignificant in the valley landform. The river flows past the southern fringe of Hatfield Moors where peat extraction is taking place. Downstream of Auckley the river has been substantially modified with floodbanks dominating the river and sparse tree cover.

The River Idle is fed by the Rivers Meden, Maun and Poulter which become the Idle near Gamston. The River Ryton joins upstream of Bawtry. These watercourses flow through Mansfield, Worksop, Warsop and Ollerton. Downstream of Gamston the river flows through East Retford, Bawtry and down to the River Trent at West Stockwith. The river channel downstream of Retford has been highly modified for flood relief purposes and is embanked in some areas. Generally this area is farmed intensively and has very sparse tree cover, but some planting has been carried out on the river banks downstream of Idle Stop. West Stockwith pumping station dominates the landscape near its confluence with the River Trent.

2.1.3 Geology

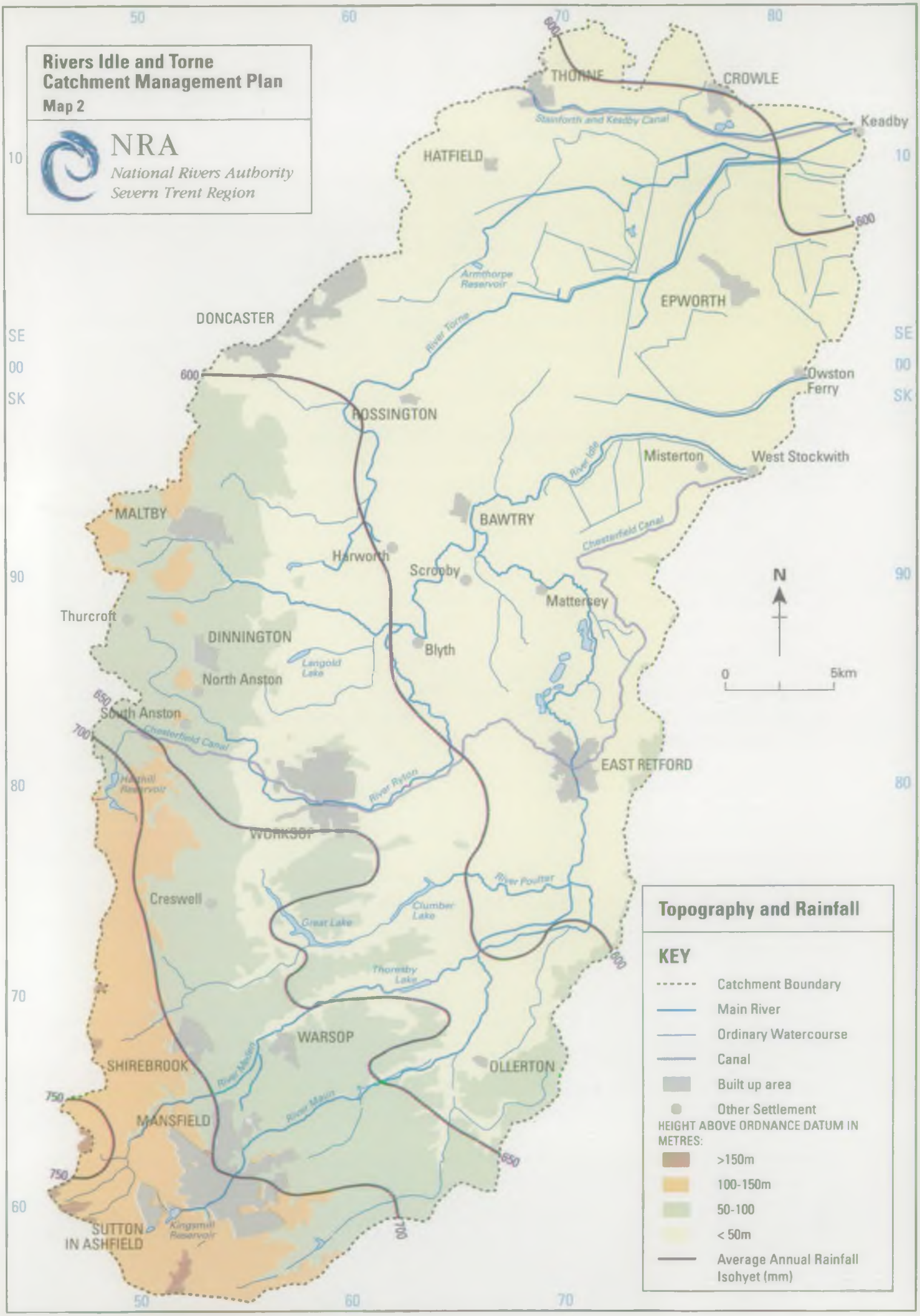
The underlying solid geology is shown on Map 3. To the west, small areas of Coal Measures are overlain by the Lower Magnesian Limestone. These form a broad band along the western edge of the catchment that is generally separated from the overlying strata by the Middle Permian Marl, though this becomes thin or absent in the south. To the south of Worksop, the Middle Permian Marl is overlain directly by Sherwood Sandstones. To the north, the Upper Magnesian Limestone and the Upper Permian Marl intervene.

The outcrop of the Sherwood Sandstone underlies the majority of the catchment and continues out to the east, where it is overlain by the Mercia Mudstone, which now forms a low escarpment. All the strata dip gently to the east at an angle of 2 - 3 °.

The solid geology is generally drift free. The Doncaster area however, is notable for its complex drift sequence, which varies both with depth and spatially.

2.1.4 Hydrogeology

The Coal Measures consist mostly of impermeable strata, with occasional thin sandstone beds, from which very limited supplies of groundwater can be obtained. The quality of the water


Rivers Idle and Torne
Catchment Management Plan
Map 2
NRA
National Rivers Authority
Severn Trent Region
THORNE
CROWLE
Keadby
Stainforth and Keadby Canal
HATFIELD
Armthorpe Reservoir
EPWORTH
River Torne
DONCASTER
ROSSINGTON
Owston Ferry
River Idle
Misterton
West Stockwith
MALTBY
BAWTRY
Chesterfield Canal
Harworth
Scrooby
Mattersey
Thurcroft
DINNINGTON
Blyth
Langold Lake
North Anston
South Anston
EAST RETFORD
Hodsock Priory Reservoir
River Ryton
WORKSOP
Creswell
River Poulter
Great Lake
Clumber Lake
Thoresby Lake
WARSOP
SHIREBROOK
River Meden
River Maun
OLLERTON
MANSFIELD
SUTTON IN ASHFIELD
Kingsmill Reservoir
N
0
5km
Topography and Rainfall
KEY
Catchment Boundary
Main River
Ordinary Watercourse
Canal
Built up area
Other Settlement
HEIGHT ABOVE ORDNANCE DATUM IN METRES:
>150m
100-150m
50-100
< 50m
Average Annual Rainfall Isohyet (mm)

can be poor, with high concentrations of chlorides and sulphates.

The Lower Magnesian Limestone is capable of providing substantial water supplies if well developed fissure systems are intersected during drilling. However, it is not possible to determine, in advance, either the likely yield, or the quality of proposed sources prior to exploratory work. Yields are often poor and attempts in the past to develop the aquifer for public water supply have failed.

The main aquifer in the catchment is the Sherwood Sandstone. Whilst this outcrops in the area of this report, it also continues under the Mercia Mudstone to the east. It is important to realise that abstractions in this area, which is nominally outside this CMP area, have an effect on the water resources within the catchment and must be taken into account.

Groundwater in the Sherwood Sandstone flows in an east to northeasterly direction. Borehole yields in excess of 5 Ml/d are easily achievable from large diameter boreholes. The aquifer is heavily utilised and the patterns of abstraction cause some stretches of river to contribute water to the aquifer and others to receive water from it. Overabstraction has caused falling water levels and environmental damage in some areas. The quality of the groundwater is very good, apart from the elevated levels of nitrate in the outcrop area, caused by excessive leaching of agricultural nitrate. This high nitrate does not occur under the protective cover of the Mercia Mudstone, though there is some evidence that high nitrate outcrop water is being drawn into this confined region by abstraction.

Recharge to the sandstone is affected by the drift sequences, especially in the Doncaster area, which also make it difficult to determine how water level changes in the sandstone will affect the surface water features. The depth of the unsaturated zone can vary between 0m in the lowlying areas and 50m under the higher ground.

2.1.5 Water Resources and Supplies

Sherwood Sandstones form a very major aquifer in the area which has been extensively developed primarily for public water supply, industry and more recently for spray irrigation. The Sherwood Sandstones outcrop as shown on Map 3 and continue to the east below a cover of younger confining strata. Public water supply sources in the confined area benefit from low levels of nitrate and blending with groundwater having elevated levels of nitrate in the outcrop area is now a common occurrence.

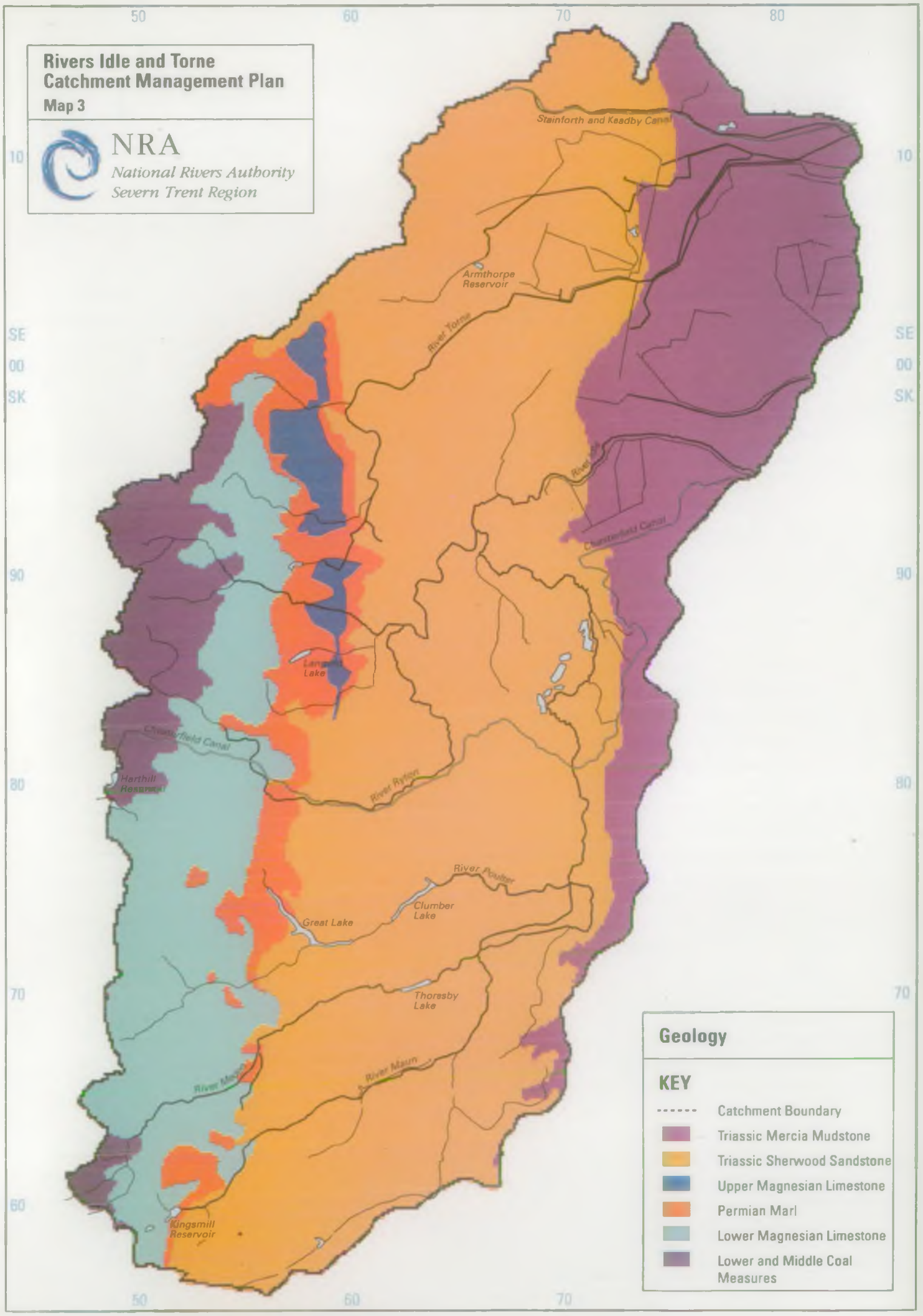
To the west of the Sherwood Sandstones is the Lower Magnesian Limestone aquifer. Development has been rather limited due to the generally poor yields, since the limestone is much less permeable than the sandstones. Groundwater quality is generally good in both aquifers except for the elevated nitrate levels recorded in some outcrop areas. Three major public water supply companies have in total thirty-one sources which draw on the groundwater resources of the Sherwood Sandstones.

Groundwater resources have also been extensively developed for use in association with coal mining activities. Over the past 10 years mining has been in rapid decline and many licences

Rivers Idle and Torne Catchment Management Plan

Map 3

NRA
National Rivers Authority
Severn Trent Region



have been revoked. In contrast, there has been a major increase in the demand for irrigation water for potatoes, carrots and sugarbeet. Food processing companies, especially in the Worksop area, also use groundwater sources and there is an increase in demand by the recreational industry, especially golf courses. Large groundwater licences, many of which are not used to their full capacity, are retained by the sand and gravel extraction companies, for mineral washing.

There is no surface water abstraction for public water supplies in either catchment. Extensive development of the surface water resources has however taken place to meet spray irrigation demands, although many licences cannot be utilised during periods of very dry weather. The only major abstraction from rivers, other than for spray irrigation, is the British Waterways abstraction at Worksop for the Chesterfield Canal.

For both groundwater and surface water abstraction a large percentage is either exported out of the catchments or is lost due to irrigation uses. As a result of these two operations there is a significant net loss of resource from the river system and this reduces the dilution available for Sewage Treatment Plant (STP) effluent, leading to water quality problems which, in turn, can adversely impact on fisheries and amenity interests.

2.1.6 Water Quality

The five main tributaries which feed the Idle/Torne system all rise on the western edge of the catchment from coal measures or limestone strata. The headwaters are of good quality, with a General Quality Assessment (GQA) of A/B, which is good. However, it is a feature of the catchment that each of the tributaries receive significant sewage effluent discharges in their upper sections. This is the single most important factor determining river quality in this catchment area. The discharge of sewage effluent generally reduces quality to fair (GQA C or D) in the middle reaches.

The Maun, Meden and Poulter all feed in-stream lake systems and the presence of treated sewage effluent in low dilution has raised the concentration of nutrients, causing eutrophication. In the case of Kingsmill Reservoir on the River Maun at Mansfield, blue green algae have developed and the reservoir has been designated as having sensitive area status under the EC Urban Waste Water Directive. Work is to be undertaken at Sutton in Ashfield Sewage Treatment Plant (STP) to alleviate the problem. Other lakes on the Meden and Poulter also suffer from eutrophication and they are monitored for review in 1997 of actions required.

The Rivers Ryton and Torne are also heavily affected by sewage effluent and urban runoff. The River Ryton requires a pumped release of good quality groundwater to replace the loss of water to Chesterfield Canal and to dilute Worksop STP effluent. Both rivers recover sufficiently to support good coarse fisheries in their lower reaches.

Discharges from mines have had significant effects on all tributary rivers in the past. In some cases, this water has provided essential dilution water for STP effluent and in other cases raising salinity and causing spray irrigation problems to arable farmers. Despite the colliery

closure programme, there are currently discharges of minewater to each of the major rivers in the catchment.

The River Idle, which is joined by the Maun, Meden and Poulter, with the River Ryton joining at Bawtry, is of generally fair to good quality and supports an EC Designated Cyprinid Fishery. At times of low flow, however, stagnation in the lower section, prior to controlled release into the Trent, has created some quality problems which are under investigation.

2.1.7 Flood Defence

The upper reaches of the River Idle and Torne are predominantly urbanised. Surface water from these urban areas has lead to the reconstruction and modification of these watercourses under capital improvement schemes to improve flow capacity and provide a level of protection to varying standards.

A major improvement scheme has been undertaken on the River Idle between the new pumping station constructed in the early 1980s at West Stockwith and upstream of Retford, defending over 300 properties in Retford. Other major improvement schemes have been carried out on the River Torne between Keadby and Auckley and on the River Maun through Mansfield.

In addition to the problem of urban runoff, the lowlands of the Rivers Idle and Torne catchments lie below high tide level in the River Trent and have suffered local land drainage problems in the past. Following the drainage works by Cornelius Vermuyden, Internal Drainage Boards (IDBs) were established to improve and maintain the drainage standards to satisfy local needs. The majority of the IDBs in Severn-Trent Region lie within this area. The drainage of the area now relies on a comprehensive system of pumped drainage and flood defences. The maintenance of the floodbanks on the highland carrier watercourses is essential to provide continued flood protection. Map 4 gives a diagrammatic representation of the lower catchment reaches, in order to make the drainage pattern clearer.

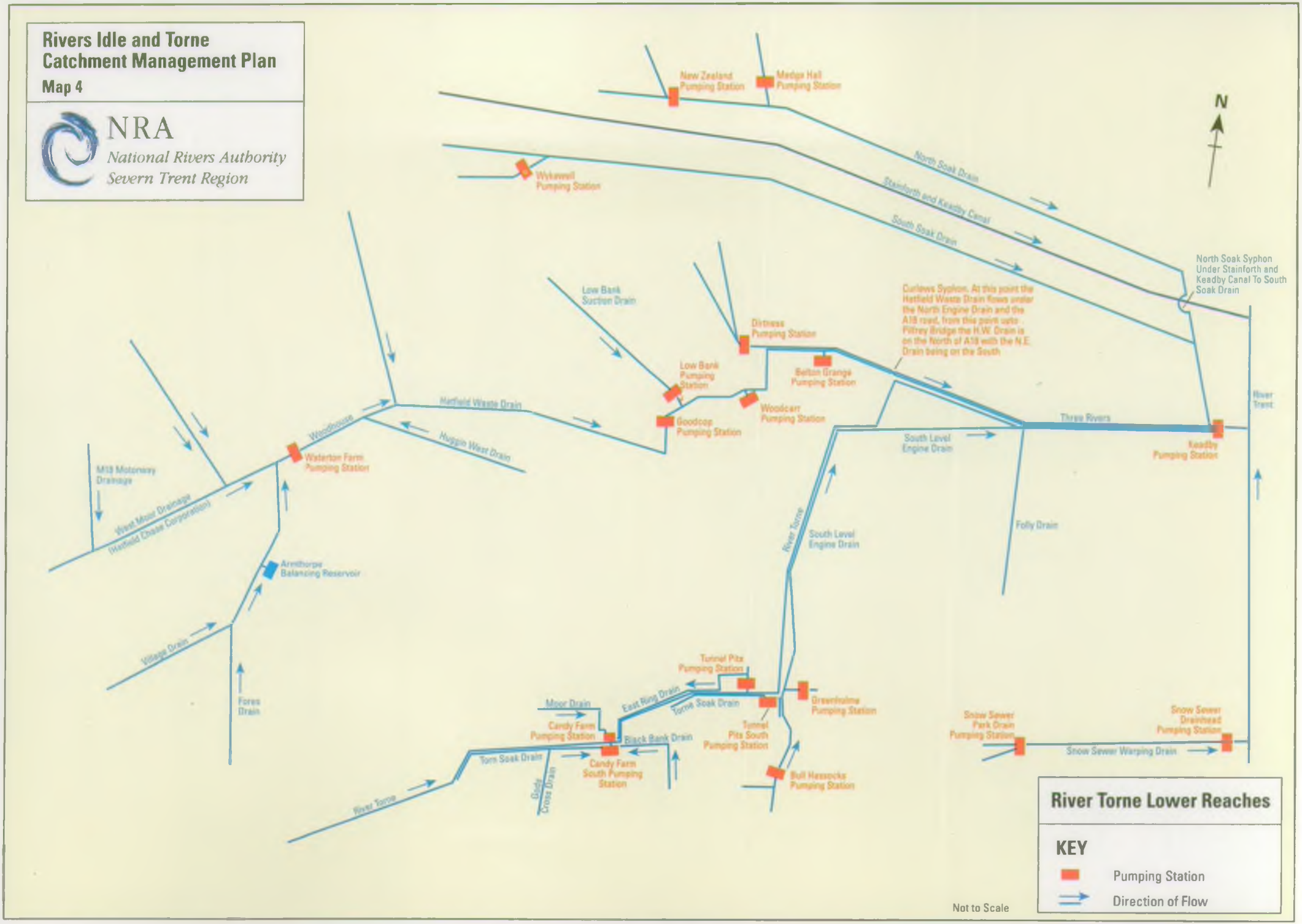
While most main river urban flooding has been reduced by flood alleviation schemes, the problem of flooding from ordinary watercourses (see Glossary) still exists.

The NRA has general supervisory powers over all matters relating to land drainage. However, responsibility for the maintenance of any watercourse normally rests with the riparian owner. On designated main rivers (see Glossary), the NRA has permissive powers to construct and to control the actions of others. On ordinary watercourses, District and County Councils have permissive powers to carry out works and to make byelaws, but their works require the approval of the NRA. The IDBs have broadly the same powers as the NRA within their areas, including the power to levy drainage rates to fund improvement schemes and permissive powers to carry out drainage works on their awarded drains.

Rivers Idle and Torne Catchment Management Plan

Map 4

NRA
National Rivers Authority
Severn Trent Region



River Torne Lower Reaches

KEY

- Pumping Station
- Direction of Flow

2.1.8 Fisheries

The catchment area provides a diverse range of fisheries. The upper reaches of the Rivers Ryton, Meden and Poulter have excellent native brown trout populations. Downstream these rivers are dominated by mixed coarse fisheries, with chub, dace, roach and eels being the most important species.

In contrast, fish populations in the River Maun have been detrimentally affected by the impact of major conurbations at the headwaters of the catchment.

The lowland areas of the catchment include the Rivers Idle and Torne. The Idle is characterised by poor habitat structure. The fish populations are variable in quality and quantity usually associated with availability of fish holding habitat. The Torne provides an improved fisheries habitat, given the presence of extensive aquatic plant life for refuge and spawning. Both rivers are dominated by roach, bream and eels, with perch, tench and pike locally important.

Stillwater fisheries are widely available in the catchment providing both coarse and trout fishing.

2.1.9 Conservation, Recreation and Navigation

The catchment is rich in historical and archaeological finds dating from the palaeolithic period to post medieval. Of particular note are the Creswell Crags caves, and the peatland deposits in the Humberhead Levels. The drainage patterns of the Rivers Torne and Idle were substantially changed in the 1600's to drain the low lying land for agricultural gain, leaving the land 'fit for tillage'. There are old pumping stations and syphons in this area which are listed structures.

The large country estates add to the historical aspects of the catchment and the ruins at Roche Abbey and Mattersey are impressive, both sitting in river valleys. The water pumping station at Boughton is a fine example of a Blackburn building.

The once extensive Sherwood Forest is now much reduced in size but it is a Site of Special Scientific Interest (SSSI) and is listed to be considered as a Special Area for Conservation (SAC) under the Habitats Directive, together with Thorne, and parts of Crowle and Goole Moors. Thorne Moors, only partly in the catchment, and Hatfield Moors are raised mires, SSSIs and are both being mined for peat. The long term future of the sites has been assured by agreement between the peat company and English Nature, but there are concerns regarding the underlying groundwater and the ability to sustain water on the moors.

The River Torne and the rivers in the catchment of the Idle are all designated coarse fisheries, the Torne and Idle being formally leased fisheries to several angling clubs.

Sherwood Forest and the Dukeries estates offer extensive recreational facilities, the Robin Hood visitor centre and the Major Oak being very popular with foreign tourists. There are

many gravel pits in the Idle valley and these provide refuge for birds as well as excellent bird watching. Some are also used for sailing, jet skiing and power boating.

The Robin Hood Way is a recreational route running from Nottingham to Sherwood Forest, and it incorporates other routes reaching to Creswell. The Dukeries Bridle Route offers a 32 mile ride, and there are many cycle routes. Tourists are served with many caravan sites and the Sherwood Forest Holiday Village.

Boaters use the Stainforth and Keadby Canal to get from the Tidal Trent to the River Ouse in Yorkshire, and the lower stretch of the River Idle is a navigation route. In the twelfth Century, Bawtry was a well known river port. The Chesterfield Canal offers tranquil boating from West Stockwith to Retford.

It is known that in the Idle and Torne floodplains there are Bronze Age, Iron Age and Roman finds and that to preserve these remains the floodplain should remain undisturbed and regularly wet. It is also known that peat preserves organic remains whilst it is wet, but that these remains are destroyed when the peat dries out. In this way many as yet undiscovered remains are lost. The Humberhead Levels has a great many known archaeological sites and these may be protected but the loss of unknown wet-preserved archaeological remains is immeasurable. It is important to preserve such remains in the floodplains of the Rivers Idle and Torne, which are particularly rich in Bronze Age, Iron Age and Roman remains.

2.1.10 Infrastructure

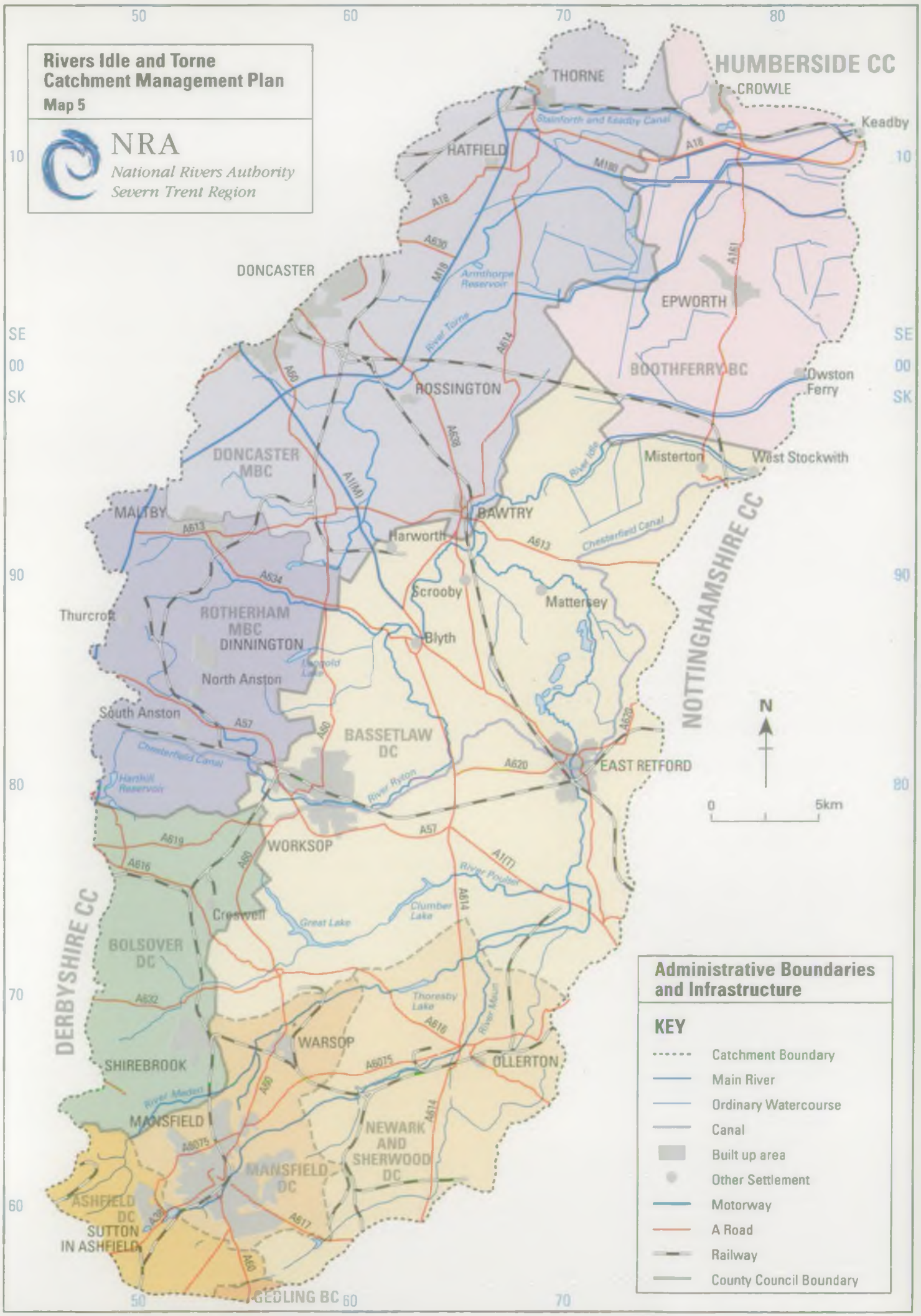
There are three County Councils, two Metropolitan Borough Councils and seven Borough/District Councils in the catchment, as shown on Map 5.

The M1 runs close to the western edge of the catchment with a number of motorways (M18, M180 and A1(M)) and trunk and A-roads linking the main population centres. The A614 trunk road runs south to north and joins the A1 which in turn becomes the A1(M) before linking up with the M18. The A57 trunk road, linking Sheffield and Lincoln, runs from west to east through the central part of the catchment.

A number of large distribution centres are being created close to motorways such as the M180 which provides key east to west connections.

Rail transport is served by the electrified east coast main railway line linking East Retford and Doncaster. The Sheffield-Worksop-East Retford line serves a number of local communities and passenger services from Nottingham to Worksop via Mansfield are being reopened with the introduction of the Robin Hood Line.

Some recent growth in business and cargo use has taken place at Retford (Gamston) Airport. Further development will only be allowed where there are no significant detrimental effects on the environment.


Rivers Idle and Torne
Catchment Management Plan
Map 5
NRA
National Rivers Authority
Severn Trent Region
HUMBERSIDE CC
THORNE
CROWLE
Keadby
Stainforth and Keadby Canal
HATFIELD
M180
A18
A630
DONCASTER
Ammthorpe Reservoir
River Torne
A614
EPWORTH
A161
BOOTHFERRY BC
Owston Ferry
ROSSINGTON
A638
DONCASTER MBC
A1(M)
Misterton
West Stockwith
River Idle
MALTBY
A613
BAWTRY
Harworth
Chesterfield Canal
A634
Scrooby
Mattersey
Thurcroft
ROTHERHAM MBC
DINNINGTON
Blyth
North Anston
South Anston
A57
A60
BASSETLAW DC
A620
EAST RETFORD
NOTTINGHAMSHIRE CC
Chesterfield Canal
Harthill Reservoir
River Ryton
A619
WORKSOP
A616
River Poulter
A1(T)
Creswell
Great Lake
Clumber Lake
A614
BOLSOVER DC
DERBYSHIRE CC
A632
Thoresby Lake
River Maun
A618
WARSOP
OLLERTON
SHIREBROOK
A6075
River Meden
MANSFIELD
NEWARK AND SHERWOOD DC
MANSFIELD DC
ASHFIELD DC
SUTTON IN ASHFIELD
A38
A617
GEDLING BC
N
0
5km
Administrative Boundaries and Infrastructure
KEY
Catchment Boundary
Main River
Ordinary Watercourse
Canal
Built up area
Other Settlement
Motorway
A Road
Railway
County Council Boundary

2.2 DATA COLLECTION WITHIN THE CATCHMENT

2.2.1 River Levels and Flows

There are 13 gauging stations, consisting of a mixture of traditional level monitoring stations and advanced high technology ultrasonic and electromagnetic flow gauges. These are shown on Map 6.

2.2.2 Rainfall

There are two automated tipping bucket raingauges in the catchment. The NRA also acts as the Meteorological Office liaison for its network of rainfall observers which are numerous in the Catchment, but are not directly related to NRA operations.

2.2.3 Water Use

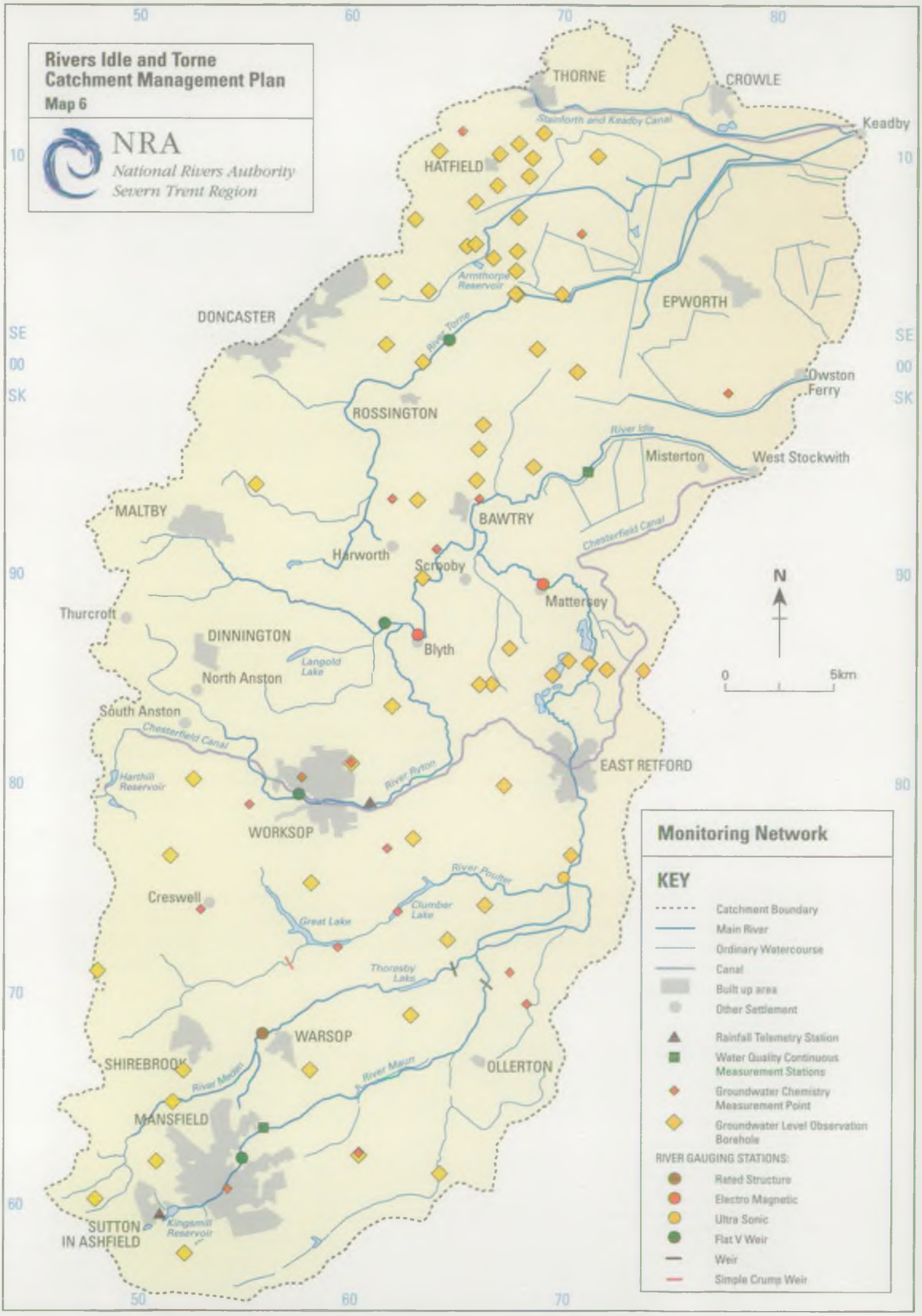
Use of surface waters for spray irrigation is measured and recorded on a continuous basis on 5 farms, in respect of 10 sets of spray irrigation equipment. This information will be used to develop a licensing policy for the watercourses draining to Keadby Pumping Station. Other data needs for this catchment are being assessed by consultants and it is anticipated that additional measurement of abstraction and transfer will be instituted, as well as measurement of additional flows and levels.

2.2.4 Groundwater Levels and Quality Monitoring

There are 48 observation boreholes maintained in the catchment to monitor long term changes in groundwater levels. The network in the catchment is large as a result of extensive development of groundwater resources. The records for most sites are long, with many stations extending over 20 years. During the period that the record has been running, there has been increasing demand on groundwater resources. This has resulted in an overall reduction in the water table. There are 44 sites regularly monitored for groundwater quality throughout the catchment, some of which have been sampled for at least twenty years. A review of the network is being undertaken.

2.2.5 Surface Water Quality

Surface water quality samples are taken regularly from a network of 125 river and canal sites, as shown on Map 6. These are analysed for a wide range of parameters to assess compliance with EC Directives and UK Quality Objectives and to assess general water quality. These routine observation points are supported by additional continuous Water Quality Monitoring instruments which can be deployed where necessary. Effluent discharges are also sampled


Rivers Idle and Torne
Catchment Management Plan
Map 6
NRA
National Rivers Authority
Severn Trent Region
THORNE
CROWLE
Keadby
Stainforth and Keadby Canal
HATFIELD
Armthorpe Reservoir
EPWORTH
DONCASTER
River Torne
Dwston Ferry
ROSSINGTON
River Idle
Misterton
West Stockwith
MALTBY
BAWTRY
Chesterfield Canal
Harworth
Scrooby
Mattersey
Thurcroft
DINNINGTON
Blyth
Langold Lake
North Anston
South Anston
Chesterfield Canal
Harthill Reservoir
River Ryton
EAST RETFORD
WORKSOP
River Poulter
Creswell
Great Lake
Clumber Lake
Thoresby Lake
WARSOP
SHIREBROOK
River Meden
River Maun
OLLERTON
MANSFIELD
SUTTON IN ASHFIELD
Kingsmill Reservoir
50
60
70
80
10
SE 00 SK
90
N
0
5km
Monitoring Network
KEY
Catchment Boundary
Main River
Ordinary Watercourse
Canal
Built up area
Other Settlement
Rainfall Telemetry Station
Water Quality Continuous Measurement Stations
Groundwater Chemistry Measurement Point
Groundwater Level Observation Borehole
RIVER GAUGING STATIONS:
Rated Structure
Electro Magnetic
Ultra Sonic
Flat V Weir
Weir
Simple Crump Weir

and analysed routinely to determine compliance with the NRA's Consent conditions.

2.2.6 Biological Monitoring

Routine Biological monitoring is undertaken at a total of 116 sites: 19 on the River Maun and its tributaries; 17 on the River Meden; 11 on the River Poulter; 23 on the River Ryton; 9 on the River Idle; 13 on the River Torne and its tributaries; 14 on the Warping Drain and other Drains; 8 on the Chesterfield Canal and 2 on the Stainforth and Keadby Canal. Samples are taken in spring, summer and autumn from the main river, and in spring and autumn from the tributaries and canals. Data on the macro-invertebrate life is used to ascertain the effects of discharges on the benthic ecology of the river.

Macrophyte assessment is being carried out for the purposes of the EC Urban Waste Water Treatment Directive (UWWTD) (91/271/EEC) at 29 macrophyte sites and 2 algal monitoring sites.

2.2.7 Flood Defence

The main data collection for flood defence purposes is the hydrometric data from NRA gauging stations, together with data from flood defence pumping stations. During flood events, additional data is collected by NRA flood defence personnel reading gauge boards or marking flood levels for later post event levelling. This data is used to calibrate or recalibrate mathematical computer models, which have been constructed for the NRA by consultants.

2.2.8 Fisheries

A three-year rolling programme of fisheries surveys are carried out at 36 sites to produce data on the fish populations. This data is used to determine the current status of the fisheries within the catchment. Most surveys are carried out using electric fishing methods. Some larger sites with low flows, as found on the rivers Idle and Torne, are surveyed by netting.

2.2.9 Conservation

River corridor surveys have been undertaken on the majority of rivers in the catchment. Alert maps are maintained showing SSSIs, Sites of Interest for Nature Conservation (SINCs), Scheduled Ancient Monuments (SAMs) and some SMR sites. Macro Scale landscape assessment has been carried out for the Rivers Torne and Idle. Aerial videos have been taken of all major rivers and canals.

2.3 KEY DETAILS

Catchment Details	Area	1307 km^2
(Idle 842 km^2, Torne 378 km^2, Others 87 km^2)		
	Population	625,000 (See Table 1)
Topography	Minimum level	0 mAOD
	Maximum level	204 mAOD

Administrative Details

County Councils	Derbyshire County Council Humberside County Council Nottinghamshire County Council
Metropolitan Borough Councils	Doncaster Metropolitan Borough Council Rotherham Metropolitan Borough Council
District/Borough Councils	Ashfield District Council Bassetlaw District Council Bolsover District Council Boothferry Borough Council Gedling Borough Council Mansfield District Council Newark and Sherwood District Council
National Rivers Authority	Lower Trent Area, Severn-Trent Region
Water Companies	Anglian Water Services Severn Trent Water Limited Yorkshire Water Services
Internal Drainage Boards	Althorpe IDB Armthorpe IDB Ashfield & Westmoor IDB Crowle IDB Everton IDB Finningley IDB Hatfield Chase IDB Idle & Ryton IDB Potteric Carr IDB South Axholme IDB Tickhill IDB Tween Bridge IDB West Axholme and Greenholme IDB West Butterwick IDB

British Waterways	Chesterfield Canal , Stainforth and Keadby Canal
Other navigations	River Idle

Main Towns and Populations

Bawtry	2,628	Mansfield	89,065
Crowle	3,699	Ollerton	6,745
Dinnington	7,970	Rossington	12,472
Doncaster(part)	285,364	Shirebrook	9,220
East Retford	21,070	Sutton in Ashfield	40,455
Epworth	3,359	Thorne	16,855
Hatfield	15,421	Warsop	13,035
Maltby	12,320	Worksop	39,120

Land Use

The main land uses in the catchment are arable (61%); woodland (12%); urban/industrialised (11%); grass (10%); fallow/bare (4.4%); peat bog (0.7%) and water (0.2%) (see Table 3).

Water Quality

River and canal in each General Quality Assessment (GQA) Scheme class -1994

GQA CLASS		LENGTH (km)	%
Good	A	17	3.4
	B	62.4	12.4
Fair	C	180.2	35.8
	D	109.6	21.7
Poor	E	127.1	25.2
Bad	F	7.7	1.5
TOTAL		504	100

No of river and canal chemical sample monitoring points 125

No of Consented Discharges 325

Comprising:-
- 57 Water Undertaker STP final effluent
- 40 Water Undertaker STP storm tank overflows
- 106 Storm sewage and Emergency Pumping Station overflows
- 45 Private STP
- 93 Trade effluent/Site drainage and rainfall related effluent

Water Resources

Average Annual Rainfall		638	mm
Total licensed abstraction		671.7	Ml/d
Long term average flow of River Idle at Mattersey		225	Ml/d
Long term average flow of River Torne at Auckley		85	Ml/d
95 percentile exceedance flow of River Idle at Mattersey		78	Ml/d
95 percentile exceedance flow of River Torne at Auckley		30	Ml/d
Number of licensed abstractions		455	
of which :-	surface water	285	
	groundwater	170	

Flood Defence

Length of main river in Catchment	312.8 km
Length of floodbank maintained by NRA	119.4 km
Length of floodwalls	1.5 km
No. of major recent Flood Alleviation Schemes on Main river	3
Length of major recent Flood Alleviation Schemes on Main river	70 km
NRA pumping stations	17
Other pumping stations (pumping direct to Main river)	26

Fisheries

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

Salmonid	0 km
Cyprinid	114 km

Conservation

Sites of Special Scientific Interest (SSSIs)	48
Sites of Importance for Nature Conservation (SINCs)	409
Scheduled Ancient Monuments (SAMs)	48
National Nature Reserves	1
Local Nature Reserves	7
Important archaeological sites in Humberhead Levels	6
Other archaeological sites and finds in Humberhead Levels	580

SECTION 3 ISSUES AND OPTIONS

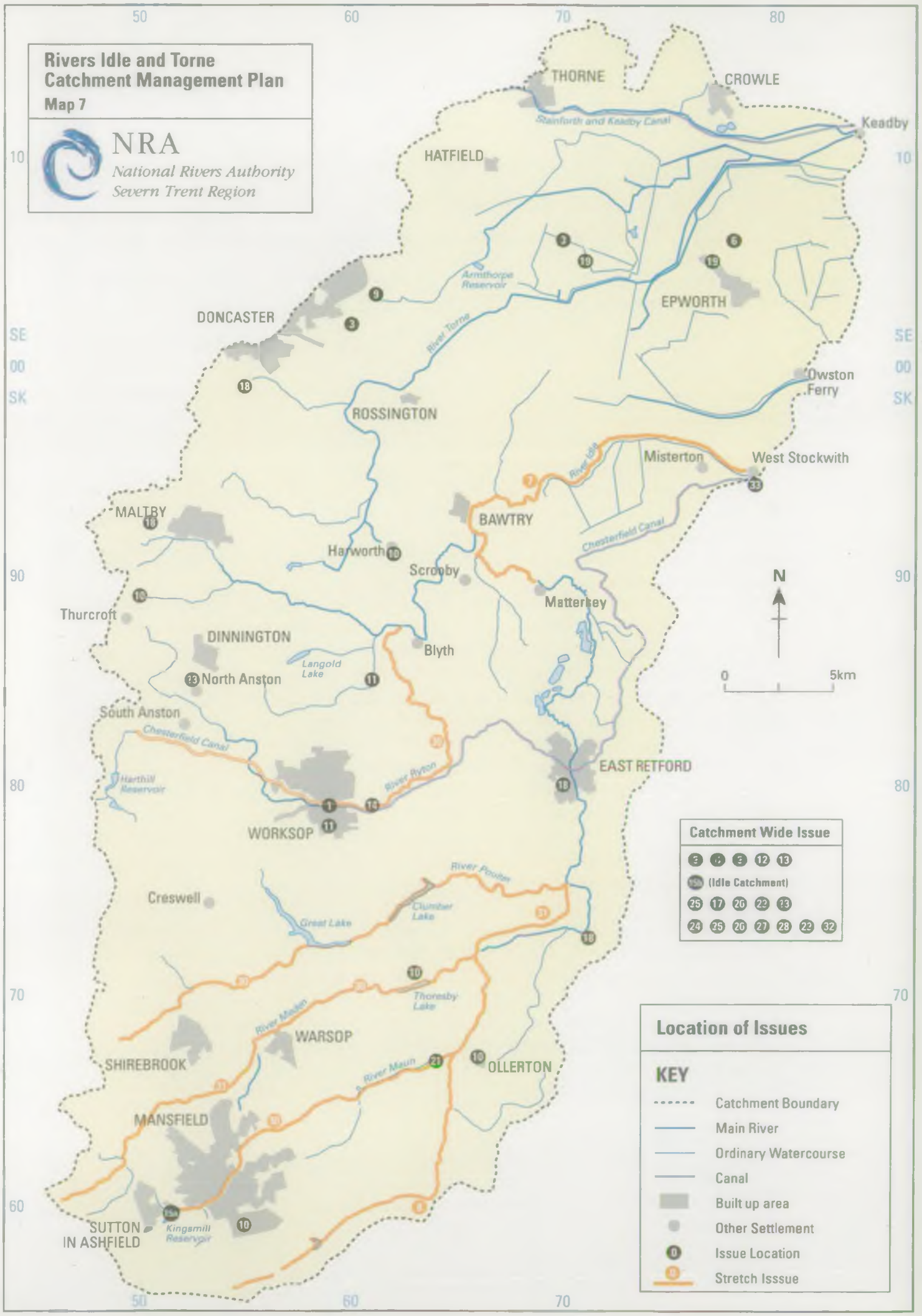
General

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

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

The options as presented are the initial views of the Lower Trent Area, Severn-Trent Region of the NRA and do not constitute policy statements.

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.


Rivers Idle and Torne
Catchment Management Plan
Map 7
NRA
National Rivers Authority
Severn Trent Region
50
60
70
80
10
90
80
70
60
SE
00
SK
THORNE
CROWLE
Keadby
Stainforth and Keadby Canal
HATFIELD
Armthorpe Reservoir
River Torne
DONCASTER
EPWORTH
Owston Ferry
ROSSINGTON
River Idle
Misterton
West Stockwith
MALTBY
BAWTRY
Chesterfield Canal
Harworth
Scrooby
Mattersey
Thurcroft
DINNINGTON
Blyth
Langold Lake
North Anston
South Anston
Chesterfield Canal
Harthill Reservoir
River Ryton
EAST RETFORD
WORKSOP
River Poulter
Creswell
Great Lake
Clumber Lake
Thoresby Lake
River Meden
WARSOP
SHIREBROOK
River Maun
OLLERTON
MANSFIELD
SUTTON IN ASHFIELD
Kingsmill Reservoir
N
0
5km
Catchment Wide Issue
(Idle Catchment)
Location of Issues
KEY
Catchment Boundary
Main River
Ordinary Watercourse
Canal
Built up area
Other Settlement
Issue Location
Stretch Isssue

3.1 ISSUES IDENTIFIED

The issues and options that follow are not in a priority order. Many of the issues identified in the Rivers Idle and Torne Catchment cover all the NRA's functions.

Comments on the issues and options are requested together with any new ideas/suggestions.

1 Impact of British Waterways abstraction from the River Ryton at Worksop for the Chesterfield Canal:
   a) effects of abstraction on the River Ryton.
   b) abstractions for agriculture from the canal.
   c) quality of water imported to the canal.
   d) restoration of further stretches of the canal.
2 Lack of water resources to meet demand.
3 Reduced groundwater levels in the Sherwood Sandstone Groundwater Unit, particularly the Doncaster Unit
   a) non-sustainability of wetland sites caused by falling groundwater levels in the Doncaster Groundwater Unit.
   b) long term effects of negotiated reduction in Public Water Supply abstraction.
   c) Review of Groundwater Management Unit boundaries
4 Hydraulic relationship between rivers and some Public Water Supply boreholes, adjacent to rivers, is imprecisely known.
5 Dewatering activities associated with mineral extraction.
6 Management of water releases from high level watercourses into lowland drains and the licensing of subsequent abstractions.
7 The loss of flow in the River Idle between Mattersey and West Stockwith and associated quality problems.
8 Low flows in Rainworth Water.
9 Elevated nitrates in groundwater.
10 Impact of contaminated land on controlled waters.
11 Potential impact of the spreading of industrial effluent to land.
12 The need for setting of appropriate RQOs to meet the needs and uses of the river catchment.
13 The need to prioritise sewage treatment and sewerage improvements.
14 Optimisation of the compensation flow from the public water supply source at Manton into the River Ryton.
15 Eutrophication in the Catchment:
   a) Kingsmill Reservoir.
   b) Other Locations.
16 Impact of discharge of minewater from current coal mining operations.

17 Impact of Colliery closures.
18 Inadequate foul and surface water disposal at a number of small developments.
19 Impact of managed land drainage and peat cutting on water quality in the Torne catchment.
20 Groundwater Quality is at risk.
21 Effects of coal mining subsidence on the water environment and potential increased flood risk to property.
22 There is currently no flood warning scheme.
23 The extent of floodplains are not clearly defined.
24 Degradation of physical diversity due to past flood alleviation schemes on the Rivers Idle and Torne.
25 Potential conflict between interests in the pumped Rivers.
26 Eradication/control of alien/ invasive plant species.
27 Insufficient habitat to encourage the return of otters to the catchment.
28 Litter and rubbish problems in and near rivers.
29 Lack of recreational facilities and public access to rivers.
30 The need to protect and maintain the genetic integrity of native brown trout in the upper reaches of the River Idle tributaries.
31 The inappropriate EC designation to some fisheries reaches.
32 The perceived predation and possible need for control of piscivorous birds in affected fisheries.
33 Impact of letting tidal Trent water into theWarping Drain to sustain levels for abstraction.

3.2 A DESCRIPTION OF THE ISSUES FACING THE CATCHMENT

ISSUE 1 - Impact of British Waterways abstraction from the River Ryton at Worksop for the Chesterfield Canal

There is currently no controlling framework for the quantity of water British Waterways abstracts from the River Ryton to maintain flow in the Chesterfield Canal. Potentially it puts the quality of the river under threat and in summer time this constitutes a significant reduction in the dilution for Worksop sewage effluent.

a) effects of abstraction on the River Ryton

During periods of low flow in the Ryton in excess of 60% of the flow is diverted into the canal. This transfer significantly reduces the dilution available for the effluent from Manton Sewage Treatment Plant (STP), thereby potentially affecting river quality. This also adversely affects the ability of existing surface water licence holders to abstract water from the river for irrigation purposes. The transfer also impacts on the fish stocks in the river.

b) abstractions for agriculture from the canal

Increased abstractions from the canal are likely to be resisted by the NRA if they increase demand on the River Ryton, with consequential environmental impact on the river (both visual and water quality).

c) quality of water imported to the canal

The canal itself is vulnerable to water quality problems in the River Ryton, which would threaten the SSSI on the canal, notable for its plant species.

d) restoration of further stretches of the canal

There are proposals to extend the restored stretch of the canal to the west, which may require the need to increase abstraction from the River Ryton and consequently put further pressure on the quality of the river as well as increasing the period of abstraction restriction for downstream licence holders. Increased abstraction would also increase pressure on the fish stocks in the river.

ISSUE 2 - Lack of water resources to meet demand

Water resources are generally ample within the catchment. However there are some areas where it is limited.

Historical over-exploitation of the Sherwood Sandstones aquifer now prevents further licences being granted for groundwater abstraction. The same over-abstraction has lead to a reduction in baseflow in those watercourses draining the aquifer and as a consequence either no more surface water licences are being issued, in some areas, or licences are still being issued in other areas but with a clause introduced into the licence which restricts abstraction during periods of low flow.

For the Lower Magnesian Limestone aquifer, which is less developed than the Sherwood Sandstones aquifer, future groundwater development, necessary to meet local demand, may have to be limited in order to maintain baseflow and essential dilution water for effluents in the watercourses draining eastwards over the Sherwood Sandstones.

There is a strong persistent demand for additional resources, both surface and groundwater, to be made available for agricultural and horticultural usage over most of the catchment; industrial demand is also strong especially in the Mansfield area.

ISSUE 3 - Reduced groundwater levels in the Sherwood Sandstones Groundwater Units, particularly the Doncaster Unit

Reduced groundwater levels are a problem in the Sherwood Sandstones Groundwater Units, particularly the Doncaster Unit, principally due to over abstraction for Public Water Supply.

a) **non-sustainability of wetland sites caused by falling groundwater levels in the Doncaster Groundwater Unit.**

It is alleged that falling groundwater levels are affecting the sustainability of wetland sites, such as Hatfield Moors. Hatfield Moors is a raised mire and is currently used for peat extraction for the horticultural industry. Parts of the site have been drained for the milling of peat, but others are untouched and have the ability to sustain levels. However, groundwater levels in the underlying sandstone, which would have been in continuity with the base of the peat, have now fallen and the future restoration of the site is in question.

There are other wetland sites in the area which have also suffered a drop in levels and are in danger of drying out.

b) **Long term effects of negotiated reduction in Public Water Supply abstraction**

Due to the existence of large Licences of Right, issued as a result of the Water Resources Act 1963, the groundwater within the Sherwood Sandstone in the area to the south and east of Doncaster has been heavily exploited, with the rate of abstraction far exceeding the long term rate of recharge. The NRA has negotiated new licensed quantities with Yorkshire Water Services (YWS) and achieved substantial reductions in actual abstraction. The long term effects of the recent reduction in abstraction and other influences are unknown.

These problems also apply to the four northern management units of the Sherwood Sandstone, which are Doncaster, Ranskill, Clumber and Clipstone and a similar approach

will be taken to solving them there.

c) Review of Groundwater Management Unit boundaries

A mathematical model designed specifically for this area by the University of Birmingham has presented a more accurate understanding of groundwater flows and the revision of the unit boundaries should now be considered.

ISSUE 4 - Hydraulic relationship between rivers and some public water supply boreholes, adjacent to rivers, is imprecisely known

Most of the rivers in the catchment traverse the Sherwood Sandstone aquifer. The aquifer is a vital source of potable water to the three major public water supply companies operating in the area.

Due to the relatively permeable nature of the river beds and the high rate of groundwater pumping, river water at some sites is induced into the boreholes. The regrading of river beds, necessary at some locations due to mining subsidence, can also enhance the rate of leakage. The mechanism, extent and impact of this leakage is however neither well documented nor known.

ISSUE 5 - Dewatering activities associated with mineral extraction

The extraction of minerals (primarily sands and gravels, and limestone) below the water table invariably necessitates dewatering activities. The water is often pumped into an adjacent watercourse and therefore represents, for most of the time, a loss of groundwater resources; only when there is a low flow problem in the receiving watercourse does any benefit accrue. Every effort should be made to introduce the pumped groundwater back to the underlying aquifer, especially in those areas where the aquifer is already fully or over-exploited. Dewatering can be a threat to adjacent wetland sites which could result in desiccation.

For those quarried areas where the water table is close to the surface, the increasing lack of inert waste available to restore the land to original ground level necessitates restoration to either wetland or to low level agriculture. If it is the latter, at some sites the aggregate companies wish to pump in perpetuity in order to depress the water table to an acceptable level to facilitate agricultural usage. This can again, for most of the year, result in a loss of groundwater resources, unless action is taken to re-introduce the water back to the aquifer at an appropriate location.

There is a prevalence of historical Interim Development Orders (IDO's) and other new proposals for sand and gravel extraction on the aquifer. If progressed, there will be a significant loss of surface protection of the aquifer. Problems of backfill on the aquifer could lead to low level restoration over wide areas (see Section 4.5 - Solid Waste Disposal).

ISSUE 6 - Management of water releases from high level watercourses into lowland drains and the licensing of subsequent abstractions

At strategic locations within the Isle of Axholme, during summer dry weather conditions, water can be gravitated from high level watercourses, like the River Torne, to the low level drains. This water is used for irrigation either by returning to the field drainage systems or by spray irrigation. Releases are controlled by NRA Flood Defence Supervisors who maintain contact with the Internal Drainage Boards (IDBs) and the farmers, and balance their demands against water levels in the high level watercourses. Sufficient water must be retained in the high level channels to allow for weed maintenance and meet other abstraction needs. In both the high and low level systems, water levels must be kept within limits which allow flora and fauna to flourish. In winter and other wet periods, the low level drains need to be pumped out into the high level, and from the high level into the River Trent to avoid flooding of land and buildings. Water levels are maintained at lower levels in winter, than in summer, so that some flood flows can be stored.

The optimum operating levels to take account of all of these interests are being determined in the Hatfield Chase Water Level Management Plan (WLMP). Water quality concerns related to the acidity and dissolved metals content of the high level water will need to be studied further. The irrigation demands are being addressed through a programme of water resources modelling and licensing policy determination.

ISSUE 7 - The loss of flow in the River Idle between Mattersey and West Stockwith and associated quality problems

For several weeks each summer, there is no flow discharging from the River Idle into the River Trent. Flows appear to be lost between Mattersey and West Stockwith on the River Idle. Flows in excess of 55 Ml/d are measured in the River Idle at the Mattersey Gauging Station during periods of low flow. When this is added to the flow from the River Ryton, downstream of Mattersey, there should be between 80 and 100 Ml/d flowing in the lower River Idle. Some of the loss in flow can be accounted for by surface water abstraction but not all. A lack of flow can result in quality problems, leading to a failure of River Quality Objective (RQO). The loss in flow at the downstream end of the river leads to eutrophication, which has implications for recreational use. Quality problems could, in turn, have detrimental effects on fisheries and the loss in flow could also be having an effect on the River Idle Washlands SSSI, downstream of Bawtry.

ISSUE 8 - Low flows in Rainworth Water

Due to groundwater abstraction from the Sherwood Sandstone aquifer, baseflow in Rainworth Water has been virtually eradicated. During most of the year any flow which now occurs is primarily effluent from STPs at Rainworth and Bilsthorpe. The recent closure of Rufford Colliery has resulted in the cessation of discharge of colliery water to the watercourse and this has exacerbated the situation. A lack of flow has lead to a shortage of water being available to satisfy the numerous surface water licences; there are also water quality and amenity problems. Only when the watercourse is joined by the

Gallow Hole Dyke, immediately upstream of Rufford Lake, is the flow satisfactory for most of the year. However, the additional flow is occasionally insufficient to satisfy the many environmental requirements of the lake, which is part of a major Country Park attracting many visitors. Periodic mining subsidence under the lake also causes a lowering of lake levels by creating fissures which exacerbates leakage from the system.

Rainworth Water is on the national 'top 40' list of watercourses which are adversely affected by low flows. Further investigation is required to determine whether there is justification in introducing an 'ALF' (alleviation of low flows) scheme to part, or all, of the watercourse.

ISSUE 9 - Elevated nitrates in groundwater

The Sherwood Sandstone aquifer in the area is covered with a light sandy soil which is highly suitable for arable agriculture. This has resulted in high nitrate leaching and a consequent high concentration of nitrate in the groundwater that is extensively used for public supply by both Severn Trent Water (STW) and Yorkshire Water Services (YWS). The need to supply water with a nitrate concentration of less than 50 mg/l (as NO_3) has required a blending strategy to be implemented. If the nitrate concentrations continue to rise, this strategy would be unable to maintain the correct concentrations without the provision of nitrate removal plant. To maintain the present strategy and to minimise the need for further plant, it is desirable to reduce the input of nitrate from agricultural sources. In addition, the EC Nitrate Directive requires the designation as Nitrate Vulnerable Zones (NVZs) all known areas of land that drain into waters where the nitrate concentrations exceed or are expected to exceed 50 mg/l as a result of agricultural activities (see Section 5.1.2 - Groundwater Quality).

ISSUE 10 - Impact of Contaminated Land on Controlled Waters

Industrial dereliction and waste disposal in the catchment has resulted in contamination of land in several locations with waste containing substances which are potentially hazardous to the water environment.

There are sites where former activities have left residual contamination and where disturbance or redevelopment might lead to a serious risk of deterioration in water quality. The NRA will seek to use redevelopment opportunities to agree remediation measures to eliminate the risk of pollution. Where appropriate, it may be necessary to instigate remedial works on operational land.

Among the areas of concern are the disused coal carbonization plants on several of the colliery sites such as Thoresby, Mansfield, Harworth, Thurcroft and Ollerton. The site at Mansfield is being investigated under a European Fund Research Grant.

ISSUE 11 - Potential impact of the spreading of industrial effluent to land.

There is concern given the high vulnerability of much of the groundwater and the need to protect surface water that the practice of spreading industrial effluent onto land is carried

out in a way and in locations which will not affect water resources.

There are two sites at Hodsock and Worksop, where liquid effluent from food processing is regularly sprayed onto agricultural land for disposal. The effluents are currently under investigation with a view to consenting them.

In addition, there are a wide range of other wastes (liquids and sludges) from various activities, such as abattoirs and food processing which are spread at many sites across the catchment. Subject to immediate prior notification to the Waste Regulation Authorities, there is a requirement only that the waste should be 'of agricultural benefit'.

ISSUE 12 - The need for setting of appropriate RQOs to meet the needs and uses of the river catchment

Most of the tributaries feeding the Rivers Idle and Torne rise to the west of the catchment a short distance upstream of towns such as Mansfield, Worksop, Maltby and Doncaster. These tributaries include the Rivers Maun, Meden, Poulter, Ryton, Maltby Dyke and Mother Drain.

The tributary headwaters are of mostly good quality (see Table 5) but the distribution of urban areas in the catchment is such that most receive significant discharges of treated sewage effluent in low river flow dilution close to source, eg Sutton in Ashfield and Mansfield on the River Maun, Worksop discharging to River Ryton, Maltby to Maltby Dyke, Balby (South Doncaster), Harworth and Warmsworth all discharging sewage effluent in the headwaters of the River Torne catchment. There is a consequent deterioration to fair quality with recovery to support EC designated fisheries further downstream.

The method of classification and setting of river quality objectives (RQOs) has been revised by NRA through implementation of the Rivers Ecosystem (RE) scheme, the background to which are given in Section 5.1.1, Table 5.

The RQOs for each river are intended to be realistic and have been assigned bearing in mind the needs and uses of each section of river. It should be noted that in some cases short term RQOs have been set; these are designed to be achievable within the constraints of committed investment (see Issue 13).

ISSUE 13 - The need to prioritise sewage treatment and sewerage improvements

The Idle/Torne Catchment is served by 30 significant STPs. Most of the urban areas served are also drained by a network of combined sewerage systems. The STPs and the majority of the infrastructure assets are vested in the statutory water undertakers (STW and YWS in South Doncaster). The quality of sewage effluent discharged is the single most important determining factor in river quality in this catchment. Many of the assets require improvement in order to achieve and sustain the identified RQOs.

The Water Company investment programme for the period 1995-2000 has been determined

by OFWAT, through the Asset Management Planning process (AMP2).

Environmental requirements, including the implementation of the EC Urban Waste Water Treatment Directive (UWWTD) are contained in agreed AMP2 Guidelines for Effluent Quality. The AMP2 National Environment Programme is the means by which expenditure by Water Companies on environmental improvement is determined. AMP2 plans include provision for improvements to ensure compliance with all UK and European statutory obligations. The funding of improvement schemes to meet non statutory requirements such as RQOs however is limited to a number of discretionary schemes agreed between DoE, NRA and the relevant Water Company.

Tighter discharge standards have been agreed under the AMP2 process to meet statutory obligations at STPs such as Sutton in Ashfield, Armthorpe, Hodsock and Retford.

In cases where the criteria required for AMP2 expenditure are not met and discretionary scheme investment has not been agreed short term RQOs have had to be set. The NRA will continue to monitor the effects of discharges and prioritise the need for imposition of tighter standards within AMP3 (2000 - 2005) to meet long term RQOs, eg River Maun below Mansfield and River Ryton below Worksop.

In order to sustain quality objectives, improve the aesthetic appearance of rivers and address public complaints, improvements to sewerage systems are also necessary. However, the financial constraints of the AMP2 programme has meant a need to assign priorities to the identified problem combined sewer overflows (CSOs). Significant sewerage improvements have been agreed under AMP2 at Sutton in Ashfield and Mansfield.

ISSUE 14 - Need for optimisation of the compensation flow from the public water supply source at Manton into the River Ryton

Historically, good quality groundwater has been pumped out of one of the shafts at Manton Colliery in order to facilitate coal mining operations. Approximately 70% of the pumped water went for public supply with 30% discharged, as surplus, to the River Ryton. Such shaft pumping was exempt from licensing until 1994, when, upon the cessation of mining activities, pumping for public water supply, necessitated a licence.

STW now have a licence to abstract groundwater from a shaft at the now closed Manton Colliery. A clause in the time limited licence, permitting abstraction, requires a compensation flow of 5 Ml/d to be discharged into the River Ryton on a continuous basis which mirrors what was happening when the colliery was operational. The discharge however represents a waste of groundwater resources except for those periods when there is a low flow problem in the River Ryton. A more flexible discharge is therefore required with probably a higher discharge required from Manton during parts of the summer period to meet effluent dilution requirements at Manton STP and also the downstream spray irrigation demands plus a much lower (or nil) discharge in winter.

ISSUE 15 - Eutrophication in the Catchment

There is evidence of eutrophication in several Sensitive Areas (Eutrophic) (SA(E)) throughout the catchment. These waters may be candidates for designation under the EC Urban Waste Water Treatment Directive (UWWTD) (91/271/EC). Designation as SA(E) would require Phosphate removal to Directive standards, unless it could be demonstrated that such removal would have no effect on eutrophication.

a) Kingsmill Reservoir

Discharge of sewage effluent from Sutton in Ashfield STP to Kingsmill Reservoir in low dilution has lead to the enrichment of nutrients and consequent eutrophication in the reservoir and the prevalence of blue green algal bloom in summer. This creates a potential health risk to users of the reservoir as well as being aesthetically unacceptable and polluting.

The reservoir has been designated a SA(E) and various possible measures have been identified including extended treatment, effluent diversion, and so on, to alleviate the problem. The options have been discussed in detail in tripartite forum involving Ashfield District Council, STW and the NRA.

Further investigation is being undertaken by Ashfield District Council to establish the nutrient content of the silt bed and by the NRA to establish the likely impact of the various options. In order to comply with the Directive, STW are required to undertake ameliorative work by 1998. The option they have chosen to pursue is to improve the STP and discharge the treated effluent downstream of the reservoir.

b) Other Locations

The Idle Catchment generally, including the Chesterfield Canal receives a high proportion of sewage effluent which in turn leads to high concentrations of nutrients. These waters may therefore be granted sensitive status for the purpose of the Directive.

The first review of SA(E) designation under the Directive will be in 1997 and accordingly the NRA will be gathering chemical and biological data, including nutrient and macrophyte information at several locations in the catchment to assist in the decision making process for designation of future candidate sensitive areas.

ISSUE 16 - Impact of discharge of minewater from current coal mining operations

There are 10 collieries which discharge into the Idle/Torne Catchment and two other disused collieries which continue to pump minewater. The discharge of minewater which is frequently saline, can be ferruginous (iron stained), and can contain elevated levels of ammonia. In some discharge locations the minewater provides useful dilution, in other circumstances the minewater is problematic because of high salinity or other chemical constituents which may potentially affect river quality and/or use, including potentially

detrimental effects on the fisheries concerned. In particular, spawning success and fry survival are likely to suffer from such discharges.

ISSUE 17 - Impact of Colliery Closures

For many years the Nottinghamshire/South Yorkshire Coalfield has been an important coal mining area. Map 14 indicates the extent of former coal mining in the catchment. Many of the collieries indicated on the map raised minewater and discharged to the river catchment. In certain locations the consequent increase in river flow was advantageous, diluting sewage effluent for example, but more frequently in this catchment the reduction in chloride and/or iron in the river, following the cessation of minewater pumping, has been beneficial.

In some areas of the country the cessation of pumping could, in the long term, lead to uncontrolled reemergence of minewater. The Environment Act 1995 does not provide effective controls over discharges from mines abandoned before the end of the millennium, nor does the Coal Industry Act give legal responsibility to the Coal Authority to deal with existing discharges from abandoned mines. However, in this Nottinghamshire Coalfield many of the collieries are interconnected underground and it is unlikely that following the recent colliery privatisation programme minewater pumping will cease in the short term. The emergence of minewater is not therefore anticipated in this catchment. There is a possibility that flooding of old workings in the western part of the catchment could raise the potential hydrostatic head and cause upwelling of minewater into the overlying sandstone aquifer and thereby contaminate public water supplies. This possibility is thought to be quite remote but is an issue of considerable importance which is being investigated further. The NRA nevertheless will consider in detail the water implications of each colliery closure and is studying the possible effects of future coalmine closures.

ISSUE 18 - Inadequate foul and surface water disposal at a number of small developments

Several developments in the catchment are served by inadequate foul and/or surface water drainage arrangements. In some cases the drainage systems have not been adopted by the water undertaker and this has lead to difficulties in assigning responsibility for drainage. Pollution problems have arisen on industrial estates through poor operational practice, spillages and wrong connections, eg Hellaby, Warmsworth, North Anston and West Carr Industrial Estate at Retford. Inadequate drainage can render industrial estates unsuitable for certain types of development.

In other cases, such as the development of restaurants and hotels around the A1 Markham Moor roundabout, inadequate foul drainage has lead to the proliferation of small sewage treatment plants. The widely variable loads discharged to the private STPs here have exacerbated inconsistencies in treatment performance leading to intermittent public complaint and pollution.

ISSUE 19 - Impact of managed land drainage and peat cutting on water quality in the Torne Catchment

Land drainage within the Isle of Axholme has a water quality characteristic of the rich peat deposits which occur on the moorlands and also underlie much of the fertile agricultural land. Peat cutting operations on Hatfield Moors have been carried out for centuries. Increased operations over the last few years has accelerated alterations in drainage and this may have become potentially damaging to downstream water quality particularly in terms of the release of ammoniacal nitrogen. Humic and fulvic acids from the peat reduce the pH of water in the ground which mobilises metals. Polluted water can then drain into watercourses via land drains. The metals tend to precipitate out in the higher pH conditions of the watercourse and the precipitate can blanket the bed. Such phenomena occur mainly in the winter months and could be related to the pumping regimes at NRA and IDB operated pumping stations.

Invertebrate and plant life within the watercourse are affected by blanketing and also possible toxicity effects from metals such as aluminium, which can occur at very high levels. The land drainage also contains ammonia, increased ammonia levels being partly responsible for the lower overall quality of watercourses in the area than would be expected in a predominantly rural catchment. The fishery is likely to be affected by the toxic effects of these metals and elevated levels of ammonia. The detrimental effect on the fishery is most likely to manifest itself in poor recruitment and fry survival over a number of years, rather than in sudden, acute mortalities. These problems may be exacerbated by the pumping regimes designed principally for agricultural benefit.

ISSUE 20 - Groundwater Quality is at risk

A large part of the Idle/Torne catchment is composed in geological terms of sandstone strata, which is a major water supply aquifer, with 31 abstraction boreholes feeding STW, YWS and Anglian Water Services (AWS).

Groundwater pollution has occurred in the past, for example at Clipstone and Harworth. The remediation of groundwater is a difficult, costly and often impractical operation. Therefore, the prevention of groundwater pollution is vital.

Following publication of the NRA's Groundwater Protection Policy, computer modelling techniques have been used to delineate catchment zones of major water supply boreholes on the sandstone aquifer.

The risk of pollution of groundwater will be assessed by field surveys so that pollution prevention measures can be requested where necessary. Examples of sites concerned will include petrol stations, industrial sites and farms. Contingency procedures for dealing with emergency spillage to land, sometimes involving other emergency services, will be reviewed.

ISSUE 21 - Effects of coal mining subsidence on the water environment and

potential increased flood risk to property

The catchment areas of both the Rivers Idle and Torne have been long associated with coal mining operations. Numerous schemes have been carried out in the past to remedy the effects of mining subsidence on main river watercourses, these being paid for by British Coal.

The impact of mining subsidence on a river can be severe, as a lowering of the bed and banks of the watercourse is not usually accompanied by a corresponding lowering of water level and the fall on the river can therefore be negated or even reversed. If remedial works are not carried out, there can be an increased risk of flooding to riverside land and property. However, river regrading schemes to remedy the above effects can be environmentally damaging and in some cases even put at risk the continued use of underground water supplies by opening up fissures possibly caused by the stresses and strains set up by the ground movements. This can lead to a potential for pollution of groundwater (see also Issues 10 and 20). It is important to consider carefully what remedial works are appropriate for each situation, including the 'do nothing' option. The effects of subsidence also have potential water quality impact by occasionally threatening effective performance of STPs by tilting treatment plant, for example at Edwinstowe STP.

Following recent privatisation of the coal mining industry, the private coal operators are now responsible for remedial works and are regulated by the Coal Authority. Consultants working for the private coal operator RJ Budge (UK) Ltd, have already proposed remedial works on the River Maun, upstream of the A614 trunk road at Ollerton and it is imperative that the practice of carrying out effective remedial works continues.

ISSUE 22 - There is currently no flood warning scheme

There is currently no flood warning scheme operating for the River Idle and its tributaries, or for the River Torne. The main purpose of such a scheme would be to issue warnings for properties undefended from flooding, or those at risk from overtopping of flood defences.

ISSUE 23 - The extent of floodplains are not clearly defined

Development in floodplains will be at risk of flooding and may increase the risk of flooding elsewhere by reducing the storage capacity of the floodplain and/or by impeding the flow of floodwater. Land raising in the floodplain may have a similar effect.

Guidance for Local Planning Authorities (LPAs) on protection of floodplains is contained in the Department of the Environment Circular 30/92 "Development and Flood Risk".

The NRA looks to the LPA to resist development in such locations. Redevelopment of existing sites should only be considered where the LPA, in consultation with the NRA, is satisfied that the developer will provide appropriate mitigation and/or protection measures. The NRA, as a consultee of the LPAs, seeks to prevent development encroaching into the

floodplain to avoid any increase in flood risk to people and property. In order to control the floodplain effectively it is necessary therefore to have an accurate definition of its extent. The extent of the definitive 1 in 100 year return period floodplains are not currently adequately mapped for the main rivers within the Catchment.

ISSUE 24 - Degradation of physical diversity due to past flood alleviation schemes on Rivers Idle and Torne

During the 1970s and 1980s, capital flood defence schemes were undertaken on both the Rivers Torne and Idle. By the late 1980s more sympathetic river works were undertaken, incorporating conservation enhancements.

The lower reaches of the River Torne are trapezoidal in character, with floodbanks set away from the river channel and very little tree cover.

In both cases, the fisheries and conservation status of the river are reduced as a result. Improvements within the corridor are possible to reverse this situation.

The lack of physical diversity has had a detrimental effect on the fishery. Reduced habitat has caused the remaining fish population to become spatially sporadic and usually associated with the few remaining fish holding areas. Habitat diversity also provides fry refuges. This is particularly important during times of high flows. Without these, most recruitment to the fishery is lost, as fry and young fish are washed out of the system during adverse water conditions.

ISSUE 25 - Potential conflict between interests in the pumped Rivers

The Rivers Torne and Idle are both pumped drainage systems. The adjacent land use relies on the management of the water levels of these systems to enable adequate drainage in the winter and provide water for irrigation in the summer. Drainage requirements for agriculture can be incompatible with the needs of conservation. Both rivers are fished by Angling Clubs and the River Idle has a right of navigation from West Stockwith to Bawtry. Conflicts can also arise with these interests when pumps operate.

The River Idle was the subject of a flood alleviation scheme in 1980 - 1993 and large areas of washlands, scheduled as SSSIs, were reduced by the provision of flood defences. A large pumping station was constructed at West Stockwith to evacuate water from the Idle to the tidal River Trent. The remaining four areas of SSSI washland were left unprotected but failed to flood regularly enough to retain the population of Bewick and Hooper swans who were winter visitors. In recent years, changes to the pumping regime and wet winter periods have resulted in the washland being flooded for longer periods of time.

Archaeological remains located in the floodplain are at risk of being lost unless the peat stays wet.

ISSUE 26- Eradication/control of alien/invasive plant species

There are sites in the catchment of the River Idle where Himalayan Balsam and Japanese Knotweed have been identified. Measures should be taken to control the spread of these plants because they:-

* Grow densely, shading out native plants
* devalue the natural landscape
* could create a potential flood hazard if dead stems fall in and clog watercourses
* are invasive and require checking to prevent greater problems in the future

There are also considerable growths of water fern in the Warping Drain and Australian stonecrop in the catchment of the River Torne. These should be controlled before they spread further.

ISSUE 27 - Insufficient habitat to encourage the return of otters to the catchment

In order to encourage the return of otters to the catchment, there are certain habitat deficiencies in the area. These include a lack of sprainting sites, which could be provided under bridges to aid monitoring. Removal of bankside vegetation from watercourses may also discourage the return of otters to the area. Dredgings from the rivers may exacerbate the situation if they are not disposed of carefully.

It is known that otters cross the River Trent between Lincolnshire and Yorkshire, but there is insufficient information to determine numbers.

ISSUE 28- Litter and rubbish problems in and near rivers

The rivers in the Idle catchment all flow through urban areas at some point along their length. Waterborne litter can alter the public perception of rivers. It can also be harmful to livestock and wildlife. Litter campaigns should be encouraged in urban areas, using interested organisations from the local community.

ISSUE 29- Lack of recreational facilities and public access to rivers

The Authority has provided car parks and stiles for fishermen and informal recreational users along the River Torne. However there is a lack of facilities for disabled anglers on all the rivers in the catchment. There is a need for provision of a linear walkway along the River Idle and tributaries, to link Greenwood Community Forest in the south to Sherwood Forest and the parks of the Dukeries further north, to the River Idle and on to the River Trent. This would then link to the Trent Valley Way at West Stockwith.

The River Idle has an ancient right of navigation but there are no boating facilities along its length and there is no Navigation Authority.

ISSUE 30- The need to protect and maintain the genetic integrity of native brown trout in the upper reaches of the River Idle tributaries.

Native brown trout are a species nationally threatened from the loss of habitat, pollution and restocking. The upper reaches of the rivers Meden and Poulter still contain good stocks of such fish.

To protect and maintain these populations it may be necessary to prohibit the stocking of farm-bred trout into these rivers. Interaction between native and stocked fish may simply involve direct competition for food. However if stocked fish reproduce they will contribute significantly to future generations. The limited parental origin of farmed trout may result over time, in a significant reduction in genetic integrity.

Consideration needs to be given to the stocking of trout into other rivers in the catchment. This may involve the stocking of brown trout only, preferably of a local origin, and of a size comparable to the resident, wild fish.

The habitats required to support brown trout will also need protection, through the application of the NRA's regulatory powers. Monitoring is necessary to establish the continuing status of these stocks.

ISSUE 31 - The inappropriate EC designation to some fisheries reaches

Fisheries reaches were first designated under the EC Fisheries Directive in the late 1970's. A need for a comprehensive review and revision of these derogations within the Severn-Trent Region has been identified. This situation has largely arisen following improvements in water quality in reaches and rivers not currently designated under the EC directive.

The following reaches should afford designated status.

* River Meden above Warsop, using Warsop Mill for directive purposes. Proposed status - cyprinid.

* River Meden below its confluence with the River Maun, to its confluence with the River Idle. For directive purposes the GQA sampling point will be West Drayton. Proposed Status -cyprinid.

* River Poulter above Cuckney has an excellent native brown trout population. Pending a decision on water quality status this reach should be considered for derogation status. Salmonid or cyprinid status to be discussed.

ISSUE 32- The perceived predation and possible need for the control of piscivorous birds in affected fisheries.

Nationally many birds eat fish in freshwaters and some can be a nuisance, such as cormorants and herons. Only the cormorant is commonly perceived to present a serious

problem for fisheries within the area. Numbers of these birds have increased substantially, particularly with regards to their hunting grounds.

Some enclosed systems, such as fish farms and small lakes, are likely to be more susceptible from this form of avian predation.

At present most evidence of damage is anecdotal or circumstantial. The lack of hard evidence for bird damage to fisheries is not necessarily because this does not occur, but could be because the appropriate experiments have not been carried out.

ISSUE 33- Impact of letting tidal Trent water into the Warping Drain to sustain levels for abstraction.

It has been the practice in the past to allow water from the tidal Trent to pass back into the Warping Drain at high tide to ensure levels are sufficient for abstraction to continue. There is concern that the influx of saline water from the River Trent may have an adverse impact on the invertebrate population of the drain, as well as quality of water available for abstraction. This may, in turn, have an effect on the fishery which is owned by the Authority.

3.3 A SUMMARY OF THE ISSUES, AND OPTIONS FOR ACTION

The issues facing the catchment, described in the previous section, are shown in the summary tables in the following pages. These are intended to provide quick reference to the issues that need to be addressed as well as the options available. The abbreviations used can be found in the Glossary (Appendix 4).

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

This should not be taken as a definitive list of issues, nor should the proposed options be taken to be the only ones available. We hope that interested parties will debate these issues and pass their comments to the NRA for consideration when preparing the Action Plan.

The following key explains the abbreviations used in the tables.

Abbreviation	Full Name
BW	British Waterways
DoE	Department of the Environment
EN	English Nature
IDBs	Internal Drainage Boards
LA	Local Authority
LPA	Local Planning Authority
MAFF	Ministry of Agriculture,Fisheries &Food
NRA	Natuinal Rivers Authority
OT	Otter Trust
PWS	Public Water Supply
RL	Riparian Landowners
RSPB	Royal Society for the Protection of Birds
STW	Severn Trent Water Ltd
WC	Water Company
WOs	Waste Operators
WRA	Waste Regulation Authority
WTs	Wildlife Trusts

ISSUE No: 1	Impact of British Waterways abstraction from the River Ryton at Worksop for the Chesterfield Canal		
OPTIONS	**RESPONSIBILITY**	**BENEFITS**	**CONSTRAINTS**
1. Securing operational agreement between NRA and BW	NRA / BW	Optimum use of scarce water resources	Cost of flow monitoring and control Limits scope for abstraction from the canal
2. Review of other sources of water to feed canal	BW / NRA	Optimum use of scarce water resources	Potential increased cost associated with the utilization of other sources

ISSUE No 2	Lack of water resources to meet demand.		
OPTIONS	**RESPONSIBILITY**	**BENEFITS**	**CONSTRAINTS**
1. Provide winter storage facilities	Abstractor / NRA	Reliability Utilizing ample surface water resources in winter months	Cost Potential shortage of resources in dry winters - in some catchments baseflows have been depleted
2. Co-operative use of surface water licensed abstractions	Abstractor / NRA	More efficient use of scarce resources	
3. Co-operative scheme to abstract Trent water for importation to this area	Abstractor / NRA	Providing an additional reliable source of supply	Occasional less flexibility to the individual licence holder High cost. Possibly some restriction during low flow periods

ISSUE No: 3	Reduced groundwater levels in the Sherwood Sandstone Groundwater Unit, particularly the Doncaster Unit		
OPTIONS	**RESPONSIBILITY**	**BENEFITS**	**CONSTRAINTS**
a) non sustainability of wetland sites caused by falling groundwater levels in the Doncaster Groundwater Unit.			
1. Detailed hydrogeological investigation to determine degree of continuity between wetland sites and groundwater.	NRA/EN	Ability to assess restoration options to nationally raised issues	Lack of data
b)appraisal of long term effects of negotiated reduction in Public Water Supply abstraction			
2. Maintain/ improve present level of monitoring of water levels/ streamflow	NRA	Early detection of any changes in groundwater levels/ streamflows	Cost of staff
3. Regular update of groundwater model	NRA	Improved understanding of local groundwater conditions	none
c) Review of Groundwater Management Unit boundaries			
4. Investigate use of groundwater model to reappraise groundwater units	NRA	Development of a robust groundwater licensing policy	none

ISSUE No: 4	Hydraulic relationship between rivers and some Public Water Supply boreholes, adjacent to rivers, is imprecisely known.		
OPTIONS	**RESPONSIBILITY**	**BENEFITS**	**CONSTRAINTS**
1. Detailed low flow study to determine any significant loss in stream flow in vicinity of PWS boreholes	NRA	Regional distribution of problem defined	NRA staff time and cost Discontinuous data Technically difficult to accurately resolve small differences in flows on larger rivers
2. Detailed investigation of river / borehole quality	NRA / PWS Companies	Improved understanding of river / aquifer interrelationship	Analysis may not detect presence of river water in the boreholes
3. Local detailed investigation of river / aquifer interrelationship	NRA / PWS Companies	Improved understanding of river / aquifer interrelationship	Complex hydrogeology Cost

ISSUE No: 5	Dewatering activities associated with mineral extraction.		
OPTIONS	**RESPONSIBILITY**	**BENEFITS**	**CONSTRAINTS**
1. Develop consistent national strategy	NRA	More effective management of groundwater resources	Limited control under existing legislation

ISSUE No 6	Management of water releases from high level watercourses into lowland drains and the licensing of subsequent abstractions.		
OPTIONS	**RESPONSIBILITY**	**BENEFITS**	**CONSTRAINTS**
1. Improve resources model of system draining to Keadby	NRA	Strategic resourced decisions can be made. Licensing Policy can be further developed	Cost, staff time
2. Carry out ecological survey to establish environmental needs of drainage systems	NRA, IDBs, EN	Water level needs can be confidently decided - contributions to WLMP	Relating results to water needs is difficult
3. Do nothing different		Little cost	Interim Licensing Policy vulnerable to challenge. Requirements for Pumping Stations not likely to be met.

ISSUE No: 7	The loss of flow in the River Idle between Mattersey and West Stockwith and associated quality problems.		
OPTIONS	**RESPONSIBILITY**	**BENEFITS**	**CONSTRAINTS**
1. Carry out detailed investigation to confirm extent of problem	NRA	To confirm degree of perceived problem	Lack of manpower. Data availability
2. As a result of 1, possibly review operating regime for gates at West Stockwith	NRA	Improvement in water quality up-stream of West Stockwith	Reduction in the amount of water available for abstraction

ISSUE No: 8	Low flows in Rainworth Water		
OPTIONS	**RESPONSIBILITY**	**BENEFITS**	**CONSTRAINTS**
1. Borehole discharges to watercourses	NRA	Improve flow and amenity value	Water loss through river bed limits net gain. Long term operating costs.
2. Stream bed lining	NRA RL	Improved flow and amenity value	Cost. Impact on conservation value of stream bed. Visual impact
3. Reductions in abstraction	NRA STW	Improved baseflow	Problems in reducing / reversing licences ie cost of providing alternative supplies

ISSUE No: 9	Elevated nitrates in groundwater.		
OPTIONS	**RESPONSIBILITY**	**BENEFITS**	**CONSTRAINTS**
1. To assist in the designation of aquifer outcrop as a NVZ	DoE / MAFF / NRA	Reduced leaching of nitrates	Opposition from the affected agricultural community
2. To assist in the designation of NSA's around specific boreholes	MAFF / NRA	Reduced leaching of nitrates	Existing scheme runs for 5 years and extension beyond this time will require further EC funding

ISSUE No 10	Impact of contaminated land on controlled waters.		
OPTIONS	**RESPONSIBILITY**	**BENEFITS**	**CONSTRAINTS**
1. Encourage appropriate remediation of contaminated sites	NRA Redevelopers LPA	Clarification of risk of pollution to water resources	Cost. Legal powers. Lack of information on situation of contaminated sites.

ISSUE No: 11	Potential impact of the spreading of industrial effluent to land.		
OPTIONS	**RESPONSIBILITY**	**BENEFITS**	**CONSTRAINTS**
1. Consent permanent discharges as appropriate	NRA	Clarification of extent of problem	Cost
2. Ensure sites used for occasional spreading of effluent are not likely to cause water pollution	WOs , NRA, WRA	enable minimisation of effect of impact on water resources	Lack of adequate regulatory control. NRA not aware of sites used

ISSUE No: 12	The need for setting of appropriate RQOs to meet the needs and uses of the river catchment.		
OPTIONS	**RESPONSIBILITY**	**BENEFITS**	**CONSTRAINTS**
1. Set appropriate RQOs to meet the needs and uses of the Idle /Torne River system	NRA DoE	Improvements in water quality, recreation, fisheries, protection of SSSIs and provision of appropriate quality of resource to users	Cost
2. Identify reaches where short term RQOs will be required and prioritise for submission on AMP3 programme	NRA	Maintain existing quality	Cost
3. Obtain statutory WQO status	DoE		

ISSUE No: 13	The need to prioritise sewage treatment and sewerage improvements		
OPTIONS	**RESPONSIBILITY**	**BENEFITS**	**CONSTRAINTS**
1. Monitor the implementation and effects on water quality of improvements agreed under AMP2	NRA	Ensure achievement of standards associated with statutory obligations. Improve water quality, recreation and fisheries. Protect SSSIs.	Cost
2. Review the quality effects of STP effluent discharge	NRA	Ensure compliance with long term RQOs and, where appropriate, with short term RQOs	
3. Identify priorities for future investment	NRA	Enable compliance with long term RQOs	Cost

ISSUE No: 14	Optimisation of the compensation flow from the public water supply source at Manton into the River Ryton.		
OPTIONS	**RESPONSIBILITY**	**BENEFITS**	**CONSTRAINTS**
1. Existing discharge to be continued	NRA STW	Advantageous to river water quality. Reduces risk of changing quality of abstracted water.	Waste of groundwater resource when flows in Ryton are high.
2. Study water quality needs of river and formulate operational plan to optimise use of groundwater resource	NRA	Maintain river water quality (preserve groundwater reserve) Optimise use of groundwater resources and conserve reserves.	May affect borehole quality. May require expenditure to set up and operate.

ISSUE No 15	Eutrophication in the Catchment:		
OPTIONS	**RESPONSIBILITY**	**BENEFITS**	**CONSTRAINTS**
a) Kingsmill Reservoir			
1. Identify measures required to remove or reduce nutrient inputs and prevent eutrophication including the development of blue green algae	NRA, STW	Improve water quality and safeguard recreational uses	Cost
2. Treat sewage effluent and improve upstream sewerage systems	STW	Reduce nutrient input to reservoir, improving water quality and preventing eutrophication	Cost. Very low nutrient levels required.
3. Divert sewage effluent and improve upstream sewerage systems	STW	Improve reservoir chemical and bacteriological quality	
4. Remove basal silt	STW Ashfield DC	Reduce nutrient input Deeper reservoir water advantageous for recreational use	Cost. Reduce flow through reservoir.
5. Do nothing		Kingsmill Reservoir remains eutrophic and contains blue green algae	Cost. Increase retention time in reservoir.
b) Other Locations			
6. Gather data on nitrates, phosphates and macrophytes	NRA	Increase understanding of potential eutrophication process	
7. Review data in 1997 for possible inclusion in action programme under EC UWWT Directive (91/271/EEC)	NRA DoE	Programme of priorities	
8. Removal of nutrients to prevent eutrophication	NRA WC	Reduce eutrophication, benefit environment	Cost

ISSUE No: 16	Impact of discharge of minewater from current coal mining operations.		
OPTIONS	**RESPONSIBILITY**	**BENEFITS**	**CONSTRAINTS**
1. Review impact of each discharge on watercourse	NRA	Improve understanding of effects on receiving waters	Manpower / time
2. Revise consents where necessary	NRA	Protect river quality and uses	Cost to discharger meeting higher standards
3. Establish areas liable to future subsidence effects	NRA Coal companies	Agree measures to protect controlled waters	Cost
4. Assess implication of future colliery closures	NRA	Protect controlled waters	Cost of study

ISSUE No: 17	Impact of Colliery closures.		
OPTIONS	**RESPONSIBILITY**	**BENEFITS**	**CONSTRAINTS**
1. Investigate loss of resource to river	NRA	Better planning of water quality issues	Cost of investigation
2. Investigate emergence of uncontrolled pollution within the catchment	NRA Coal Authority Owners	Early implementation of remedial work measures	Cost.
3. Remediation measures to protect water quality	Coal Companies Owners	Avoidance of pollution	Cost Legal powers. Technical difficulty.

ISSUE No: 18	**Inadequate foul and surface water disposal at a number of small developments.**		
OPTIONS	**RESPONSIBILITY**	**BENEFITS**	**CONSTRAINTS**
1. Identify sites by undertaking pollution audit of businesses on each of the estates	NRA STW Local Authorities	Clarification of the extent of the problem Raised awareness and better information on the pollution potential	Cost / funding Manpower.
2. Establish a plan for each site identified in 1. above	NRA Local Authorities		No legal basis to seek improvements where pollutions are not occurring
3. Establish a plan for the following categories of future developments: i) sewage & effluent disposal facilities ii) oil & chemical storage and handling facilities	NRA Local Authorities	Existing situation does not become worse	Does not improve existing developed areas

ISSUE No: 19	Impact of managed land drainage and peat cutting on water quality in the Torne catchment.		
OPTIONS	**RESPONSIBILITY**	**BENEFITS**	**CONSTRAINTS**
1. Reduce polluting load by altering management practices	NRA	Protect EC designated fishery. Improve water quality with benefit to flora and fauna	Land drainage managed for benefit of agricultural land. Opposition assured unless measures shown to be of no detriment to agriculture
2. Investigate further cause of pollution from land drainage	NRA	Increase understanding of the issues	Issues may be complex
3. Pilot study on designated part of catchment to examine effects of changing pumping regime	NRA / IDB	Select part of the catchment favourable to all parties. Concentration of resources. Choose site to minimise variables. Direct information on effect of altering practices, eg changing winter/summer levels	Manpower. Subject to agreement between all interested parties. Time consuming
4. Maintain status quo	NRA / IDB	No cost	Three rivers system continues to fail to comply with EC legislation
5. Consent drainage related to peat cutting operations	NRA	Protect EC designated fishery. Control of potential polluting load to watercourse	Insufficient information for setting of workable consent Would raise problem of how to treat drainage to ensure consent can be met at all times
6. Collect further information on impact of drainage related to peat cutting operations	NRA Operator	Would help to decide whether consent needed and if so what controlling limits should be applied	Manpower Analytical costs
7. If appropriate, discuss with the operator the possibility of reducing drainage by altering practices	NRA	May be able to achieve pollutant load reduction without excessive costs	Practical options may not exist
8. Prohibit operator from making discharge of site drainage related to peat cutting operations	NRA	Estimate pollutant load	Operator certain to appeal. Insufficient information to justify such an option

ISSUE No 20	Groundwater Quality is at risk.		
OPTIONS	**RESPONSIBILITY**	**BENEFITS**	**CONSTRAINTS**
1. Identity borehole catchment areas	NRA	Target pollution prevention work	Manpower
2. Undertake pollution prevention surveys in catchment areas	NRA	Identify pollution risks and recommend preventative measures	Manpower

ISSUE No: 21	Effects of coal mining subsidence on the water environment and potential increased flood risk to property.		
OPTIONS	**RESPONSIBILITY**	**BENEFITS**	**CONSTRAINTS**
1. Identify potential areas of mining activity	NRA	The carrying out of Mining Subsidence Remedial Works at the expense of coal operator and provision of conservation enhancement	Cost / resources limited to Main Rivers only
2. Investigate the impact of subsidence where it affects Main Rivers and serve damage notices as necessary	NRA	Define areas put at risk from mining activity	Cost / resources Information from coal operators subject to change

ISSUE No: 22	There is currently no flood warning scheme.		
OPTIONS	**RESPONSIBILITY**	**BENEFITS**	**CONSTRAINTS**
1. Investigate introduction of flood warning schemes	NRA	Issue of warnings of overtopping of flood defences Improved Emergency Planning Reduce risk of injury or loss of life resulting from flooding Reduction in financial losses arising from flood damage to property	Cost of construction and operation of new monitor stations Resource implications to Police, LPAs, Flood Wardens Limited data presently available

ISSUE No: 23	The extent of floodplains are not clearly defined		
OPTIONS	**RESPONSIBILITY**	**BENEFITS**	**CONSTRAINTS**
1. Define extent of floodplain to 1 in 100 year return period	NRA	Enable LPAs to include clear floodplain protection policies in Development plans	Cost Data collection timescale
2. Do nothing		No cost	Risk of flooding of new and existing development

ISSUE No: 24	Degradation of physical diversity due to past flood alleviation schemes on the Rivers Idle and Torne.		
OPTIONS	**RESPONSIBILITY**	**BENEFITS**	**CONSTRAINTS**
1. Identify degraded stretches .	NRA	Understand extent of problem	Manpower
2. Undertake rehabilitation feasibility	NRA	First stage in strategic objectives	Consultant costs
3. Undertake physical works to rehabilitate	NRA (with RLs)	Habitat creation for wildlife, fish and public perception	Costs/ Manpower
4. Do nothing			No improvement to degraded habitats
5. Undertake landscape assessment	NRA	Understanding of rivers in context of valley and corridor	Consultant costs

ISSUE No: 25	Potential conflict between interests in the pumped Rivers		
OPTIONS	**RESPONSIBILITY**	**BENEFITS**	**CONSTRAINTS**
1. Manage water levels to ensure periodic inundation of River Idle Washlands (SSSI)	NRA, IDBs	Wetland/ grassland are maintained for birdlife	Possible inundation of agricultural land
2. Do nothing			Possible drying out of river SSSI
3. Manage water levels in both rivers to benefit anglers	NRA, IDBs	Improved angling facility	Operation of Pumping Station/ Manpower
4. Undertake WLMPs	NRA, IDBs, EN	Give greater understanding of pumped systems	

ISSUE No: 26	Eradication/control of alien/ invasive plant species.		
OPTIONS	**RESPONSIBILITY**	**BENEFITS**	**CONSTRAINTS**
1. Undertake surveys of all watercourses to identify problem areas	NRA	Gain understanding of scale of problem	Consultant costs
2. Undertake eradication programme	NRA/ LA, RL	Removal of alien species to allow native species to regenerate	Herbicide use in catchment and manpower

ISSUE No 27	Insufficient habitat to encourage the return of otters to the catchment.		
OPTIONS	**RESPONSIBILITY**	**BENEFITS**	**CONSTRAINTS**
1. Provide sprainting sites at suitable locations	NRA, WTs	Enable gathering of information on movements	Require flood defence consents
2. Investigate provision of otter holts at suitable locations	NRA, WTs, OT	Habitat creation	Identifying sites with riparian landowners
3. Undertake survey of area for otter movements	NRA, WTs, EN	Provide information on state of catchment	Consultant costs
4. Set up long term programme for reintroduction into the catchment	EN	Native mammal back in catchment	National Policies for otter reintroduction

ISSUE No: 28	Litter and rubbish problems in and near rivers.		
OPTIONS	**RESPONSIBILITY**	**BENEFITS**	**CONSTRAINTS**
1. Raise public awareness of problems caused by rubbish dumping	NRA, LA	Public education to increase awareness	Promotion costs
2. Support local initiatives in clearing small watercourses	NRA LA	Encourage local communities to clean up watercourses	

ISSUE No: 29	Lack of recreational facilities and public access to rivers.		
OPTIONS	**RESPONSIBILITY**	**BENEFITS**	**CONSTRAINTS**
1. Investigate possibility of a River Idle walk	LA, NRA	Eventual through route from Greenwood to River Trent	Riparian landowners approval needed Costs to lay path
2. Investigate sites for provision of disabled anglers pegs	NRA, RLs	Improved facilities on rivers	Riparian landowners approval needed Construction costs
3. Possible provision of mooring sites on River Idle	RLs, Boat club, NRA	Improved facilities for boaters	Riparian landowners approval needed Construction costs Flood defence requirements

ISSUE No: 30	The need to protect and maintain the genetic integrity of native Brown Trout in the upper reaches of the River Idle tributaries.		
OPTIONS	**RESPONSIBILITY**	**BENEFITS**	**CONSTRAINTS**
1. Determine genetic diversity of brown trout in river	NRA	Assess scope of problem	Cost. Manpower.
i) Assess past stocking levels and extent	NRA	Determine scale of the problem	
ii) Undertake genetic analysis of native brown trout	NRA	To prove or disprove hypothesis	Cost. manpower.
2. If necessary; restrict introduction of farmed trout into native populations	NRA	Protection of existing native stocks	Agreement of owners

ISSUE No 31	The inappropriate EC designation to some fisheries reaches.		
OPTIONS	**RESPONSIBILITY**	**BENEFITS**	**CONSTRAINTS**
1. Determine designation status and / or suitability status in rivers concerned	NRA	Fisheries protection with designation status	Water quality status / objective monitoring requirements

ISSUE No: 32	The perceived predation and possible need for control of piscivorous birds in affected fisheries.		
OPTIONS	**RESPONSIBILITY**	**BENEFITS**	**CONSTRAINTS**
1. Determine level of predation in rivers and still waters	NRA	Assess scope of problem. Determine scale of problem. To prove or disprove hypothesis.	Cost. Manpower
2. Establish methods of control	NRA, MAFF , RLs, RSPB, LA	Protection of fisheries	Agreement of all interested parties

ISSUE No: 33	Impact of letting tidal Trent water into Warping Drain to sustain levels for abstraction.		
OPTIONS	**RESPONSIBILITY**	**BENEFITS**	**CONSTRAINTS**
1. Investigate effects of saline water on invertebrate population, water quality and fisheries.	NRA	Better understanding of the levels and effects of salinity	Cost
2. Do Nothing different.		None	No solution to the problem
3. Cease practice of letting tidal Trent water into the Warping Drain.	NRA	Lowering of salinity	Insufficient water available for abstraction

PART II

SUPPORTING INFORMATION

SECTION 4 USES AND RESOURCES OF THE CATCHMENT

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

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

4.1 LAND USE DEVELOPMENT AND INFRASTRUCTURE

General

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

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

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

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

The strategic objective for this category is:

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

Local Perspective

The Goverment's Regional Planning Guidance for the East Midlands draws to the attention of LPAs that CMPs are an important and valuable source of information and advice on water-based interests; LPAs should have regard to CMPs when formulating their Development Plan policies. The NRA has recently commented on the draft Regional Planning Guidance for Yorkshire and Humberside, and requested that a similar statement

is included in the final version.

Seven District/Borough Councils have planning and administrative responsibilities in the catchment along with Nottinghamshire, Derbyshire and Humberside County Councils. Significant parts of the Metropolitan Borough Councils of Doncaster and Rotherham also lie within the catchment. Map 5 shows the administrative boundaries and infrastructure details.

Housing

The Nottinghamshire Structure Plan Review (Deposit) recognises a need for housing growth and identifies a requirement for 22,500 buildings to be built in Ashfield, Bassetlaw, Mansfield, Newark and Sherwood between 1991-2006 of which approximately 14,000 will be within the catchment. The Consultation Draft of the Derbyshire Structure Plan Review is due later in the year but the only major housing development proposed in the Derbyshire part of the catchment is at Shirebrook (South Shirebrook Planning Brief refers). The Boothferry Borough Local Plan has allocated 73.1 hectares of land for residential development in the Isle of Axholme.

Doncaster's UDP deposit draft identifies a basic requirement of an additional 16,800 dwellings between 1986 and 2003 approximately 7,700 of which will be in the catchment. Sites for 11,370 new dwellings are allocated in the Rotherham UDP to be built between 1991 and 2001. Of these approximately 3,400 and a further allocation of 104 hectares will be in the catchment.

The present status of development plans covering the catchment is shown in Table 1.

Industry/Commerce

There are now only ten working collieries in the catchment and the closure of others has resulted in various initiatives for employment including the establishment of new enterprise zones at Crown Farm, Mansfield and Manton Wood, Bassetlaw; and new industrial and business estates. The main traditional employment sectors - coal mining and electricity generation, textiles and clothing, and engineering - face problems in maintaining present levels of employment. Various longstanding manufacturing industries are concentrated in the main population centres including leading companies such as Pretty Polly, Coates Viyella, and Toray. The Nottinghamshire Structure Plan Review recognises a need to expand the financial and business services role of the County's sub-regional centres of Mansfield, Worksop and East Retford.

In Derbyshire, industrial development is proposed at Shirebrook on the former colliery site, and the former Pleasley Colliery site is to be redeveloped for commercial use, possibly as a country park.

Doncaster supports a rapidly expanding service sector with growth in office-based activities, warehousing and distribution. Rotherham MBC has established Strategic

Regeneration Areas to diversify local employment by identifying areas for industrial and business uses.

A number of large distribution centres are being created close to motorways such as the M180 which provides key east-west connections.

Tourism

Tourism and leisure based industries offer possibilities for job growth particularly in the Sherwood Forest area following the decline in the mining industry. The Nottinghamshire Structure Plan Review recognises a need for more evening entertainment facilities, public access and a greater range of tourism accommodation facilities. The number of visitors at peak periods to Sherwood Forest Visitor Centre and Clumber Park has created some problems of over-use and traffic congestion. A Tourism Study of the Mansfield, Ashfield, Bassetlaw and Newark & Sherwood District Council areas was undertaken in 1990 and made various recommendations for tourism.

Doncaster Tourism Strategy identifies a number of tourism related activities including: The Dome, the Leisure Park, the Racecourse, the town-centre itself, Hatfield Marina and the water park at Lindholme.

Tourist attractions such as the Chesterfield Canal provide employment activities compatible to the character of the surroundings such as small craft workshops and cafes.

Vacant and derelict land provide an opportunity for improving the provision of open space and other leisure facilities and river valleys, canals and disused railways can be used for developing recreational routes both within urban and rural areas, and from one to the other.

Transport/Infrastructure

The area is well placed in relation to the national road network. The M1 runs close to the western edge of the catchment with a number of motorways (M18, M180 and A1 (M)) and trunk and A-roads linking the main population centres. The A614 trunk road running south to north joins the A1 which in turn becomes the A1(M) prior to linking up with the M18. The A57 trunk road, linking Sheffield and Lincoln, runs west/east through the central area of the catchment. The A1(T) Tuxford-Blyth is to be upgraded to motorway status. Bypasses are proposed at Edwinstowe, Clarborough-Welham and Rainworth.

Rail transport is served by the electrified east coast main railway line which runs through the catchment linking East Retford and Doncaster. The Sheffield-Worksop-East Retford line serves a number of local communities and helps to reduce congestion on the roads. Nottinghamshire County Council is also reopening the passenger services from Nottingham to Worksop via Mansfield with the introduction of the Robin Hood Line.

Retford (Gamston) Airport has experienced some recent growth in business and cargo use and further development will be allowed where there are no significant detrimental effects

on the environment.

European Funding

A substantial part of the south-western part of the catchment is within the area of eligibility for EC funding of projects under East Midlands Objective 2 Area SPD. This area is centred on Mansfield and covers the North Nottinghamshire and Derbyshire coalfield. Parts of the Objective 2 Areas of South Yorkshire and Humberside are also in the catchment area.

Funding in the Idle Torne catchment is difficult to calculate but will be a substantial share of the total allocations in the East Midlands, South Yorkshire and Humberside respectively. Schemes of benefit to the water environment will generally be financed from the European Regional Development Fund (ERDF).

Parts of the catchment area are also eligible for European assistance under the RECHAR programme for restructuring existing and former coalfield areas.

TABLE 1 - LOCAL PLANNING AUTHORITIES AND DEVELOPMENT PLANS

Local Planning Authority	Percentage of Council in Catchment Area	Population Estimated in Catchment	Development Plans Title	Status and Consultation Date
Nottinghamshire County Council	40	277,516	Nottinghamshire Structure Plan (Review) Nottinghamshire Minerals Local Plan	Deposit Draft (Apr 94) Examination in Public (Jan 95) Deposit Draft (Sept 93) Public Inquiry (Oct 94)
Ashfield District Council	23	50,080	Ashfield Local Plan	Deposit Draft (Apr 94) Public Inquiry (May 95)
Bassetlaw District Council	68	95,704	Bassetlaw Local Plan	Consultation Draft (Dec 93) Deposit Draft (Apr 95)
Gedling Borough Council	2	<100	Gedling Borough Local Plan	Adopted Nov 90 Review for Public Consultation Summer/Aut 95
Mansfield District Council	100	102,100	Mansfield Local Plan	Consultation Draft (Dec 93)
Newark and Sherwood District Council	20	29,632	Newark and Sherwood Local Plan	Deposit Draft (Feb 95)
Derbyshire County Council	6	39,330	Derbyshire Structure Plan (Review) Derbyshire Minerals Local Plan	Consultation Draft (Due 95) Consultation Draft (Sept 94)
Bolsover District Council	54	39,330	Bolsover Local Plan	Consultation Draft (Due 95)
Humberside County Council	6	15,189	Humberside Structure Plan Replacement	Consultation Draft (Jan 94) New Unitary Authority to progress
Boothferry Borough Council	24	15,189	Boothferry Borough Local Plan	Deposit Draft (Jun 94) Public Inquiry (Jun 95)
Doncaster Metropolitan Borough Council	48	234,535	Doncaster Unitary Development Plan	Deposit Draft (Jun 94) Public Inquiry (Jun 95)
Rotherham Metropolitan Borough Council	41	58,440	Rotherham Unitary Development Plan	Deposit Draft (Jun 95)

4.2 ABSTRACTION - SURFACE AND GROUNDWATER

General

The removal of water from streams, rivers or groundwater by man, is termed **abstraction**. Abstractions are controlled by licences, which ensure that the right balance is struck, between the needs of abstractors and the environment. All abstraction licences specify maximum volumes that the licence holder may take, and many contain conditions to protect the environment and other abstractors. All licensed sites are visited on a regular basis to enforce the conditions on the licence.

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

The strategic objectives for this category are:

* To manage abstraction to long term sustainable levels.

* To encourage efficient water use including leakage reduction, efficient irrigation and winter storage for summer use, and to optimise re-use.

* To safeguard public supply abstraction sources with respect to water quality and quantity.

* To ensure groundwater resources are not over licensed or over abstracted where possible.

* To actively enforce the conditions of abstraction licences to protect the rights of other abstractors and the aquatic environment.

* To develop and implement a clear licensing policy for abstractions in the catchment.

* To encourage abstractions to be made as far down a river or stream as is practical to minimise the effect of the abstraction on river flows.

Local Perspective

Table 2 summarises the number, size and category of use of all licensed surface and groundwater abstractions in both catchments.

TABLE 2 - ABSTRACTION LICENCES

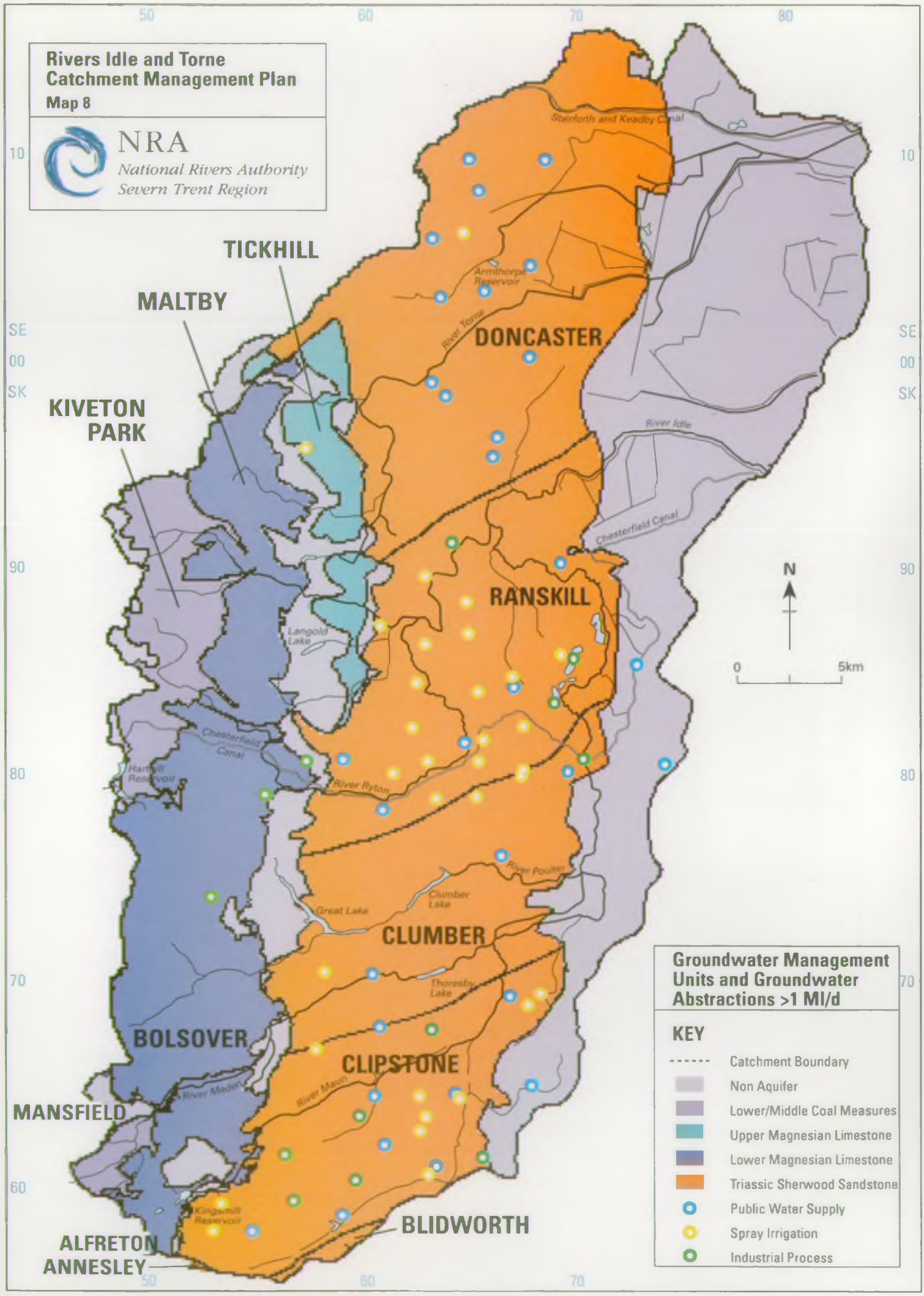
Type of Abstraction	Surface Water Abstraction			Groundwater Abstraction		
	No of Licences	Licensed Abstraction (Ml/d)	Percent by Volume (%)	No of Licences	Licensed Abstraction (Ml/d)	Percentby Volume (%)
Public Water Supply	0	0	0	26	277.2	82.7
Private Water Supply	0	0	0	4	0.8	0.3
Industrial	15	20.0	6.3	40	43.1	12.9
Agricultural - spray irrigation	263	271.9	85.9	55	12.2	3.6
Agricultural - other than spray irrigation	0	0	0	45	1.8	0.5
Others (e.g. power production, fish farms)	7	24.7	7.8	0	0	0
TOTAL	285	316.6		170	355.1	

4.2.1 Drinking Water Supply

General

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

The NRA is not responsible for the quality of the raw water, nor of the delivered, treated water. However, it does have a duty to protect water and will specify protection zones around groundwater sources that seek to control certain potentially polluting activities. The Groundwater Protection Policy forms the basis for the NRA's activities in this area, on a wider aquifer basis by identifying groundwater vulnerability; at a more localised level specific sources can be identified as "Source Protection Zones" within which activities which threaten the source can be


Rivers Idle and Torne
Catchment Management Plan
Map 8
NRA
National Rivers Authority
Severn Trent Region
TICKHILL
MALTBY
KIVETON PARK
DONCASTER
RANSKILL
CLUMBER
BOLSOVER
CLIPSTONE
MANSFIELD
BLIDWORTH
ALFRETON
ANNESLEY
Stainforth and Keadby Canal
Armthorpe Reservoir
River Torne
River Idle
Chesterfield Canal
Langold Lake
Hardwell Reservoir
River Ryton
River Poulter
Great Lake
Clumber Lake
Thoresby Lake
River Meden
River Maun
Kingsmill Reservoir
N
0
5km
Groundwater Management Units and Groundwater Abstractions >1 Ml/d
KEY
Catchment Boundary
Non Aquifer
Lower/Middle Coal Measures
Upper Magnesian Limestone
Lower Magnesian Limestone
Triassic Sherwood Sandstone
Public Water Supply
Spray Irrigation
Industrial Process

prohibited. (See Section 5.1 for further details)

Local Perspective

Due to the presence of the Sherwood Sandstones and, to a lesser extent, the Lower Magnesian Limestone aquifers groundwater development has been extensive for public water supply, agricultural and industrial usage. Three public water supply companies, namely Yorkshire Water Services (YWS), Anglian Water Services (AWS) and Severn Trent Water Ltd (STW), have in total 31 sources drawing on the groundwater resources. Due to the prolific yielding characteristics of the Sherwood Sandstones many of the individual sources pump at rates in excess of 10Ml/d. All three water companies supply local communities within the two catchments. The 11 YWS boreholes are situated to the south and east of Doncaster which straddles the boundary between the NRA's Severn-Trent Region and Yorkshire/Northumbria Region. They yield an average of 78 Ml/d, supplying to the town itself as well as the old mining villages outside the town. The five AWS sources yield an average of 44 Ml/d, most of which supplies the City of Lincoln which is outside the two catchments and is within the Anglian Region of the NRA, as well as towns such as Gainsborough and Retford. STW abstract from 15 sources at an average rate of 99 Ml/d. Some of this water supplies the City of Nottingham as well as centres of population within the Idle Catchment such as Mansfield. At two of the 15 sites, STW abstracts water from the underlying confined Lower Magnesian Limestone, as well as the overlying Sherwood Sandstones. Much of the groundwater is therefore pumped out of the catchments and represents a net loss to the two catchments.

There are no surface water public water supply abstractions from either rivers or reservoirs. The relatively flat nature of the catchment, combined with the presence of underlying permeable strata have precluded the construction of water supply reservoirs.

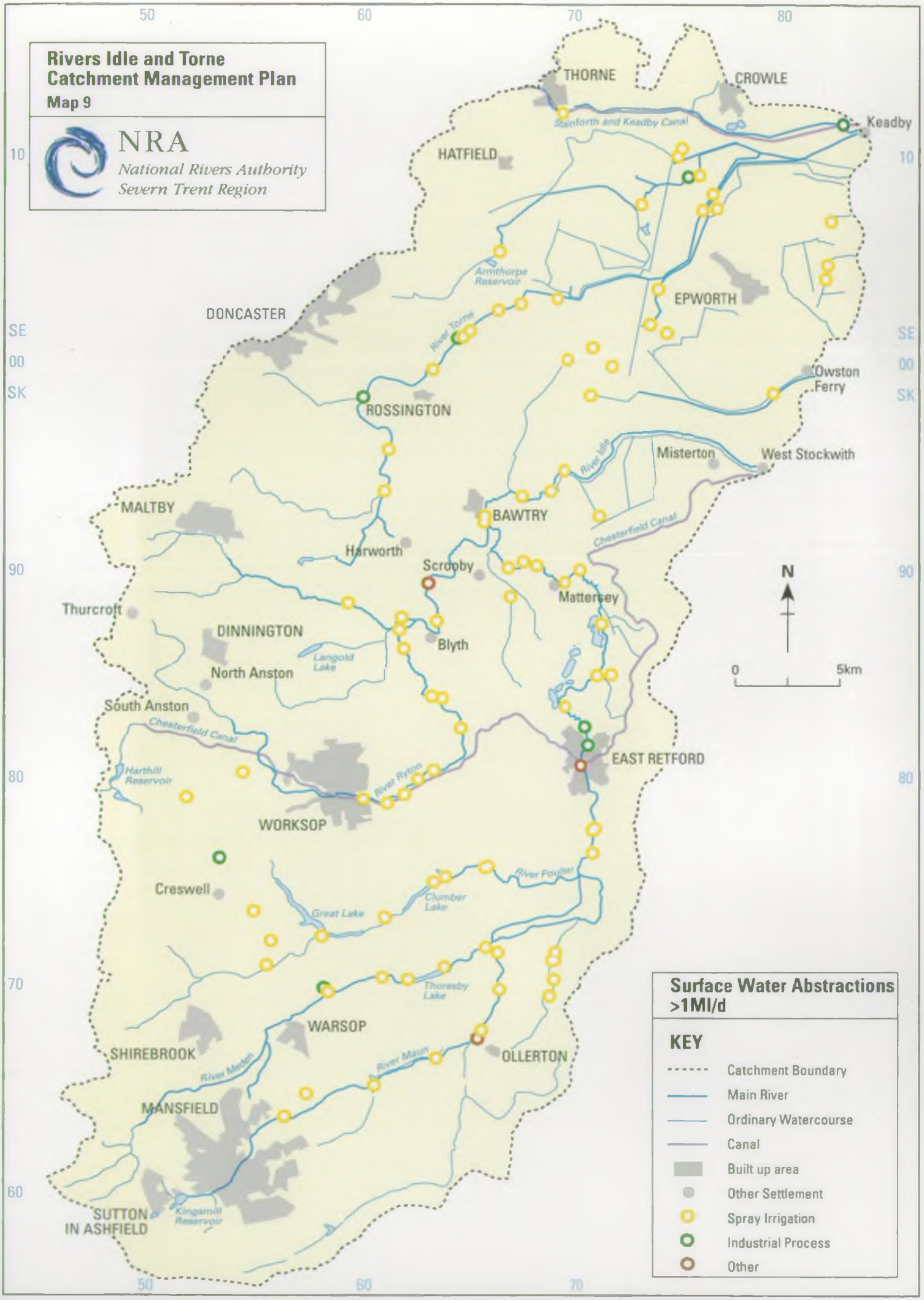
4.2.2 Industry

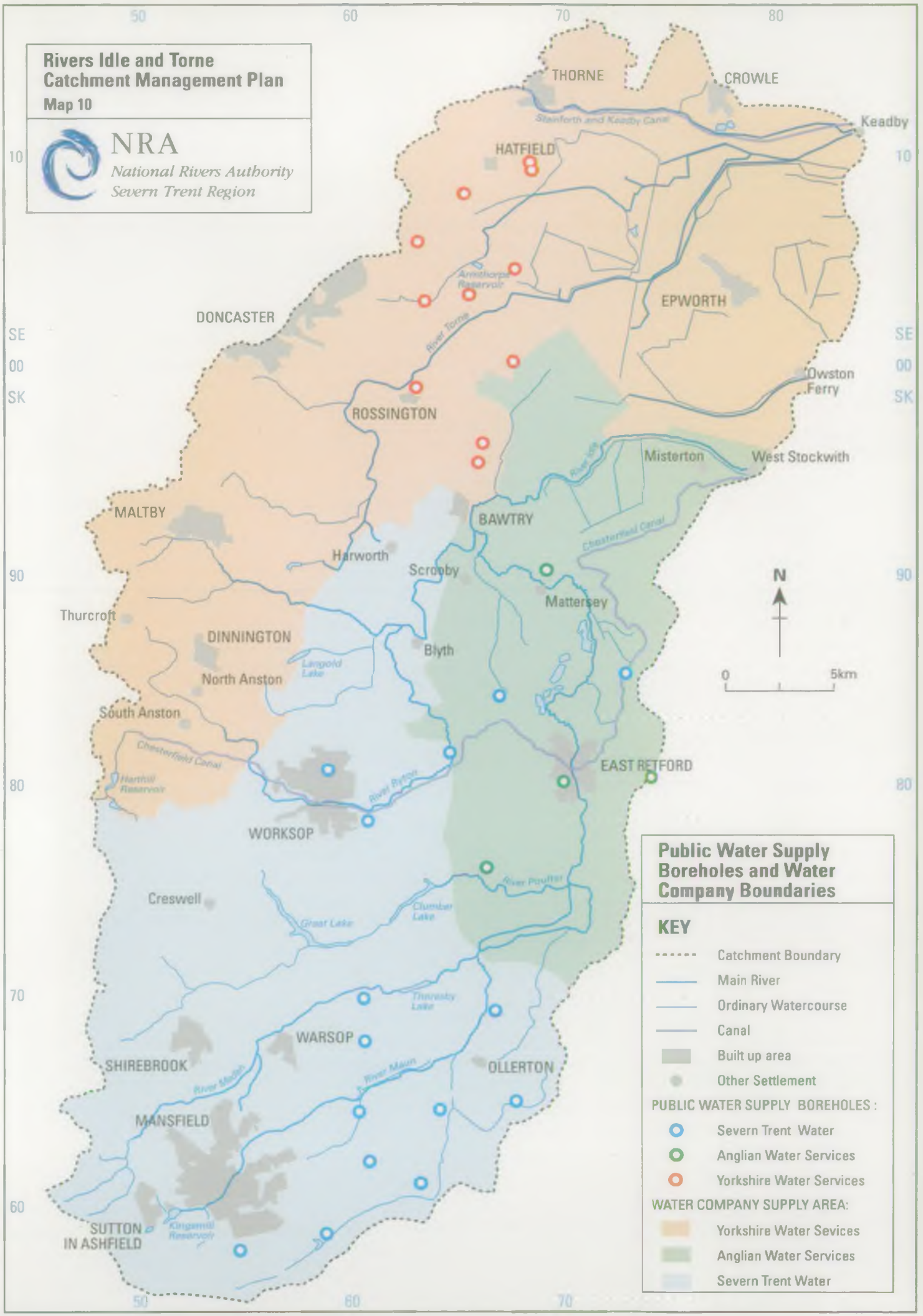
General

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

Local Perspective

Industrial usage accounts for 13% of licensed groundwater abstraction with most of the licences being retained by aggregate quarrying companies, chiefly for sand and gravel and limestone washing operations. Except for some evaporative loss most of the pumped water is returned to the aquifer via lagoons and therefore does not represent a significant drain on resources. Other industrial usage of groundwater include major food processing, especially in the Worksop area, textile and brewing in the Mansfield area and at some of the few remaining coal mines in the area.


Rivers Idle and Torne
Catchment Management Plan
Map 9
NRA
National Rivers Authority
Severn Trent Region
50
60
70
80
10
SE
00
SK
90
80
70
60
THORNE
CROWLE
Keadby
Stainforth and Keadby Canal
HATFIELD
Armthorpe Reservoir
EPWORTH
DONCASTER
River Torne
Owston Ferry
ROSSINGTON
Misterton
West Stockwith
River Idle
MALTBY
BAWTRY
Chesterfield Canal
Harworth
Scrooby
Mattersey
Thurcroft
DINNINGTON
Blyth
Langold Lake
North Anston
South Anston
Chesterfield Canal
Harthill Reservoir
River Ryton
EAST RETFORD
WORKSOP
Creswell
River Poulter
Great Lake
Clumber Lake
Thoresby Lake
WARSOP
SHIREBROOK
River Meden
River Maun
OLLERTON
MANSFIELD
SUTTON IN ASHFIELD
Kingsmill Reservoir
N
0
5km
Surface Water Abstractions >1Ml/d
KEY
Catchment Boundary
Main River
Ordinary Watercourse
Canal
Built up area
Other Settlement
Spray Irrigation
Industrial Process
Other


Rivers Idle and Torne
Catchment Management Plan
Map 10
NRA
National Rivers Authority
Severn Trent Region
THORNE
CROWLE
Keadby
Stainforth and Keadby Canal
HATFIELD
Armthorpe Reservoir
EPWORTH
DONCASTER
River Torne
Owston Ferry
ROSSINGTON
Misterton
West Stockwith
River Idle
MALTBY
BAWTRY
Chesterfield Canal
Harworth
Scrooby
Mattersey
Thurcroft
DINNINGTON
Blyth
North Anston
Langold Lake
South Anston
Chesterfield Canal
Harthill Reservoir
River Ryton
EAST RETFORD
WORKSOP
River Poulter
Creswell
Great Lake
Clumber Lake
Thoresby Lake
WARSOP
SHIREBROOK
River Meden
River Maun
OLLERTON
MANSFIELD
SUTTON IN ASHFIELD
Kingsmill Reservoir
N
0
5km
50
60
70
80
10
SE
00
SK
90
80
70
60
Public Water Supply Boreholes and Water Company Boundaries
KEY
Catchment Boundary
Main River
Ordinary Watercourse
Canal
Built up area
Other Settlement
PUBLIC WATER SUPPLY BOREHOLES :
Severn Trent Water
Anglian Water Services
Yorkshire Water Services
WATER COMPANY SUPPLY AREA:
Yorkshire Water Sevices
Anglian Water Services
Severn Trent Water

4.2.3 Agriculture

General

Agricultural abstractions can be for a variety of purposes and this may determine whether a licence is required. Abstractions from surface water sources for less than 20 cubic metres a day do not require a licence. This includes general stock watering, use around the farm and crop spraying. All other abstractions greater than this quantity do require a licence.

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

Local Perspective

Usage of groundwater for agriculture, and dominantly for spray irrigation, is widespread throughout both catchments. Water is required for many crops but especially for potato, carrot and sugar beet.

Development of surface water resources has been dominated by spray irrigation requirements with 263 licences, out of a total of 285, being authorised specifically for this purpose. As with groundwater, main usage is for the potato, carrot and sugar beet crops. The abstractions are spread throughout both catchments and many of the more recent licences have restriction clauses which restrict abstraction when the river concerned falls below a certain flow; these clauses are to protect river quality and also fisheries.

4.2.4 Other Abstractions

General

There are a variety of other uses for abstracted water. These include topping up of pools, transfer of water, cooling water, industrial processing and hydropower. Some are licensed and others are exempt from licensing. When an abstraction licence is received, its use must be considered together with all existing abstractors. This can prove quite difficult when there is no information on existing unlicensed users and the catchment is reaching its resource limit.

Local Perspective

Non spray irrigation licences are variable in their usage and include abstraction from the Torne for use at Auckley Quarry; a fish farm using Idle water; direct usage of Maun water for corn grinding at Ollerton Mill; the NRA licence transferring water from the Idle to the Carr Dyke at Retford and the British Waterways abstraction from the Stainforth and Keadby Canal for Keadby Power Station. Except for hydropower at Ollerton Mill there is no other current hydropower generation in either catchment and the NRA has received no enquiries about the use of hydropower. No sites in the catchments are listed in the ETSU survey of possible small scale hydropower sites.

4.3 SEWAGE AND INDUSTRIAL EFFLUENT DISPOSAL

General

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

The strategic objective for this category is:

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

Local Perspective

Most of the tributaries feeding the Rivers Idle and Torne rise on limestone sandstone or coal measures strata to the west of the catchment. These tributaries include the Rivers Maun, Meden, Poulter, Ryton, Maltby Dyke and Mother Drain.

Sewage Effluent

The headwaters are of good quality but it is a feature of the catchment that all of the tributaries receive significant discharges of treated sewage effluent close to source. The water quality of the catchment is therefore dominated by the impact of sewage effluent (see Issues 12 and 13).

For example, in the River Maun, under dry weather conditions approximately 75% of the derived flow consists of treated sewage effluent. A similar figure applies to the River Ryton below Worksop. The location of 30 significant STPs is shown on Map 11. It is worth noting that as a consequence of urban growth with historical industrial development, associated particularly with the Nottinghamshire/South Yorkshire coalfield, local water resources have been abstracted for domestic and industrial use, normally with subsequent discharge to river. The natural high quality base flows may therefore have reduced, being returned to the rivers as treated effluent. In some cases the situation has been exacerbated by over abstraction, particularly of sandstone groundwater, and net transfer of resource out of the catchment.

Although in terms of the control of the conventional parameters Biochemical Oxygen Demand (BOD) and Ammoniacal Nitrogen the principal STPs discharging to the catchment generally perform quite well, the high proportion of treated sewage effluent has given rise to elevated

nutrient levels. These are being monitored carefully and the need for more extensive treatment will have to be examined in the future (see Issue 9).

There are many small private STPs discharging either to soakaway or to river serving certain facilities with limited occupancy in unsewered areas. The small scale normally precludes significant quality impact provided that the plants are effectively maintained. The systems are inspected and sampled from time to time by the Authority and sometimes give cause for concern and possible legal action. At Markham Moor near Retford a proliferation of small plants in an area unsuitable for effluent soakaway and lacking in adequate watercourse dilution has caused problems.

The discharge of sewage effluent to underground strata, other than single septic tank volumes, is considered with care implementing the NRA Groundwater Protection Policy with particular reference to groundwater protection zones around potable supply boreholes on the sandstone. The discharge of Ranby STP effluent to ground has recently been replaced by pumped transfer of sewage to Retford STP as a groundwater protection measure.

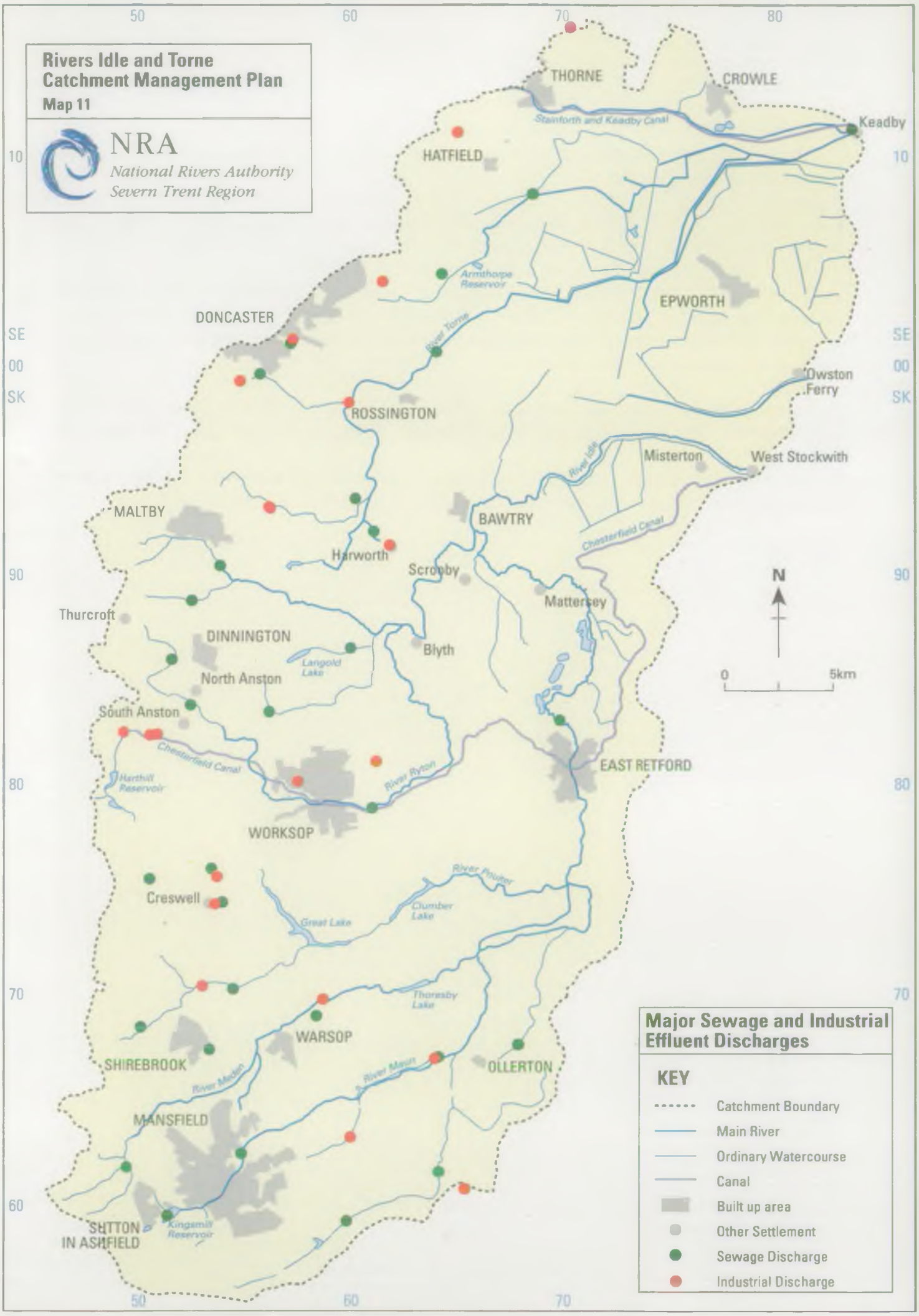
Many of the urban areas referred to above are served by combined sewerage systems which can exhibit intermittent discharges from sewer overflows. These may have significant quality and aesthetic effects on rivers. A notable example is the River Maun in Mansfield and Sutton in Ashfield where extensive sewerage improvement work has been negotiated as part of the AMP2 agreement (see Issue 13).

Industrial Effluent

The principal industrial or trade effluent discharges to river in the catchment arise from coal mining operations. Although the number of operating collieries has reduced following the Colliery Closure Programme, 10 operating collieries remain in the catchment. Two other disused collieries continue to discharge minewater under consent. Rainfall generated runoff from these and from former colliery spoil tips is discharged to all of the main tributaries. The main river impact of coal mining arises from the discharge of minewater effluent. The quality of minewater varies from colliery to colliery and from seam to seam. It is however normally saline, contains ammoniacal nitrogen and can be ferruginous. Apart from the latter which can be treated by oxidation, the chloride and ammoniacal nitrogen content are not easily treated. In some circumstances the discharge of minewater can be advantageous, such as providing additional dilution for other effluents, in other cases very high chloride or ammoniacal nitrogen contents may threaten quality or other river uses.

The NRA recognises the difficulty in treating some effluents to remove salinity but where practicable it has taken the pragmatic approach of permitting controlled discharge under appropriate river conditions. In the case of Welbeck Colliery for example a consent has recently been issued, to be reviewed after one year, which permits discharge when adequate natural dilution is afforded to protect fisheries. Discharge has been prohibited when other uses such as abstraction of river water for crop irrigation would have been compromised by increased salinity.

In another case the NRA has opposed the discharge of additional minewater from the non


Rivers Idle and Torne
Catchment Management Plan
Map 11
NRA
National Rivers Authority
Severn Trent Region
50
60
70
80
10
SE
00
SK
90
80
70
60
THORNE
CROWLE
Keadby
Stainforth and Keadby Canal
HATFIELD
Armthorpe Reservoir
EPWORTH
DONCASTER
River Torne
Owston Ferry
ROSSINGTON
Misterton
West Stockwith
River Idle
MALTBY
BAWTRY
Chesterfield Canal
Harworth
Scrooby
Mattersey
N
Thurcroft
DINNINGTON
Blyth
Langold Lake
North Anston
0
5km
South Anston
Chesterfield Canal
Harthill Reservoir
River Ryton
EAST RETFORD
WORKSOP
River Poulter
Creswell
Great Lake
Clumber Lake
Thoresby Lake
WARSOP
SHIREBROOK
River Meden
River Maun
OLLERTON
MANSFIELD
SUTTON IN ASHFIELD
Kingsmill Reservoir
Major Sewage and Industrial Effluent Discharges
KEY
Catchment Boundary
Main River
Ordinary Watercourse
Canal
Built up area
Other Settlement
Sewage Discharge
Industrial Discharge

operational Creswell Colliery (pumping is continued to protect other working collieries) into the River Poulter because of river use constraints. An overland pipeline is being constructed to direct effluent out of the catchment.

With the demise of the coalfield there has been an increase in industrial estates in many urban areas across the catchment. These estates will often cater for a wide range of industries frequently with many different parent companies. Pollution problems have arisen through poor operational practice, spillages and wrong connection which can be difficult to trace positively. The problems can be exacerbated where the drainage infrastructure has not been adopted. Examples of industrial estates where problems have been experienced include Dinnington, West Carr Retford, Hellaby and Warmsworth Holt.

There are significant effluent discharges from iron and steel wire works in the Ryton and Torne catchments. The prevalence of quarrying for limestone, sandstone, sand and gravel has also lead to discharge of settled rainfall generated effluent to many of the rivers in the catchment. The disposal of Pulverised Fuel Ash (PFA) from a coal fire power station into former sand and gravel quarries has lead to consented discharge into the River Idle below Retford.

4.4 MINERAL WORKING

General

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

The exploitation of minerals can have a major impact on water resources by altering groundwater flows and hence streamflows. The removal of material from above the water table reduces the opportunity for natural filtering and attenuation of pollutants, which will consequently enter the groundwater more readily. The dewatering of mineral workings is exempt from the need for an abstraction licence but a conservation notice may be needed to minimise the impact of such operations on the water environment. Reclamation with impermeable material will increase runoff and reduce the recharge of groundwaters, whilst the use of mineral extraction sites for landfill also poses a significant threat to groundwater quality and is not encouraged by the NRA.

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

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

All mineral workings are subject to general planning controls. The NRA is a consultee on such applications, and the final planning consent should contain conditions which control the operations in order to satisfy the NRA's requirements. Both the impact of the mineral working and its restoration need to be considered.

The strategic objective for this category is:

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

Local Perspective

The mineral resources, which include hydrocarbons, are extensive. They have been and continue to be heavily exploited, with the area being a major exporter of such resources to neighbouring large centres of population.

Peat, oil, gas and coal are all forms of hydrocarbons. Peat is extensively extracted from Hatfield and Thorne Moors, while small amounts of oil and gas are found and exploited in the Bothamsall and Hatfield areas. The large coal reserves have been mined for over 150 years at a very high rate of extraction. A major contraction in the industry over the last five years has, however, resulted in only 10 operating collieries remaining. There are no operational opencast coal sites in the area.

Sand and gravel deposits occur extensively in the low lying areas of the Idle and Torne catchments and extraction is on a large scale. A number of new developments are proposed, which, if given planning permission, will ensure extraction continuing for at least the next 20 years. In the western part of both catchments, limestone (Lower Magnesian Limestone) is quarried, especially in the Mansfield, Shireoaks and Maltby areas. Clay for the production of bricks, is extracted from the Maltby area.

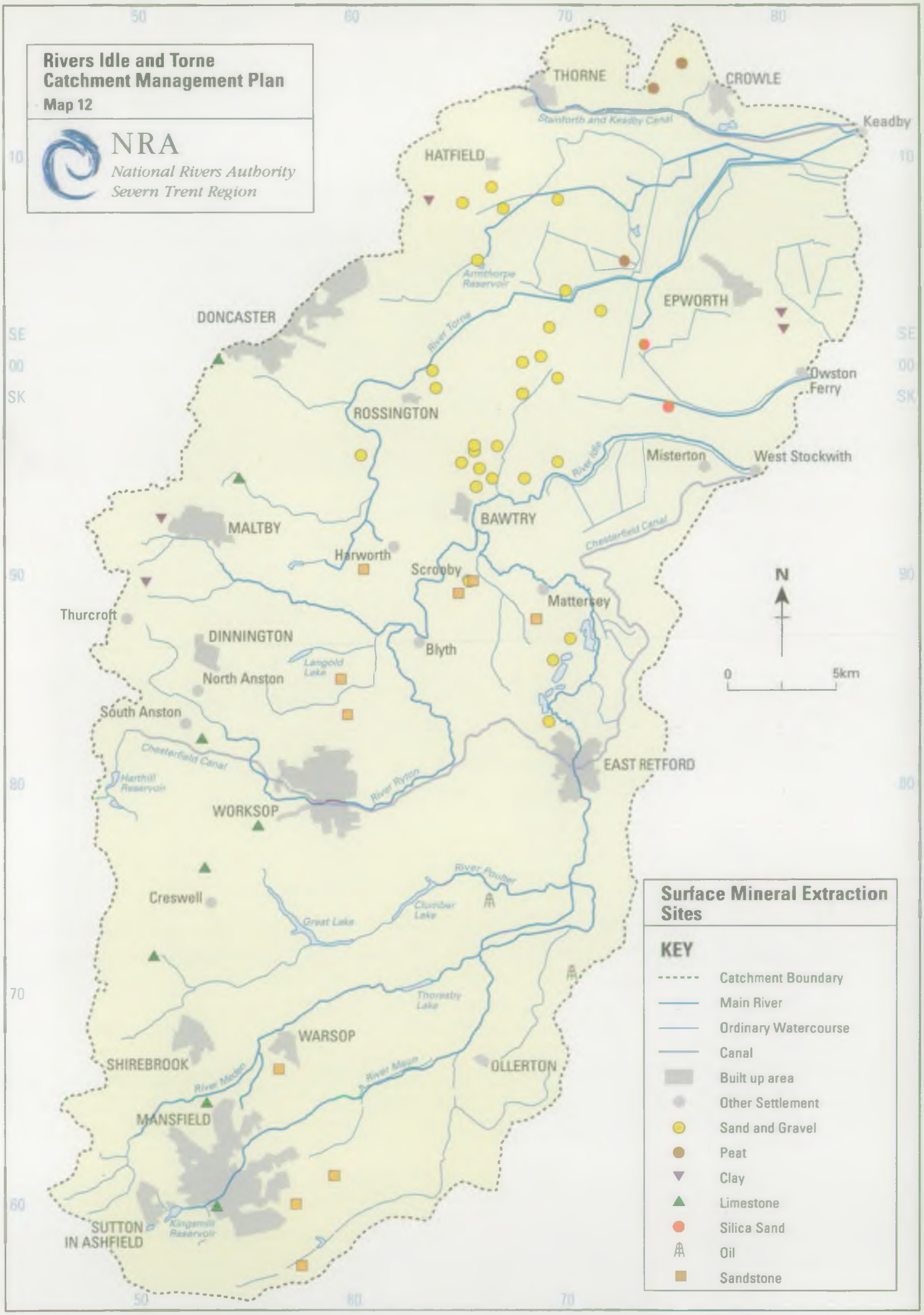
Some problems which can adversely affect the water environment, can result from the extraction of minerals. These include river subsidence arising from coal mining and loss of groundwater resources due to dewatering activities at sand and gravel quarries. In many cases, once the mineral has been quarried, large voids exist due to a lack of suitable inert infill. The NRA therefore aims to reduce the negative impacts on the water environment of mineral workings and their after use and to maximise the environmental benefit associated with site restoration. The continued close cooperation between the Mineral Planning Authorities and the NRA is essential to achieve this aim.

Since the formation of the NRA, several schemes for remedial works have been carried out principally on the Rivers Maun and Meden. At Gleadthorpe on the Meden, conservation enhancements, including a wildlife pond and improved landscaping, have been provided. A similar large scale project has recently been completed, upstream of the confluence of the Rivers Maun and Meden, at Whitewater.

Rivers Idle and Torne Catchment Management Plan

Map 12

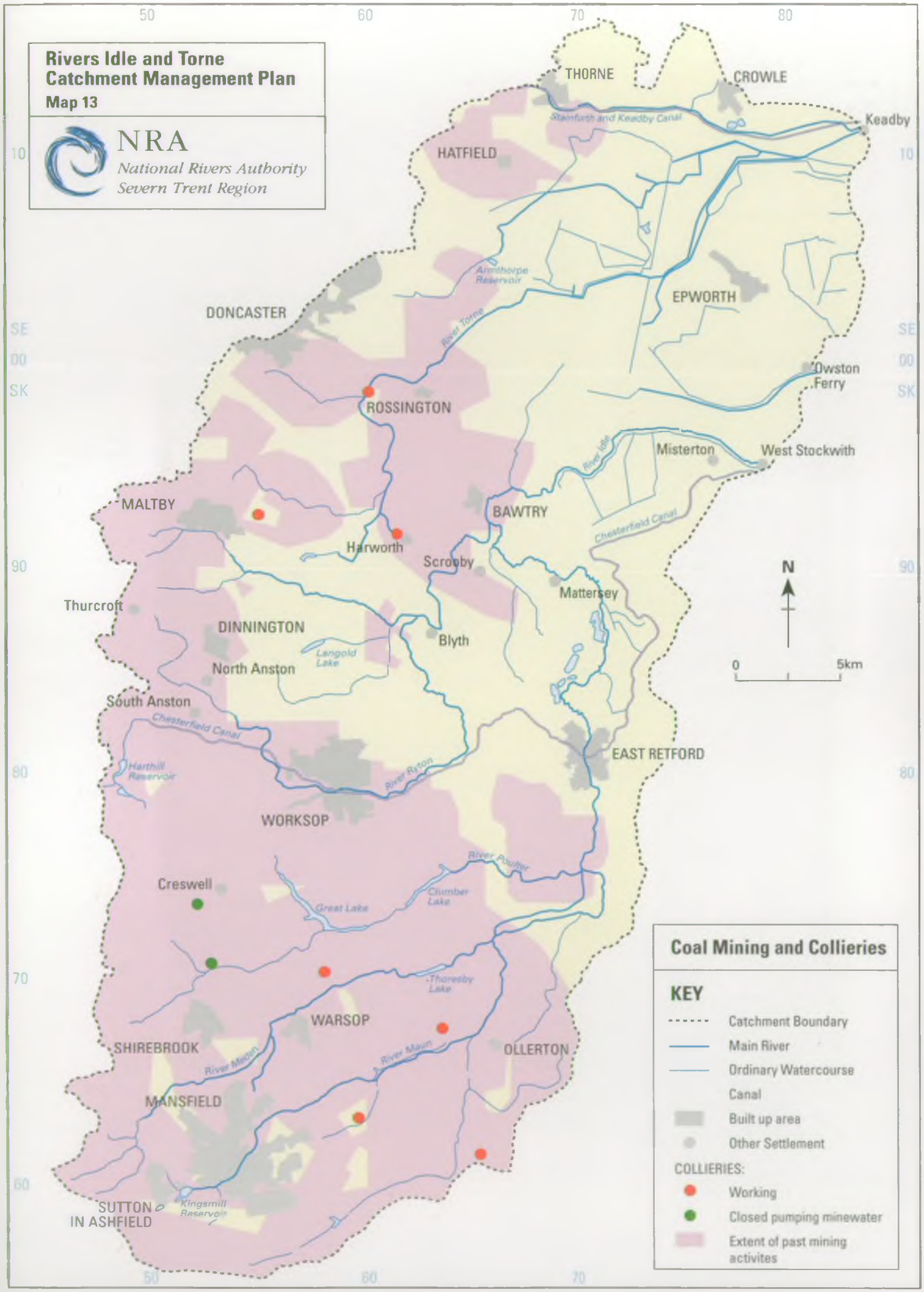
NRA
National Rivers Authority
Severn Trent Region



Surface Mineral Extraction Sites

KEY

- Catchment Boundary
- Main River
- Ordinary Watercourse
- Canal
- Built up area
- Other Settlement
- Sand and Gravel
- Peat
- Clay
- Limestone
- Silica Sand
- Oil
- Sandstone


Rivers Idle and Torne
Catchment Management Plan
Map 13
NRA
National Rivers Authority
Severn Trent Region
THORNE
CROWLE
Keadby
Stainforth and Keadby Canal
HATFIELD
Ainsthorpe Reservoir
EPWORTH
DONCASTER
River Torne
Owston Ferry
ROSSINGTON
Misterton
West Stockwith
River Idle
MALTBY
BAWTRY
Chesterfield Canal
Harworth
Scrooby
Mattersey
Thurcroft
DINNINGTON
Blyth
Langold Lake
North Anston
South Anston
Chesterfield Canal
Harthill Reservoir
River Ryton
EAST RETFORD
WORKSOP
River Poulter
Creswell
Great Lake
Clumber Lake
Thoresby Lake
WARSOP
SHIREBROOK
River Meden
River Maun
OLLERTON
MANSFIELD
SUTTON IN ASHFIELD
Kingsmill Reservoir
N
0
5km
Coal Mining and Collieries
KEY
Catchment Boundary
Main River
Ordinary Watercourse
Canal
Built up area
Other Settlement
COLLIERIES:
Working
Closed pumping minewater
Extent of past mining activites

4.5 SOLID WASTE DISPOSAL

General

Land can become contaminated through waste disposal activities. Polluting waste can adversely affect surface and groundwater quality through runoff and percolation to underlying aquifers. Since 1976, waste disposal sites have required an operational licence from the local Waste Regulation Authority - the County Council or Metropolitan Borough Council. The NRA is consulted on each application for a Waste Management Licence. This details how the site is to be constructed and operated as well as a requirement for aftercare and restoration until the time when a site is unlikely to pose a threat of pollution. The licence cannot be revoked until a Certificate of Completion is issued by the WRA, stating the site is unlikely to cause pollution of water. A valid planning permision is required before a licence can be issued. Licences are needed for waste disposal, treatment, storage and transfer operations, not just for landfills.

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

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

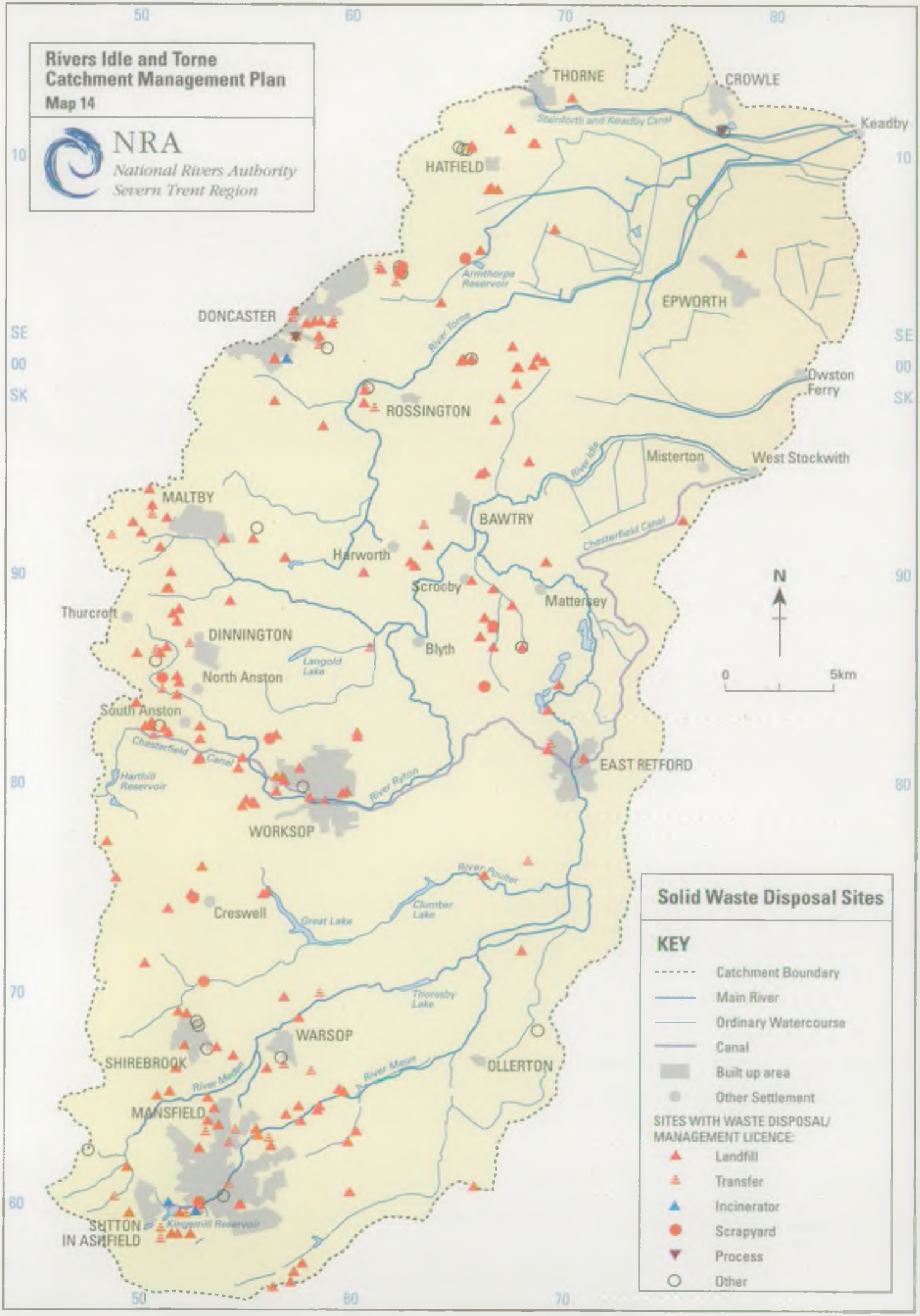
The strategic objective for this category is :

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

Local Perspective

There are 279 waste disposal facilities in the area. These include landfills, waste transfer stations, waste treatment sites and scrapyards. There are few major landfills accepting household/commercial or industrial wastes within the catchment. Generally, all waste disposal

facilities are operated satisfactorily. There are, at the time of production of this plan, a number of new proposals for major landfills within the catchment. Much of the area lies on a major aquifer of high vulnerability and is not ideally suited for landfill. Often, the minor aquifers, although theoretically less vulnerable to groundwater pollution, may be undermined, with associated fracturing above the workings, or have surface water constraints on development for landfill.


Rivers Idle and Torne
Catchment Management Plan
Map 14
NRA
National Rivers Authority
Severn Trent Region
THORNE
CROWLE
Keadby
Stainforth and Keadby Canal
HATFIELD
Armthorpe Reservoir
EPWORTH
DONCASTER
River Torne
Owston Ferry
ROSSINGTON
Misterton
West Stockwith
River Idle
MALTBY
BAWTRY
Chesterfield Canal
Harworth
Scrooby
Mattersey
Thurcroft
DINNINGTON
Blyth
Langold Lake
North Anston
South Anston
Chesterfield Canal
Harthill Reservoir
River Ryton
EAST RETFORD
WORKSOP
River Poulter
Creswell
Great Lake
Clumber Lake
Thoresby Lake
WARSOP
SHIREBROOK
River Meden
River Maun
OLLERTON
MANSFIELD
SUTTON IN ASHFIELD
Kingsmill Reservoir
N
0
5km
SE 00 SK
10
50
60
70
80
90
Solid Waste Disposal Sites
KEY
Catchment Boundary
Main River
Ordinary Watercourse
Canal
Built up area
Other Settlement
SITES WITH WASTE DISPOSAL/ MANAGEMENT LICENCE:
Landfill
Transfer
Incinerator
Scrapyard
Process
Other

4.6 CONTAMINATED LAND

General

Contaminated land may have been left as a result of former industrial use prior to any environmental controls.

Reclamation schemes may cause renewed, or enhanced problems as a result of exposing polluting substances to rainfall or groundwaters. Consequently such schemes require consultation with the NRA and any discharges consented and monitored.

The strategic objectives for this category are :

* To ensure that contaminated land and any associated reclamation proposals do not adversely affect the water environment.

* To use redevelopment opportunities.

Local Perspective

Contaminated land is not a widespread problem in this catchment, but there are several sites of concern. The cessation of industries and dereliction of the associated land has resulted in several locations where water resources are at risk or are already polluted. An example of such a former industry is the coal carbonization plants that existed on some colliery sites, such as at Thoresby, Harworth, Mansfield and Thurcroft. The Mansfield site and its associated groundwater pollution are currently being investigated using European funding.

Because of the high vulnerability of the groundwater across much of the catchment, it is essential that any problem sites are investigated and remediated to the highest standard, with close association at every stage with the NRA.

4.7 AGRICULTURAL ACTIVITY

General

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

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

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

The NRA uses other initiatives which include:

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

The strategic objectives for this category are:

* To ensure that farming practices do not compromise the use of surface and groundwater.

* To ensure that farming practices do not threaten the sustainability of the river corridor ecosystem.

Local Perspective

Around 76 % of the land within the catchment is in agricultural use, 12 % is under woodland, mainly the remaining area of Sherwood Forest (see Section 4.8 Forestry). Of the area being farmed, 85 % is under arable cropping and 15 % down to grass. The area includes just under

1000 agricultural holdings, of which about 70 % are under 100 hectares. See Map 15.

The two main soil types in the catchment determine the kind of arable cropping. On the light sandy soils of the Sherwood Sandstone area, the major crops are potatoes, sugar beet, carrots, cereals, peas and linseed. The root crops in particular, are intensively irrigated most summers, either from boreholes, or by direct abstraction from the Rivers Idle and Torne and their tributaries. In the Isle of Axholme, beetroot is grown in preference to sugar beet on many farms.

The soils on the western and eastern boundaries of the catchment are heavier. The predominant crops are cereals, oilseed rape and field beans, although potatoes and sugar beet are also grown but on a lesser scale than in the area of lighter sandy soils.

With the catchment being predominantly an arable farming area, pesticide residues are likely to be present in watercourses and boreholes throughout the area.

Dairy farming is limited to a small number of isolated large herds over most of the area, with a cluster of smaller herds on the western boundary in northeast Derbyshire and south Yorkshire.

There are clusters of very large intensive poultry units and also a number of outdoor pig units located on farms, mainly on the lighter sandy soils. Intensive pig units, with little land for manure disposal, are found throughout the area. On the majority of livestock units, manure, slurry and liquid effluent disposal takes place onto agricultural land. Nitrate contamination of public water supplies is a feature of the area.

The catchment features five Nitrate Sensitive Areas (NSAs) within its boundary. In addition, the whole of the Sherwood Sandstone area from the southern boundary of the catchment to just north of Bawtry is a designated Nitrate Vulnerable Zone (NVZ) under EC Nitrate Directive 91/676.

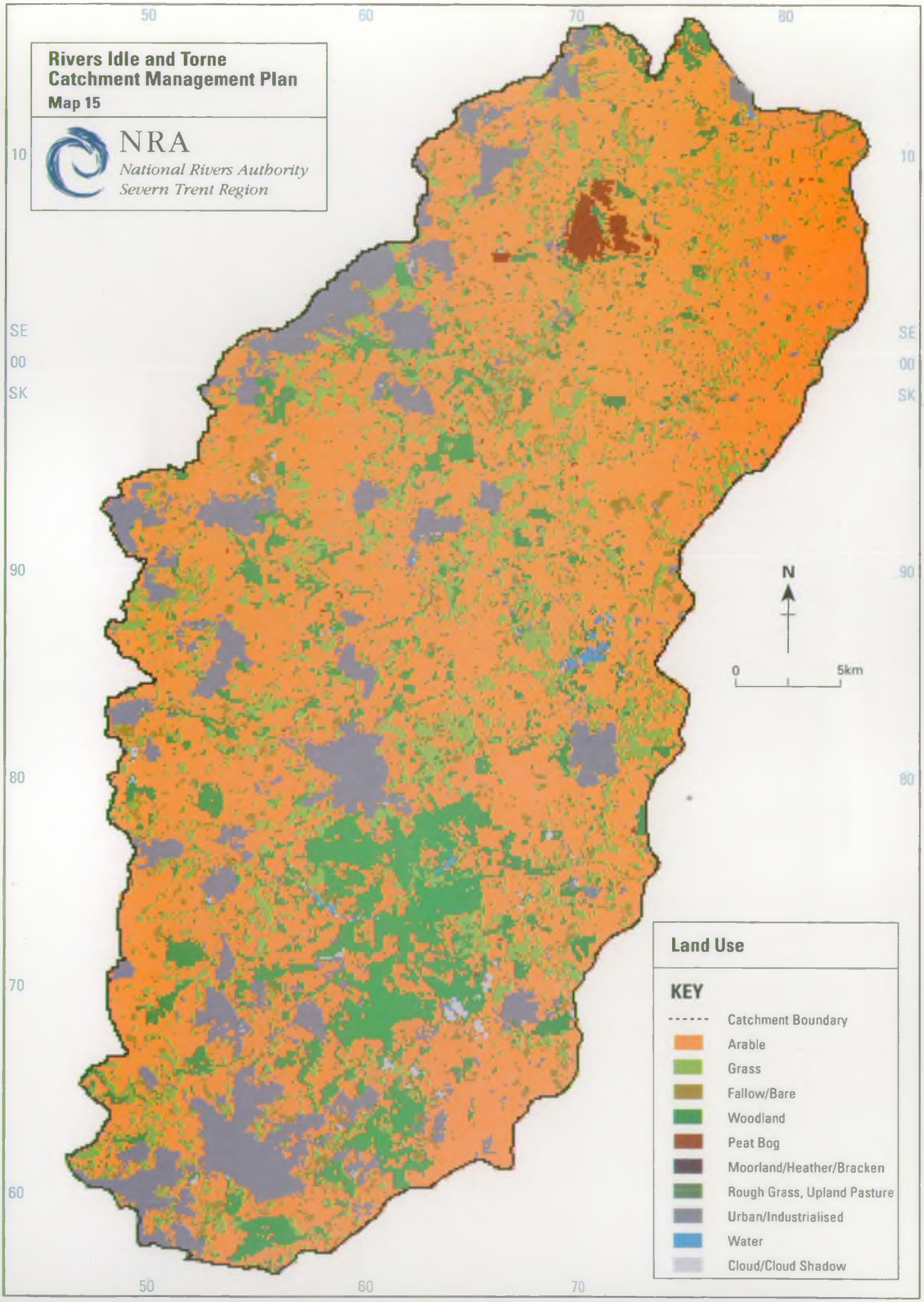
Both deep coal and opencast mining have had significant impact on the farming of the western and southern boundaries of the catchment. Most of the restored sites are down to grass, but some well established ones are now under arable cropping.

Farming has declined over the last 15 years in south Yorkshire, mainly west of the M18 motorway. Further housing development is likely to take place in this area and also on the Mansfield/Kirkby in Ashfield axis in the south of the catchment.

TABLE 3 - LAND USE

CLASS	LEGEND	AREA %	CUMULATIVE % AREA	AREA (KM^2)
1	Arable	61.1	61.1	829.5
2	Grass	10.2	71.3	138.4
3	Fallow/Bare	4.4	75.7	59.6
4	Woodland	12.2	87.9	165.5
5	Peat Bog	0.6	88.5	8.8
8	Urban/Industrialised	11	99.5	148.6
9	Water	0.2	99.7	2.5
10	Cloud/shadow	0.3	100	4.1
TOTAL		100		1357

Source: Landsat (1990)


Rivers Idle and Torne
Catchment Management Plan
Map 15
NRA
National Rivers Authority
Severn Trent Region
50
60
70
80
10
SE
00
SK
90
80
70
60
N
0
5km
Land Use
KEY
Catchment Boundary
Arable
Grass
Fallow/Bare
Woodland
Peat Bog
Moorland/Heather/Bracken
Rough Grass, Upland Pasture
Urban/Industrialised
Water
Cloud/Cloud Shadow

4.8 FORESTRY

General

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

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

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

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

The strategic objectives for this category are:

* To ensure that forest activities do not cause pollution of surface and groundwaters, increase acidification or affect existing users and uses of water below forested areas.

* To secure improved NRA links with Local Authorities on Structure and Local Plans, particularly in relation to Indicative Forest Strategies.

* To secure improved links with the Forest Authority and forest owners and managers to recommend that forest management complies with Forest Authority Guidelines and that liaison with the NRA takes place wherever necessary.

* To protect and enhance the conservation value of the water environment and associated land in connection with all forestry developments.

* To ensure that forest activities do not create or exacerbate flooding problems.

Local Perspective

Existing woodland cover is mainly concentrated in the southern half of the catchment, mainly in an area known locally as the Dukeries. As the name suggests, these were once large privately owned farm estates where the woodland followed a traditional pattern of landscape enhancement, sporting, and productive woodland, mainly concentrated around the main house and associated parkland. A large proportion is still in private hands and still managed on traditional estate lines. The remaining areas are either owned or leased by the Forestry Commission, which currently manages these commercial woodlands, following current thinking on multi functional bio-diverse woodlands. The large monoculture even-aged conifer blocks are currently being restructured with clear felling and replanting. During the replanting operations, opportunities are taken to extend the broadleaved content of these woodlands and also leaving areas unstocked to assist the extension of the remnant areas of loam and peat.

Woodland through the remaining areas of the catchment are owned and managed by small family estates, farmers and individual landowners. Remnant ancient woodland and ancient woodland sites have been acquired by the Nottinghamshire Wildlife Trust and are managed for pure conservation aims, with very little commercial exploitation. There has been very little extension to woodland cover in recent times within the catchment. Where it has occurred, it has been on a small scale, usually less than one hectare and mainly intended as shooting cover or recreational woodland. There are, however, two local initiatives within the catchment to encourage the planting of new woodlands. These are the Greenwood Community Forest and the Sherwood Initiative.

Only a small portion of the Greenwood Community Forest falls within the catchment, in an area south of Mansfield. The Sherwood Initiative has no fixed boundaries and covers an area north of Mansfield, encompassing Worksop, Bawtry and Retford. In recognition of the importance of extending woodland cover in these initiative areas, the Government has recently announced additional financial incentives, aimed at encouraging farmers to release more land from intensive production.

The only other areas likely to become available for woodland planting are; redundant coal industry sites; old sand and gravel workings and completed landfill areas.

The existing large conifer blocks currently managed by the Forestry Commission provide not only good commercial timber, but also large areas to accommodate a range of recreational activities. They also protect the Sherwood Sandstone Aquifer. Well designed, strategically placed blocks of woodland can improve the micro climate for adjacent agricultural land, and also reduce the incidence of soil loss due to wind blow and can possibly reduce the amount of water required for irrigation on some crops.

4.9 SURFACE WATER DRAINAGE AND FLOOD DEFENCES

General

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

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

Flood defences are designed to protect an area against a flood of a particular return period. Different types of land use (for example urban and rural areas) are protected against different sizes of flood, with the target standard of service detailed in Section 5.3.1.

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

The strategic objectives for this category are :

* To provide effective flood defences on main rivers for the protection of people and property to a standard appropriate to the land use.

* To provide an adequate flood forecasting and flood warning service and to respond to flood events.

* To ensure that any works in rivers do not create undue restrictions to flood flows.

* To ensure where possible that the effectiveness of the floodplain to store and convey flood waters is not impaired.

Local Perspective

The tributaries of the Rivers Torne and Idle outfall to the River Trent at large land drainage pumping stations at Keadby and West Stockwith respectively. The majority of the land in

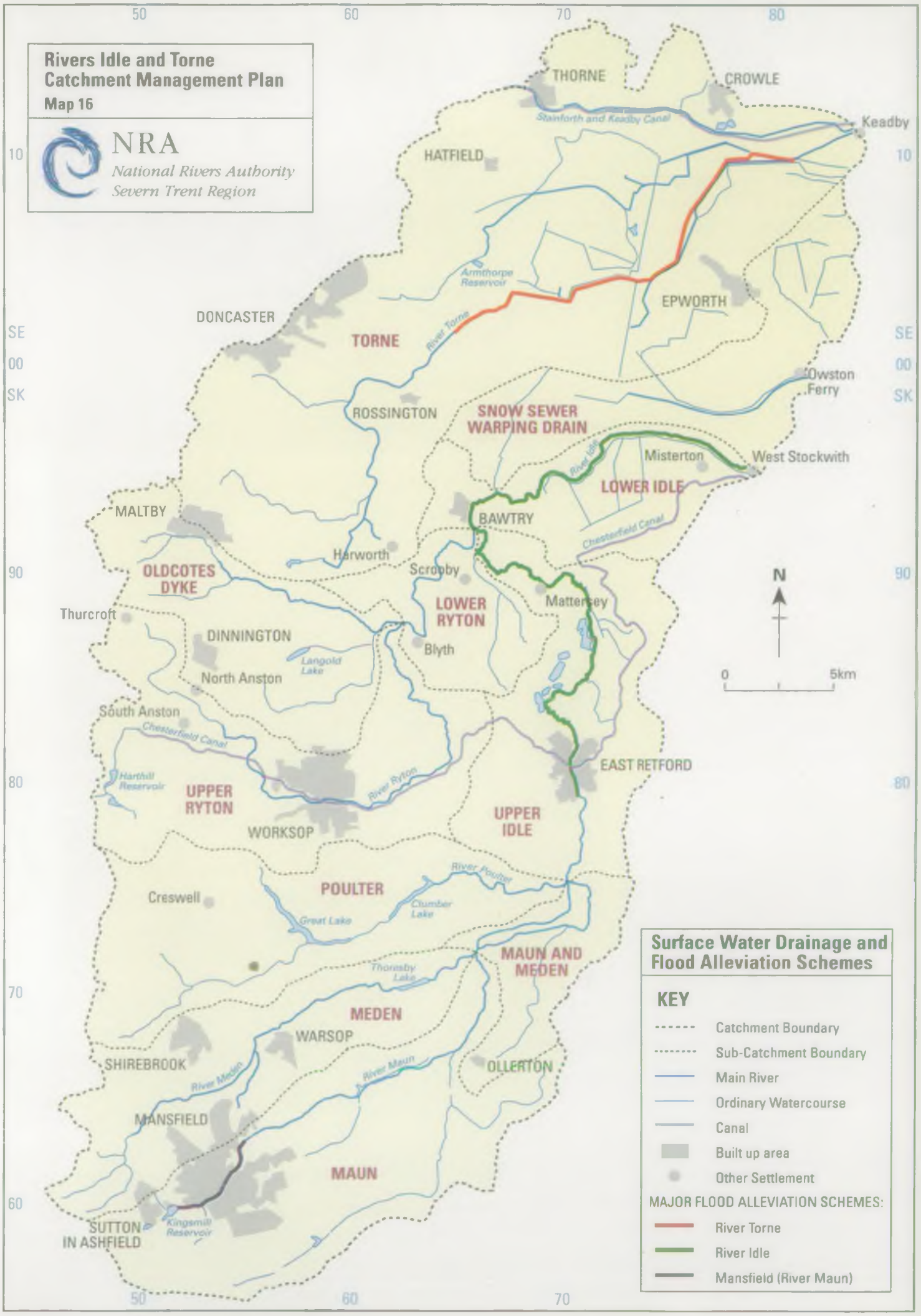
the lower reaches of both catchments lies below the Trent high tide level. Since the 1600s, when the Dutchman Cornelius Vermuyden was engaged by King Charles I, works of land drainage improvement have been a continuous process. The early gravity drainage has now been replaced by a comprehensive system of pumped drainage which supports high grade agricultural land, by discharging low level water into the embanked high level carriers. The importance of drainage within both catchment areas has lead to the creation of 14 Internal Drainage Boards (IDBs). These IDBs have similar powers to the NRA within their districts, including power to levy drainage rates to fund improvement schemes and permissive powers to carry out drainage works on their awarded drains.

River Torne

The total catchment area of the Torne system to Keadby pumping station is 378 km^2 (146 square miles), with a series of pumping stations (17 NRA and 26 others) lifting water from the surrounding land or boosting water online to discharge across almost level land. The comprehensive pumped system, collecting water from the very fertile agricultural land of the Isle of Axholme on its way to the River Trent, was first constructed in the 1940s. It has been subsequently modified and improved to form an efficient drainage system in winter and allow for controlled irrigation in the summer. The River Torne is the only natural watercourse in this system collecting water from the expanding urban area on the western edge of the catchment and discharging by gravity to Keadby pumping station. The river was improved in the late 1980s and early 1990s, but even in its improved condition can only discharge a 1 in 10 year return period flow (with a minimum of 300mm freeboard). Further raising of the level of defences is not practical or cost effective, since the riverbanks are built on peat and subject to settlement. The increasing runoff from the development in the Doncaster area could put at risk the standards of flood defence if not properly managed. A hydraulic model study of the river has been carried out for the NRA by consultants, in order to define an optimum pumping regime for this important area of agricultural production and wildlife habitat.

River Idle

The Rivers Ryton, Maun, Meden and Poulter discharge urban runoff from Worksop, Mansfield and a small part of Rotherham, before combining to form the River Idle, which flows through a low lying fertile valley, before being pumped into the River Trent. The total catchment area of the river and its tributaries upstream of its outfall is 842 km^2 (325 square miles). Following the construction of the West Stockwith pumping station in the early 1980s and the introduction of pumped drainage from the River Idle to the River Trent, a comprehensive improvement scheme has been carried out on the River Idle between its outfall with the River Trent and upstream of Retford. This protects over 300 properties to a 1 in 100 year standard and includes increased protection of over 1000 hectares of agricultural land and improvements to floodplain areas. The upper tributaries of the Idle and the Rivers Maun, Meden, Ryton and Poulter generally have reasonably wide floodplains with steep sided valleys. Periodic flooding of adjacent farmland has caused few problems here in the past. The only works carried out on these watercourses has been to improve the discharge capacity through the urban areas of Mansfield and Worksop, and to make sure that remedial works


Rivers Idle and Torne
Catchment Management Plan
Map 16
NRA
National Rivers Authority
Severn Trent Region
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SE
00
SK
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THORNE
CROWLE
Keadby
Stainforth and Keadby Canal
HATFIELD
Armthorpe Reservoir
EPWORTH
DONCASTER
TORNE
River Torne
Owston Ferry
ROSSINGTON
SNOW SEWER WARPING DRAIN
River Idle
Misterton
West Stockwith
LOWER IDLE
MALTBY
BAWTRY
Chesterfield Canal
Harworth
Scrooby
OLDCOTES DYKE
LOWER RYTON
Mattersey
Thurcroft
DINNINGTON
Blyth
Langold Lake
North Anston
South Anston
Chesterfield Canal
Harthill Reservoir
River Ryton
UPPER RYTON
EAST RETFORD
UPPER IDLE
WORKSOP
River Poulter
POULTER
Creswell
Chumber Lake
Great Lake
Thonsby Lake
MAUN AND MEDEN
MEDEN
WARSOP
SHIREBROOK
River Meden
River Maun
OLLERTON
MANSFIELD
MAUN
SUTTON IN ASHFIELD
Kingsmill Reservoir
N
0
5km
Surface Water Drainage and Flood Alleviation Schemes
KEY
Catchment Boundary
Sub-Catchment Boundary
Main River
Ordinary Watercourse
Canal
Built up area
Other Settlement
MAJOR FLOOD ALLEVIATION SCHEMES:
River Torne
River Idle
Mansfield (River Maun)

have been completed following mining subsidence.

Other watercourses

Other minor watercourses within the CMP area pump water from IDB areas directly into the River Trent and these include the Snow Sewer Warping Drain, which is a main river watercourse.

4.10 FISHERIES

General

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

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

The NRA Severn-Trent Region has documented its Fisheries Strategies for all appropriate river reaches. It will use 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.

The strategic objectives for this use are :

* To sustain a natural fish population appropriate to the catchment.

* To maintain, improve and develop fisheries

* To safeguard the quality and quantity of water sufficient for this resource.

Local Perspective

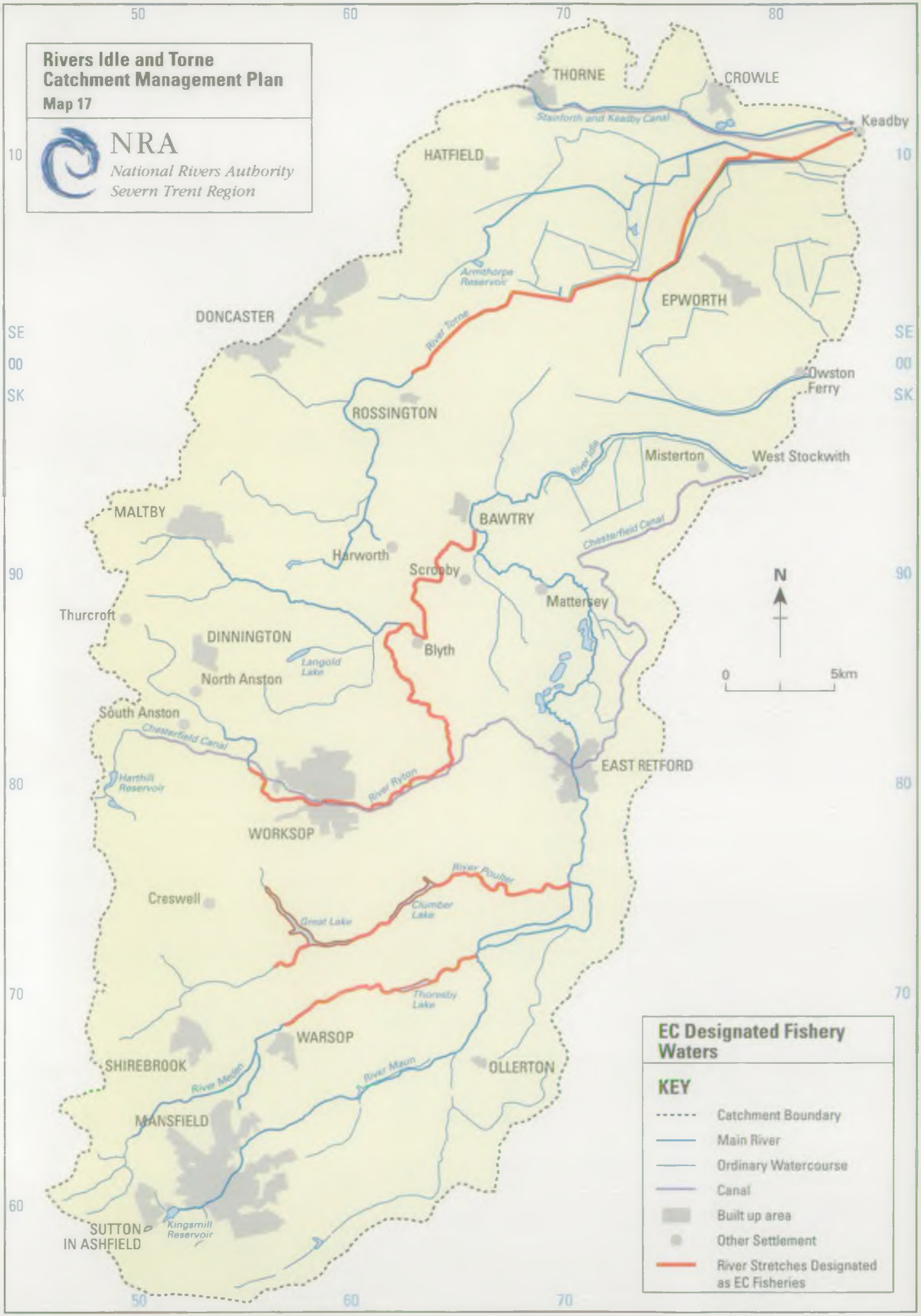
There are 114 km of river designated under the EC Fisheries Directive as cyprinid (coarse) fishery within the catchment and these are shown on Map 17. Fish populations are very much dependant on the quality and quantity of water present and the variety and quality of the habitat. The control of demand for water and the maintenance of water quality standards are therefore of paramount importance to fisheries. In essence fish can be considered as the 'customers' within the environmental market.

The quality of waters is assessed on their ability to support salmonid and cyprinid fish. Where designated, water quality should be maintained to comply with standards set in the EC Fisheries Directive. Fish populations will be monitored and managed where necessary to maintain the fishery potential.

Fishery habitat has been degraded in the past by works for flood alleviation purposes. Resident fish have in turn suffered with regards to suitable holding areas and spawning sites. Fisheries exploitation within the CMP area is largely due to rod and line fishing. Such

activity on the rivers is variable in nature from organised angling clubs and matches, to the occasional angler.

Stillwater angling is an increasingly popular option for many anglers in the catchment, especially where river fishing is poor or innaccessible. Most forms of stillwater angling are available either on club only or day ticket waters.


Rivers Idle and Torne
Catchment Management Plan
Map 17
NRA
National Rivers Authority
Severn Trent Region
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SE
00
SK
90
80
70
60
THORNE
CROWLE
Keadby
Stainforth and Keadby Canal
HATFIELD
Armthorpe Reservoir
EPWORTH
DONCASTER
River Torne
Owston Ferry
ROSSINGTON
River Idle
Misterton
West Stockwith
MALTBY
BAWTRY
Chesterfield Canal
Harworth
Scrooby
Mattersey
Thurcroft
DINNINGTON
Blyth
Langold Lake
North Anston
South Anston
Chesterfield Canal
Harthill Reservoir
River Ryton
EAST RETFORD
WORKSOP
River Poulter
Creswell
Clumber Lake
Great Lake
Thoresby Lake
WARSOP
SHIREBROOK
River Meden
River Maun
OLLERTON
MANSFIELD
SUTTON IN ASHFIELD
Kingsmill Reservoir
N
0
5km
EC Designated Fishery Waters
KEY
Catchment Boundary
Main River
Ordinary Watercourse
Canal
Built up area
Other Settlement
River Stretches Designated as EC Fisheries

4.11 CONSERVATION - ECOLOGY

General

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

This use deals with:

* the protection and, where appropriate, enhancement of flora and fauna which may be entirely or only partially dependent on the water environment.

* the protection of areas formally designated as being of particularly high conservation value, including National Nature Reserves and Sites of Special Scientific Interest (SSSI).

* the protection of sites which, although valuable in ecological terms, are not formally protected, eg. other nature reserves.

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

The strategic objectives for this category are:

* To promote and further the conservation interests of the water environment and to safeguard the conservation interests of designated sites.

* To seek to maintain river corridors in as natural a state as possible in order to maintain ecological diversity.

* To assess the environmental impact of all NRA activities and ensure that any adverse impacts are mitigated.

* To safeguard the quality and quantity of water sufficient for this use.

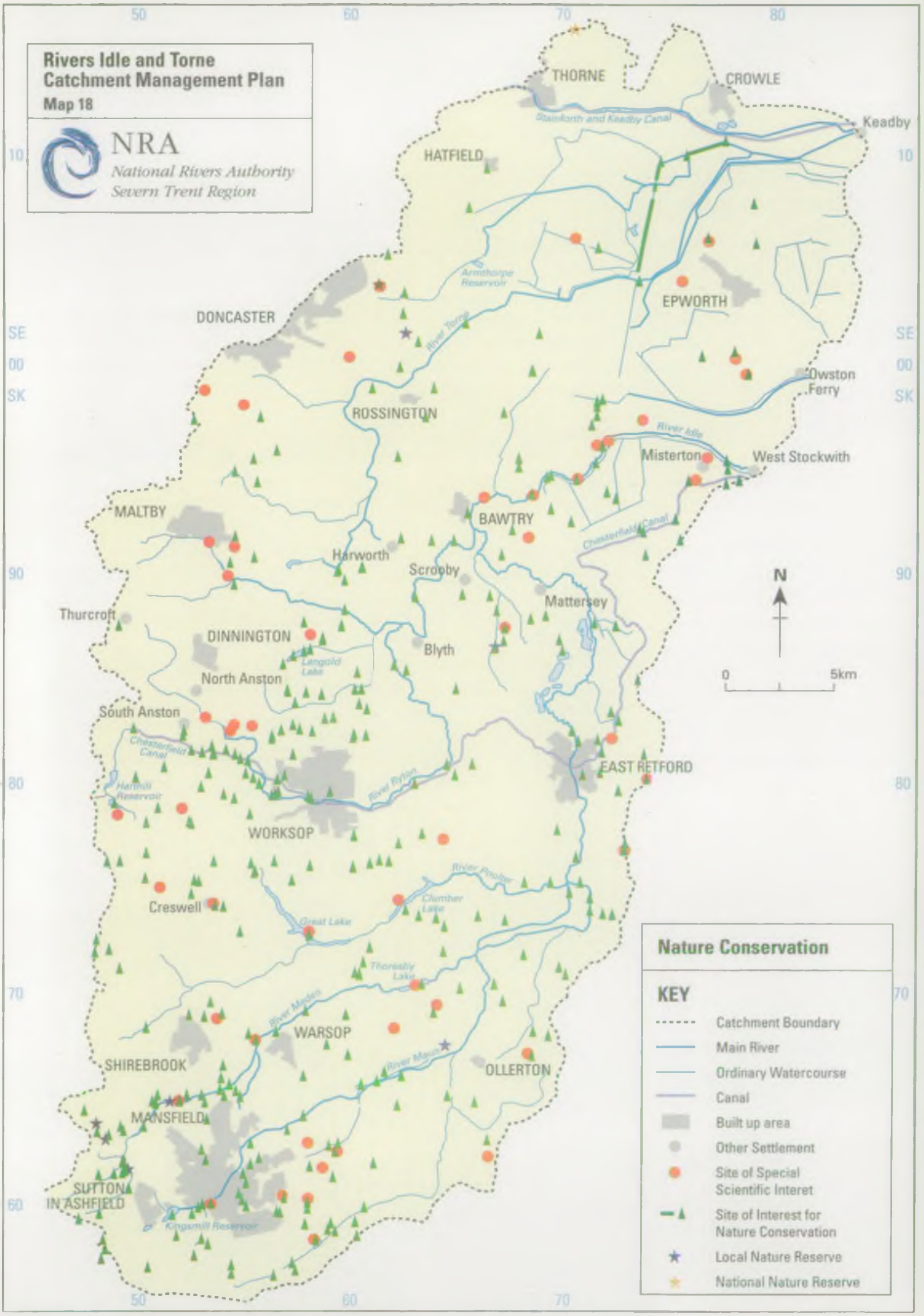
Local Perspective

The catchment area is large and supports a great many SSSIs, SINCs, Local Nature Reserves (LNRs) and 1 National Nature Reserve (NNR). Of particular note are the raised mires of Hatfield Moors and Thorne Moors, although only a small part of the latter falls within the

Rivers Idle and Torne Catchment Management Plan

Map 18

NRA
National Rivers Authority
Severn Trent Region



Nature Conservation

KEY

- Catchment Boundary
- Main River
- Ordinary Watercourse
- Canal
- Built up area
- Other Settlement
- Site of Special Scientific Interet
- Site of Interest for Nature Conservation
- Local Nature Reserve
- National Nature Reserve

catchment boundary. These peatlands are of national importance and both are currently being used for peat extraction. Studies are being carried out on the underlying groundwater levels, as the lowering of these levels could preclude the restoration of the peatlands. These areas support national important sites for nightjars and peatland fauna and flora.

The drainage system of Hatfield Chase supports floristically important watercourses and the nationally rare Pillwort is found near Sandtoft.

Between Worksop and Ollerton the remnants of Sherwood Forest can be found. There are several SSSIs in this area including the Great Lake at Welbeck and Clumber Park on the River Poulter, Thoresby Lake on the Meden and Birklands and Bilhaugh representing Sherwood Forest. This latter site is being considered as a possible Special Area of Conservation (SAC).

The River Idle washlands are another site of importance, lying between Bawtry and Idle Stop. These wet grasslands are important for breeding birds and attracting wintering birds in large numbers, such as Bewick Swans and internationally rare species.

Much of the central part of the catchment lies on Sherwood Sandstone and there are many grassland sites of interest together with a large number of important deciduous woodlands

There are areas of remnant heathland in the Mansfield, Clipstone and Rainworth areas.

Parts of the River Torne and River Idle are classified as SINCs and the many gravel pits in the Idle catchment downstream of Retford are of local importance. These water areas are used extensively by overwintering birds.

The Rivers Meden, Poulter and Ryton offer excellent habitat, being natural, wooded watercourses. These would be the chosen habitat for otters returning to the catchment. Otters are found in Yorkshire and across the River Trent in Lincolnshire, and it is suspected that they regularly move from one area to the other.

The Chesterfield Canal is SSSI and SINC for most of its length, the primary interest being aquatic flora.

4.12 CONSERVATION - LANDSCAPE, ARCHAEOLOGY AND HERITAGE

General

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

This use deals with :

* the protection of areas formally designated as being of value, such as National Parks, Areas of Outstanding Natural Beauty and Scheduled Ancient Monuments (SAMs).

* the protection of areas, which although valuable in landscape, archaeological or historical terms are not formally protected (such as sites identified on County Sites and Monuments Records).

The strategic objectives for this category are:

* To protect the landscape, archaeological, architectural and historical features associated with rivers in the catchment and to safeguard designated sites and, where appropriate, access to these sites.

* To assess the environmental impact of all NRA activities and ensure that any adverse impacts are mitigated.

* To safeguard the quality and quantity of water sufficient for this use.

Local Perspective

The northern part of the catchment, around the River Torne, is at sea level and was extensive marshland up to 1620's, when a land drainage scheme was implemented by Cornelius Vermuyden. The land in this area is primarily peat and sand. The Isle of Axholme is a high area that would have been elevated out of the marshland. The landscape in this northern part is flat lowland, dissected by drains, with few trees. In the centre of this lowland is Hatfield Moors, a notable peat bog, which is surrounded by tree cover. The NRA has carried out improvements to the Hatfield Chase area with planting schemes along farmers and IDB watercourses, and along the Torne following the Flood Defence scheme.

The south and central part of the catchment would have been covered by Sherwood Forest.

There are remnants of the forest in the Edwinstowe area and north of this are the 'Dukeries', the large, once private, estates of Welbeck, Clumber, Rufford, Thoresby and Worksop. This area is still well wooded with deciduous woods and forestry plantations.

The agricultural land on the Sherwood Sandstone is largely arable, with many potato, carrot and beet growers. This part of the catchment has large open fields with intermittent hedgerows.

The landscape of the catchment is extremely varied encompassing wooded valleys, country estates and stately homes, open agricultural areas, forests, heathland and lowlands. The main towns are Mansfield and the market towns Worksop, Retford and Bawtry, but the remaining countryside is dotted with villages.

The historical value is high with the stately homes as mentioned above and the Victorian pumping station situated on the sandstone at Boughton. There are many old water pumping stations on the Hatfield Chase drainage system, Dirtness being a listed building. Mills have been preserved at Clumber and Rufford and one has been restored at Ollerton. There has been a great deal of interest in hydropower generally, but there have been no applications for use of water for hydro - generation in this catchment area.

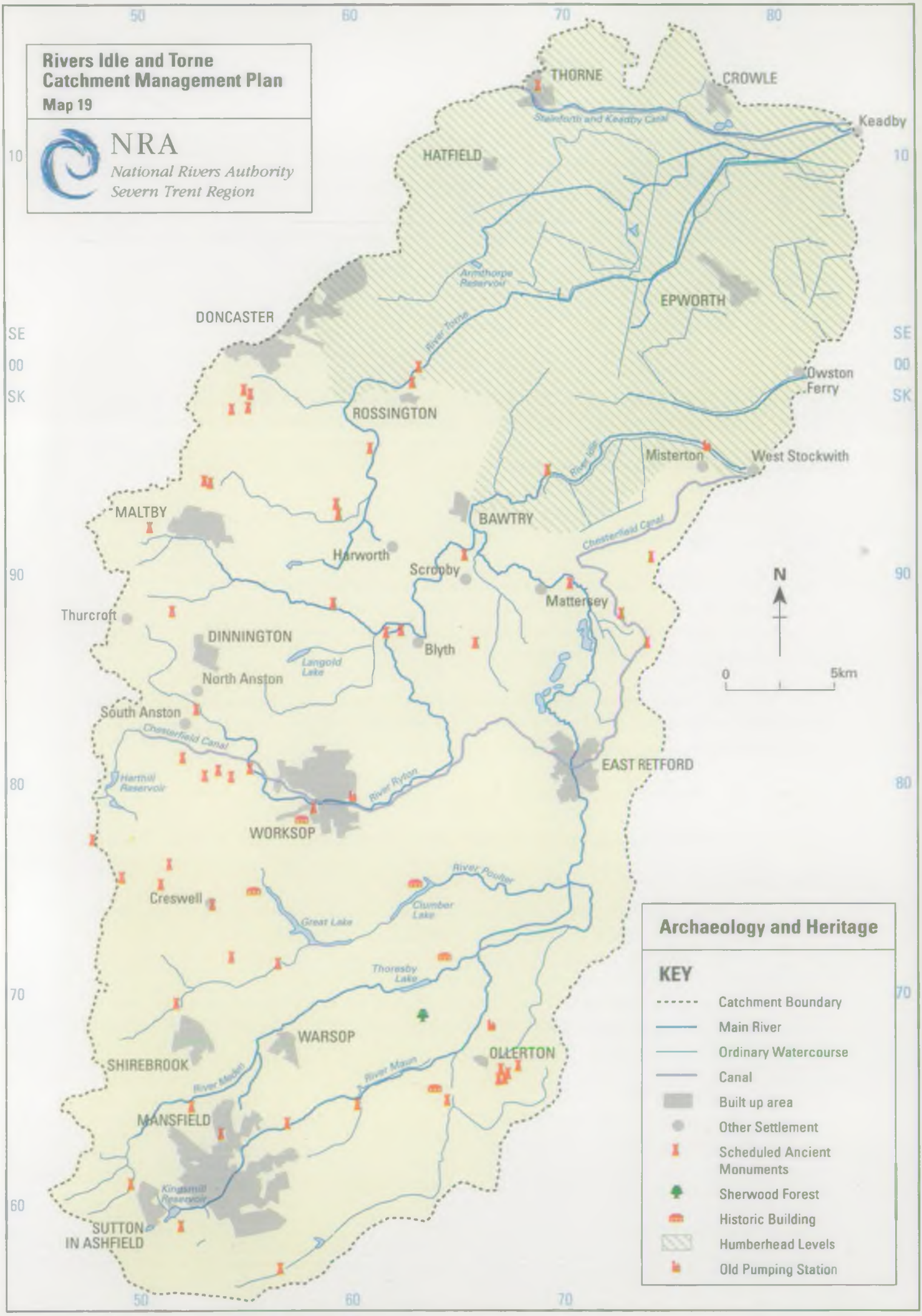
The tributaries of the River Idle supported many mills, some of which are still in existence on the Maun and Meden.

The River Idle was once an important navigation and the Pilgrim Fathers are said to have begun their journey from Scrooby, near Bawtry, down the River Idle to the Trent, and thence to Boston.

The many collieries of North Nottinghamshire gave an industrial view to the triangular area mainly between Dinnington, Mansfield and Retford. Many of these collieries are now closed, and the spoil tips are being reclaimed and landscaped.

The archaeological resource of the area is of great importance. The Humberhead Levels are noted for finds from Palaeolithic period, through Bronze Age, Iron Age, Roman to the Post-Medieval period. The peat in this area has preserved many remains. The gravel deposits along the River Idle valley have also preserved remains, and recent gravel workings have unearthed some of these.

The caves at Creswell Crags are of world renown, being Palaeolithic and later prehistoric sites. There are Roman remains at Styrrup-with-Oldcotes, Edlington and Tickhill.


Rivers Idle and Torne
Catchment Management Plan
Map 19
NRA
National Rivers Authority
Severn Trent Region
THORNE
CROWLE
Keadby
Stainforth and Keadby Canal
HATFIELD
Armthorpe Reservoir
EPWORTH
DONCASTER
River Torne
Owston Ferry
ROSSINGTON
Misterton
West Stockwith
River Idle
MALTBY
BAWTRY
Chesterfield Canal
Harworth
Scrooby
Mattersey
Thurcroft
DINNINGTON
Blyth
Langold Lake
North Anston
South Anston
Chesterfield Canal
Harthill Reservoir
River Ryton
EAST RETFORD
WORKSOP
River Poulter
Creswell
Great Lake
Clumber Lake
Thoresby Lake
WARSOP
OLLERTON
SHIREBROOK
River Meden
River Maun
MANSFIELD
Kingsmill Reservoir
SUTTON IN ASHFIELD
N
0
5km
Archaeology and Heritage
KEY
Catchment Boundary
Main River
Ordinary Watercourse
Canal
Built up area
Other Settlement
Scheduled Ancient Monuments
Sherwood Forest
Historic Building
Humberhead Levels
Old Pumping Station

4.13 RECREATION

General

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

This use deals with those recreational activities that are principally land based but occur within the proximity of the river corridor or wetlands. Examples include camping and caravanning, walking, picnicking and birdwatching. The main areas of concern are access, public safety and the general aesthetic acceptability of the water environment.

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

The NRA has formal responsibility towards angling and issues rod licences that are a legal requirement for fishing for any freshwater fish. This section deals with the recreational activity of fishing with rod and line, rather than the protection of fish stocks. The latter are dealt with in the Fisheries Section 4.10.

The NRA does not encourage swimming in rivers and lakes, because of the risk of drowning, and the possibility of swimmers catching waterborne diseases, such as Weil's Disease.

The strategic objectives for this category are:

* To safeguard the quality and quantity of water so it is sufficient for its recreational use.

* To protect and promote public access to watercourses, including facilities for the disabled, within the framework of existing local authority and National Trust policies for visitor management.

* To ensure that works on river channels do not prejudice recreational activities as far as is practicable and, where appropriate, take opportunities to enhance recreational facilities.

* To promote the use of water and associated land for recreational purposes commensurate with the interests of other users and subject to the NRA's conservation duties.

* To provide suitable conditions for successful angling.

* To improve angling by implementing measures to increase fish stocks where possible without adversely affecting water quality or nature conservation interests.

* To promote recreational use of the water for boating and canoeing commensurate with the interests of other users.

Local Perspective

There are many large lakes in the catchment, some associated with the Dukeries estates. Some are fished, such as Langold, Harthill, Kingsmill, Welbeck, Thoresby and Sandbeck. Many of the numerous gravel pits are also fished. Rufford Lake is an amenity area with no fishing.

The Rivers Torne, Idle, Three Rivers and Warping Drain are fished by angling clubs and informal fishing takes place on the Rivers Ryton, Meden and Maun.

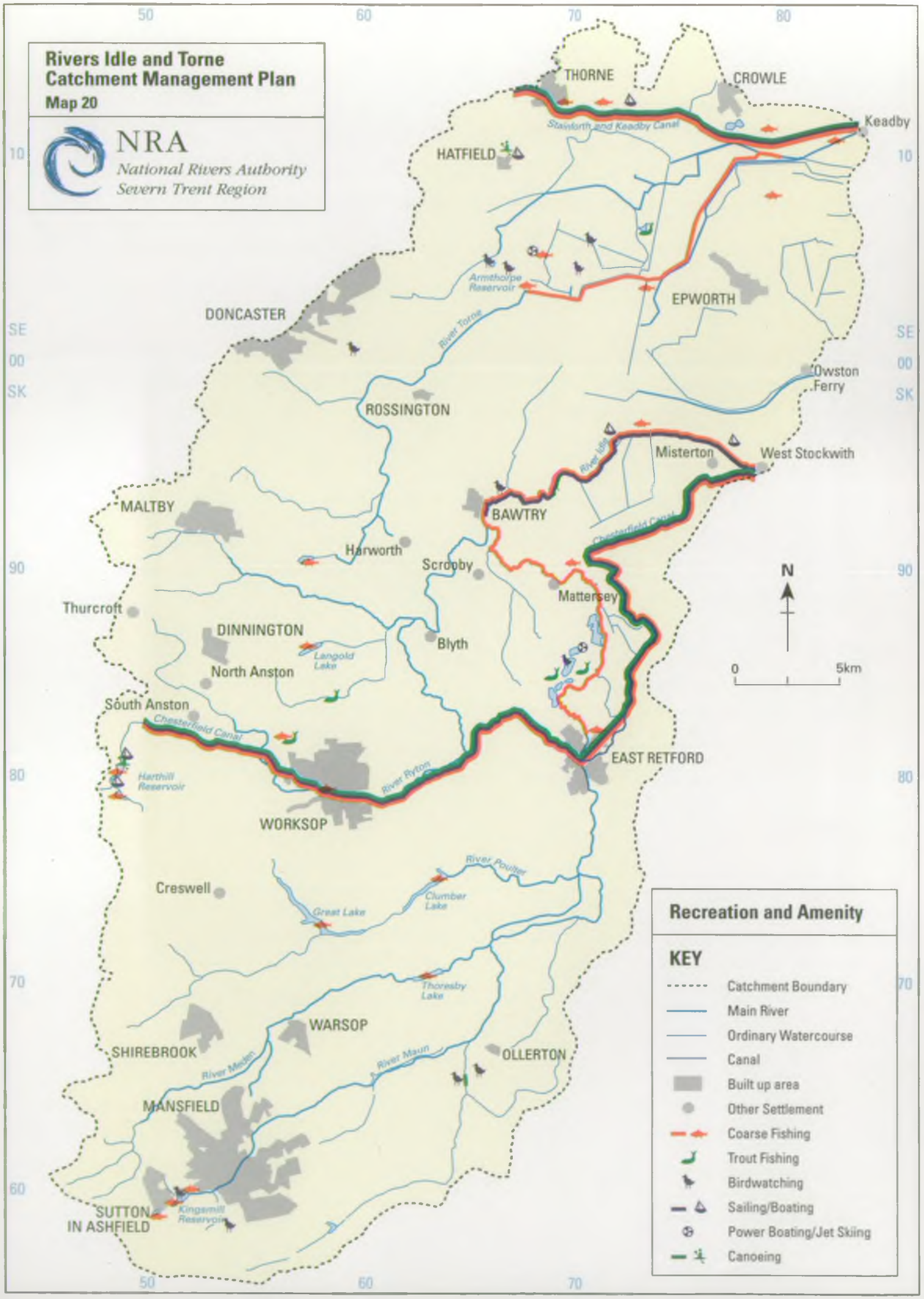
The large Dukeries estates offer many attractions for visitors. Many activities are catered for, including: walking, cycling and birdwatching. There are visitor centres at Sherwood Forest and the Major Oak, Clumber Park, Rufford Park and Creswell Crags.

Gravel pits in the Idle catchment are used for sailing, board sailing, jet ski-ing and power boating, and Kingsmill Reservoir is used for sailing.

There is some access along the river valleys for walkers, but this is intermittent. It is envisaged that a walkway along the River Idle will link up with the Trent Valley Way at West Stockwith. In the future links could be established with Greenwood Community Forest at Mansfield along the Maun and Meden to link with the Idle. Many of the reclaimed spoil heaps at closed collieries could become recreational areas for walking and cycling.

The River Torne is used occasionally for school canoeing, and on the River Idle below Bawtry boating and canoeing takes place, often during the close season for fishing.

The NRA owns various pockets of land in the catchment and improvements have been made to facilities, such as car parks, on the River Torne. There is a need to continue these improvements, particularly for disabled persons, on other NRA land.


Rivers Idle and Torne
Catchment Management Plan
Map 20
NRA
National Rivers Authority
Severn Trent Region
THORNE
CROWLE
Keadby
Stainforth and Keadby Canal
HATFIELD
Armthorpe Reservoir
EPWORTH
DONCASTER
River Torne
Owston Ferry
ROSSINGTON
Misterton
West Stockwith
River Idle
MALTBY
BAWTRY
Chesterfield Canal
Harworth
Scrooby
Mattersey
Thurcroft
DINNINGTON
Blyth
Langold Lake
North Anston
South Anston
Chesterfield Canal
EAST RETFORD
Harthill Reservoir
River Ryton
WORKSOP
River Poulter
Creswell
Great Lake
Clumber Lake
Thoresby Lake
WARSOP
SHIREBROOK
River Meden
River Maun
OLLERTON
MANSFIELD
SUTTON IN ASHFIELD
Kingsmill Reservoir
N
0
5km
Recreation and Amenity
KEY
Catchment Boundary
Main River
Ordinary Watercourse
Canal
Built up area
Other Settlement
Coarse Fishing
Trout Fishing
Birdwatching
Sailing/Boating
Power Boating/Jet Skiing
Canoeing

4.15 NAVIGATION

General

This use covers regulation of the use of waterways for navigation.

The strategic objectives for this category are :

* to safeguard the quality and quantity for water for this use

* to ensure that works on river channels do not prejudice these activities as far as is practicable and where appropriate, take opportunities to enhance recreational facilities.

* to promote the use of waters for boating.

Local Perspective

There are two canals in the catchment, the Chesterfield Canal and the Stainforth and Keadby Canal. Both these waterways are managed by British Waterways.

There are problems with water supply for the Chesterfield Canal. Plans to restore the length from Worksop to Chesterfield could result in problems of water quantity and quality in the River Ryton.

The River Idle, downstream of Bawtry, has an ancient right of navigation. The River Idle Flood Alleviation Scheme interrupted this navigation by building a pumping station at West Stockwith. However a guillotine gate was installed and this may be lifted to allow passage of boats when the levels between the River Trent and River Idle are suitable. The NRA charges for this facility. The Retford and Worksop Boat Club arrange a cruise annually along the River Idle from West Stockwith to Bawtry. There are no mooring facilities on the river and there is no navigation authority on the River Idle.

SECTION 5 CURRENT STATE OF THE CATCHMENT AND CATCHMENT TARGETS

INTRODUCTION

This section provides further information on the current state of the catchment and the targets set for the catchment. These targets are explained, and once met should result in improvements in terms of water quality, water quantity and physical features. A comparison of the targets with the current state of the catchment show how some of the issues described in Part I (Section 3) were identified.

5.1 WATER QUALITY

5.1.1 Surface Water Quality

General

River Quality Objectives

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

Table 4 describes the Water Quality Criteria of the RE Classification.

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

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

Details of the RQOs assigned to river stretches and compliance with RQOs, including the monitoring data upon which compliance assessment is based, are included on the Public Register.

Some consents for water company STPs are based on historical performance rather than target river quality and the targets can only be met by improvements in effluent quality. The NRA has negotiated a programme of improvements with the DoE and water companies under the terms of Asset Management Plans (AMP). The plans will govern priorities for investment for the period covered by this plan.

TABLE 4 - RIVER ECOSYSTEM CLASSIFICATION : WATER QUALITY CRITERIA

Class	Dissolved Oxygen % saturation 10 %ile	BOD (ATU) mg/l 90 %ile	Total Ammonia mg N/l 90 %ile	Un-ionised Ammonia mg N/l 95 %ile	pH lower limit as 5 %ile; upper limit as 95 %ile	Hardness mg/l Ca CO_3	Dissolved Copper µg/l 95 %ile	Total Zinc µg/l 95%ile
RE1	80	2.5	0.25	0.021	6.0 - 9.0	≤10 >10 and ≤50 >50 and ≤100 >100	5 22 40 112	30 200 300 500
RE2	70	4.0	0.6	0.021	6.0 - 9.0	≤10 >10 and ≤50 >50 and ≤100 >100	5 22 40 112	30 200 300 500
RE3	60	6.0	1.3	0.021	6.0 - 9.0	≤10 >10 and ≤50 >50 and ≤100 >100	5 22 40 112	300 700 1000 2000
RE4	50	8.0	2.5	-	6.0 - 9.0	≤10 >10 and ≤50 >50 and ≤100 >100	5 22 40 112	300 700 1000 2000
RE5	20	15.0	9.0	-	-	-	-	-

Class RE 1: Water of very good quality (suitable for all fish species).
Class RE 2: Water of good quality (suitable for all fish species).
Class RE 3: Water of fair quality (suitable for high class coarse fish populations).
Class RE 4: Water of fair quality (suitable for coarse fish populations).
Class RE 5: Water of poor quality (which is likely to limit coarse fish populations).
Unclassified: Water of bad quality (in which fish are unlikely to be present), or insufficient data available by which to classify water quality.

Asset Management Plan Programme

Asset Management Plan 2 (AMP 2) is the programme of proposed capital investment by the water industry. The first Asset Management Plan (AMP) was formulated following privatisation and set out planned expenditure on sewerage and sewage effluent quality for the period 1990-95.

For AMP 2 which covers the period 1995-2000 the water companies expenditure plans were put together as part of an exercise known as "Cost of Quality" in 1993. The Government was

concerned at the total cost of identified improvements. Accordingly the Secretary of State set out the criteria to be followed for determining priorities for AMP 2 in a memorandum entitled "Water Charges, The Quality Framework" to the Director General of OFWAT.

Top priority was to be given to meeting present and future statutory obligations including the EC Directives for Freshwater Fisheries, Dangerous Substances and Urban Waste Water Treatment. Lower priority was given to schemes to achieve RQO improvements and these were referred to as discretionary schemes. Estimates for the cost nationally of achieving river water quality improvements to meet existing non statutory RQOs exceeded £1.6 billion. The estimated cost of the schemes identified by the NRA as high priority was £916 million. In his announcement of July 1994 the Secretary of State allocated £522 million nationally, with an allocation of £194 million to Severn Trent Water for RQO improvements over the next 5 years. The NRA is in discussion with the water companies on the most cost effective allocation of this expenditure.

Catchment Targets

Table 5 identifies the river stretches covered by the plan and assigns various River Ecosystem classes to them.

The column headed Current Quality describes the actual quality of the river over the last three years (1992 - 1994) in terms of an RE class.

The column headed Short Term Objective shows the RE Class that should be met within the plan period, ie the next 5 years, and will take account of any improvements planned by the water company under AMP 2.

The principal quality determining factor for rivers in the area of this plan is STP effluent. The AMP 2 process outlined in the preceding section noted that not all of the river quality improvement work required to ensure compliance with RQOs could be enforced. Some STPs perform significantly better than required by their existing consents and therefore current quality complies with objective requirement, eg Manton STP which discharges to the River Ryton, but cannot be guaranteed. The Short Term Objective column is therefore included and assumes that all consented discharges within each stretch discharge up to their consent limits in terms of both quality and quantity. This category of discharges will form the list of candidates for review during the next round of expenditure allocation under AMP 3.

The Final River Quality Objective column is the objective beyond the plan period and is a translation of the former NWC scheme classification to a Long Term Objective in RE terms.

TABLE 5 - RIVER QUALITY OBJECTIVES

River	Stretch Description	Reach (KM)	River Quality Objectives		
			Current Quality	Short Term Objective	Long Term Objective
Maun	Sutton Woodhouse to I/LKingsmill Res	3	RE3	RE3(1995)	RE2
Maun	I/L Kingsmill Res to O/L Kingsmill Res	1	RE5	RE5(1995)	RE5
Maun	O/L Kingsmill Res to Mansfield STP	4.6	RE5	RE5(1995)	RE4
Maun	Mansfield STP to FB. Nr. Warren Fm	1.3	RE5	RE5(1995)	RE4
Maun	FB. Nr. Warren Fm to Edwinstowe STP	9.4	RE5	RE4(1995)	RE4
Maun	Edwinstowe STP to Conf. R. Meden	8	RE4	RE4(1995)	RE3
Maun	Conf. R. Meden to Conf. Bevercotes Beck	6.4	RE3	RE3(1995)	RE3
Maun	Conf. Bevercotes Beck to Markham Moor	3	RE3	RE3(1995)	RE3
Idle	Markham Moor to B6387 Rd Br, Gamston	4	RE3	RE3(1995)	RE3
Idle	B6387 Rd Br, Gamston to Retford	6	RE3	RE3(1995)	RE3
Idle	Retford to Chainbridge Rd	6.5	RE3	RE3(2001)	RE3
Idle	Chainbridge Rd to Mattersey Thorpe STP	10	RE3	RE3(1995)	RE3
Idle	Mattersey Thorpe STP to Idle Pumping St	15.8	RE3	RE3(1995)	RE3
Idle	Idle Pumping St to Conf. R. Trent	8	RE3	RE3(1995)	RE2
Cauldwell Bk	Stonehills Farm Bridge to Conf. R. Maun	2	RE1	RE2(1995)	RE2
Vicar Water	Inlet to Vicar Pond to Conf. R. Maun	2.8	RE5	RE4(1995)	RE4
Rainworth Water	Rail Br, Rainworth to Red Bridge	6	RE4	RE5(1995	RE4
Rainworth Water	Red Bridge to Conf. Gallow Hole Dyke	3	RE4	RE5(1995)	RE4
Rainworth Water	Conf. Gallow Hole Dyke to Conf. R. Maun	1.9	RE4		RE3
Gallow Hole Dyke	Track Bridge to Conf. Rainworth Water	3	RE4	RE3(1995)	RE3
Bevercotes Beck	Wellow to Boughton STP	3.1	RE4		RE4
Bevercotes Beck	Boughton STP to A6075 Br, Boughton	0.7	RE5	RE5(1995)	RE5
Bevercotes Beck	A6075 Rd Br, Boughton to Rd Br, Walesby	3.3	RE5	RE5(1995)	RE5
Bevercotes Beck	Minor Rd Br, Walesby to Conf. R. Maun	3	RE5		RE4
River Meden	Whiteborough to A617 Br, Pleasley	6	RE2	RE3(1995)	RE3
River Meden	A617 Br, Pleasley to Rail Br, Littlewood	4	RE1	RE2(1995)	RE3
River Meden	Rail Br, Littlewood to Warsop STP	7.7	RE2	RE2(1995)	RE3
River Meden	Warsop STP Outfall to I/L Thoresby Lake	3.8	RE2	RE4(1995)	RE3
River Meden	Inlet to Thoresby Lake to Conf. R. Maun	6.8	RE5	RE5(1995)	RE2
River Meden	Conf. R. Maun to Conf. R. Idle	6.3	RE4	RE4(1995)	RE3
Skegby Bk	Bridge at Huthwaite to Skegby STP	3.5	RE1	RE2(1995)	RE3
Skegby Bk	Skegby STP to Conf. R. Meden	0.7	NoData		RE5
Leas Brook	Mansfield STP to Conf. R. Meden	3.6	RE2	RE2(1995)	RE5
Sookholme Brook	Source at Sookholme Bath to R Meden	2.2	RE3	RE4(1995)	RE4
Shire Brook	Footbridge to Conf. Sookholme Bk	1.5	RE4	RE5(1995)	RE5

TABLE 5 CONTD

River	Stretch Description	Reach (KM)	River Quality Objectives		
			Current Quality	Short Term Objective	Long Term Objective
R Poulter	FB at Scarcliffe to I/L Langwith Lake	4.5	RE1	RE2(1995)	RE2
R Poulter	I/L Langwith Lake to Langwith STP	1	RE2	RE2(1995)	RE2
R Poulter	Langwith STP to A616 Rd Br, Cuckney	1.5	RE2	RE3(1995)	RE2
R Poulter	A616 Rd Br, Cuckney to I/L Clumber Lake	6.6	RE5	RE5(1995)	RE2
R Poulter	I/L Clumber Lake to Normanton Br	4.4	RE5	RE5(1995)	RE2
R Poulter	Normanton Br to Conf R Idle	6.8	RE4	RE3(1995)	RE2
Millwood Bk	Track Br, Hazelmere Fm to Creswell STP	3.3	RE3	RE4(1995)	RE2
Millwood Bk	Creswell STP to I/L Welbeck Top Lake	4	RE3	RE5(1995)	RE3
Millwood Bk	I/L Welbeck Top Lake to Conf. R. Poulter	3.8	RE5	RE5(1995)	RE3
Whitwell Bk	Rd Br, Whitwell Colliery to Millwood Bk	1.5	RE3	RE5(1995)	RE4
Walling Brook	Broad Ln Br, Hodthorpe to Millwood Bk	1.1	RE4	RE4(1995)	RE2
Ranskill Bk	A638 Rd Br, Barnby Moor to Ranskill	4.4	RE2	RE2(1995)	RE2
Ranskill Bk	Ranskill to Conf. R. Idle	3.7	RE4	RE5(1995)	RE4
Ryton	FB at Peck Mill Bottoms to Anston Bk	3	RE2	RE2(1995)	RE2
Ryton	Anston Bk to Ford, Shireoaks	3	RE2	RE2(1995)	RE2
Ryton	Ford at Shireoaks to Worksop STP	7	RE2		RE4
Ryton	Worksop STP to Chequer Br, Ranby	5	RE3	RE4(1995)	RE3
Ryton	Chequer Br, Ranby to Oldcotes Dyke	9	RE2	RE3(1995)	RE2
Ryton	Oldcotes Dyke to Conf. R. Idle	11	RE2		RE2
Anston Brook	Rd Br at Hardwick to Conf. Cramfit Bk	3	RE2	RE2(1995)	RE2
Anston Brook	Conf. Cramfit Bk to Church Bridge	2	RE3	RE4(1995)	RE4
Anston Brook	Church Bridge to Conf. R Ryton	3	RE2	RE4(1995)	RE3
Cramfit Bk	Dinnington STP to Conf. Anston Bk	1.6	RE5	RE5(1995)	RE5
Oldcotes Dyke	Conf. Maltby Dyke to A60 Rd Br, Oldcotes	5	RE3	RE3(1995)	RE3
Oldcotes Dyke	A60 Rd Br, Oldcotes to Conf. R Ryton	2.8	RE3	RE3(1995)	RE3
Maltby Dyke	(Hellaby Bk) Railway Br to Maltby STP	4.1	RE3	RE3(1995)	RE2
Maltby Dyke	Maltby STP to Conf. Oldcotes Dyke	1	RE5	RE5(1995)	RE5
Hooton Dyke	Rail Br, Thurcroft to Oldcotes Dyke	3	RE2	RE3(1995)	RE3
Firbeck(Lamb Lane)Dyke	Track Br at Letwell to Oldcotes Dyke	2.9	RE2	RE2(1995)	RE2
Hodsock Bk	Hodsock STW to Conf. Oldcotes Dyke	1.7	RE3	RE4(2001)	RE4
Owlands Wood	Track Br, Woodsetts to Holme House Fm Br	2	RE3	RE5(1995)	RE5
Owlands Wood	Holme House Fm Br to Conf. Hodsock Bk	5.7	NoData	RE4(1995)	RE4
Owlands Wood	Conf. Hodsock Bk to Conf. Oldcotes Dyke	0.8	RE3	RE4(2001)	RE4
Warping Drain	Road Br at Newlands Fm to Conf. R Trent	11.8	RE3	RE4(1995)	RE4

TABLE 5 CONTD

River	Stretch Description	Reach (KM)	River Quality Objectives		
			Current Quality	Short Term Objective	Long Term Objective
Ferry Drain	Cover Road Jn. to Conf. R Trent	9.5	RE5	RE5(1995)	RE4
River Torne	Styrrup Lane to Conf. Harworth Dyke	2.8	RE2	RE3(1995)	RE3
River Torne	Conf. Harworth Dyke to Little Black Lane	1.1	RE5	RE5(1995)	RE4
River Torne	Little Black Lane to Conf. Wadworth Carr	4.8	RE4	RE4(1995)	RE4
River Torne	Wadworth Carr to Rossington, A638 Br	4.9	RE4	RE4(1995)	RE4
River Torne	Rossington, A638 Br to B1396 Br, Auckley	2.5	RE4	RE4(1995)	RE3
River Torne	B1396 Rd Br, Auckley to Pilfrey Bridge	20.8	RE5	RE5(1995)	RE3
Ruddle(PaperMillDyke)	B6427 Br, Braithwell to Conf. R Torne	10.5	RE2	RE3(1995)	RE2
St Catherine'sWellSTM	Alverley Grange Rd Br to Conf. R Torne	5	RE3	RE4(1995)	RE4
Mother Drain	Balby STp to Potteric Pumping Station	2.9	RE4	RE5(1995)	RE5
Mother Drain	Potteric Pumping Station to Conf. R Torne	4.2	RE4	RE4(1995)	RE4
Three Rivers	Pilfrey Bridge to Keadby Pumping Station	3	RE4	RE4(1995)	RE4
Hatfield Waste Drain	Hatfield Woodhouse STP to Goodcop Fm	5.5	RE5	RE4(2000)	RE4
Hatfield Waste Drain	Goodcop Farm to Pilfrey Bridge	9.5	RE5	RE4(2000)	RE4
Fores Drain	Sandall Beat Wood to Conf. Village Drain	4	RE3	RE4(1995)	RE4
Diggin Dyke	Conf. Village Drain to Waterton P Station	2.5	RE6	RE4(2000)	RE4
Woodhouse Sewer	Waterton Pumping Station to Hatfield STP	3.2	RE6	RE4(2000)	RE4
Paupers Drain	Crowle STP Outfall to Conf. R Trent	20	RE5	RE5(1995)	RE4
Adlingfleet Drain	Sand House Fm to Conf. R Trent	6.5	RE5	RE5(1995)	RE4
Broadbridge Dyke	FB Hartshill to US Kiveton Park STP	1.1	RE4	RE4(1995)	RE2
Broadbridge Dyke	Kiveton Park STP to Chesterfield Canal	1.3	RE3		RE4
North Soak Drain	Medge Hall to Conf. South Soak Drain	8.2	RE5	RE5(1995)	RE5
South Soak Drain	Moors Bridge to Conf. Three Rivers	13.5	RE5	RE5(1995)	RE4
N. Level Engine Drain	Woodcarr Pumping Station to Pilfrey Br	5.8	RE5	RE5(1995)	RE5
S. Level Engine Drain	Bull Hassocks PStation to Pilfrey Bridge	14.3	RE5	RE5(1995)	RE4
Stainforth&KeadbyCan	River Don Navigation to Thorne Lock	7.2	RE3	RE4(1995)	RE4
Stainforth&KeadbyCan	Thorne Lock to River Trent	17.1	RE3	RE4(1995)	RE3
Chesterfield Canal	Conf. Broadbridge Dyke to Pudding Dyke	2.3	RE5	RE5(1995)	RE4
Chesterfield Canal	Pudding Dyke to Turner Wood	1.6	RE2	RE3(1995)	RE3
Chesterfield Canal	Turner Wood to B6045 Rd Br, Bracebridge	6	RE3	RE3(1995)	RE3
Chesterfield Canal	B6045 Bracebridge to Clarborough	17.5	RE5	RE5(1995)	RE3
Chesterfield Canal	Minor Rd Br, Clarborough to River Trent	11.3	RE4	RE4(1995)	RE3

State of the Catchment

Significant failures identified on Table 5 include:

a) **River Maun at Mansfield and Whinney Hill**

These failures are due to a combination of effects, including overflow of water from Kingsmill Reservoir for which there are planned actions (see Issue 15) and sewer overflow problems which are being addressed under AMP programme commitments in Mansfield and Sutton in Ashfield. In the longer term a further tightening of Mansfield STP consent may be necessary and this aspect is being reviewed.

b) **River Idle at Misterton**

This failure is thought to result from algal effects in the lower section of the Idle. The causes are being investigated and as an aid to this a continuous automatic river quality monitor has been installed near Misterton (see also Issue 7).

c) **River Poulter and Millwood Brook**

The failures of quality objectives on the lower sections of the above watercourses are due to elevated concentrations of BOD which result from eutrophication in the on stream lakes. The system is being monitored for nutrients and will form part of the 1997 review (see Issue 15).

d) **Walling Brook**

The Walling Brook receives STP effluent in low dilution and this quality failure is due to low levels of dissolved oxygen which result from sluggish low flow conditions in the brook. The NRA will review what action can be taken in this watercourse.

e) **Maltby Dyke at Carr Lane**

Poor quality here arises from the contribution of urban runoff in comparison with the low natural base flow in the upper stretch of the dyke.

f) **River Torne at Auckley**

Ammoniacal nitrogen causes this failure to comply with the long term objective. Although all STPs upstream of this stretch comply with their existing consents it is suspected that sewage effluent is the cause of the problem. Further investigation, including quality modelling, is being undertaken to determine the cause, and actions will be instigated under AMP 3, if necessary, to rectify this failure.

g) Diggin Dyke (Fores Drain) at Holmewood Farm
Woodhouse Sewer and Hatfield Waste Drain at Goodcop Farm

These rivers fail their objectives as a result of inadequate sewage treatment at Armthorpe STP. Severn Trent Water Ltd has agreed to rectify this and the AMP 2 programme includes provision for the necessary improvements.

h) Paupers Drain and Adlingfleet Drain

These failures result from the effects of poor quality land drainage. The causes are considered in Issue 19.

i) Chesterfield Canal at Pudding Dyke Bridge

This stretch of the canal has very low flow, is silted and exhibits low dissolved oxygen levels.

j) Chesterfield Canal at Retford

This failure is thought to result from algal growth effects and is being monitored for nutrients as a part of the on-going programme toward 1997 review (see Issue 15).

EC Directive Reporting

Sampling and reporting on two EC Directives was carried out in 1994. These were the Dangerous Substances Directive and the Freshwater Fisheries Directive.

a) Dangerous Substances Directive

Dangerous substances cover a wide range of materials and include heavy metals, chemicals and acidic and alkaline compounds.

River and canal monitoring points downstream of known discharges of dangerous substances are required to comply with the Environmental Quality Standards (EQS) for List I and II substances under the Directive. Toxic metal standards relate to total hardness of the water and the sensitivity of the aquatic life being protected.

No failures were reported in this catchment area in 1994.

b) Freshwater Fisheries Directive

This Directive lays down water quality criteria for designated river stretches, for the protection of salmonid and cyprinid fisheries.

There were 3 failures reported in this catchmnet in 1994 and they are listed in Table 6 with comments.

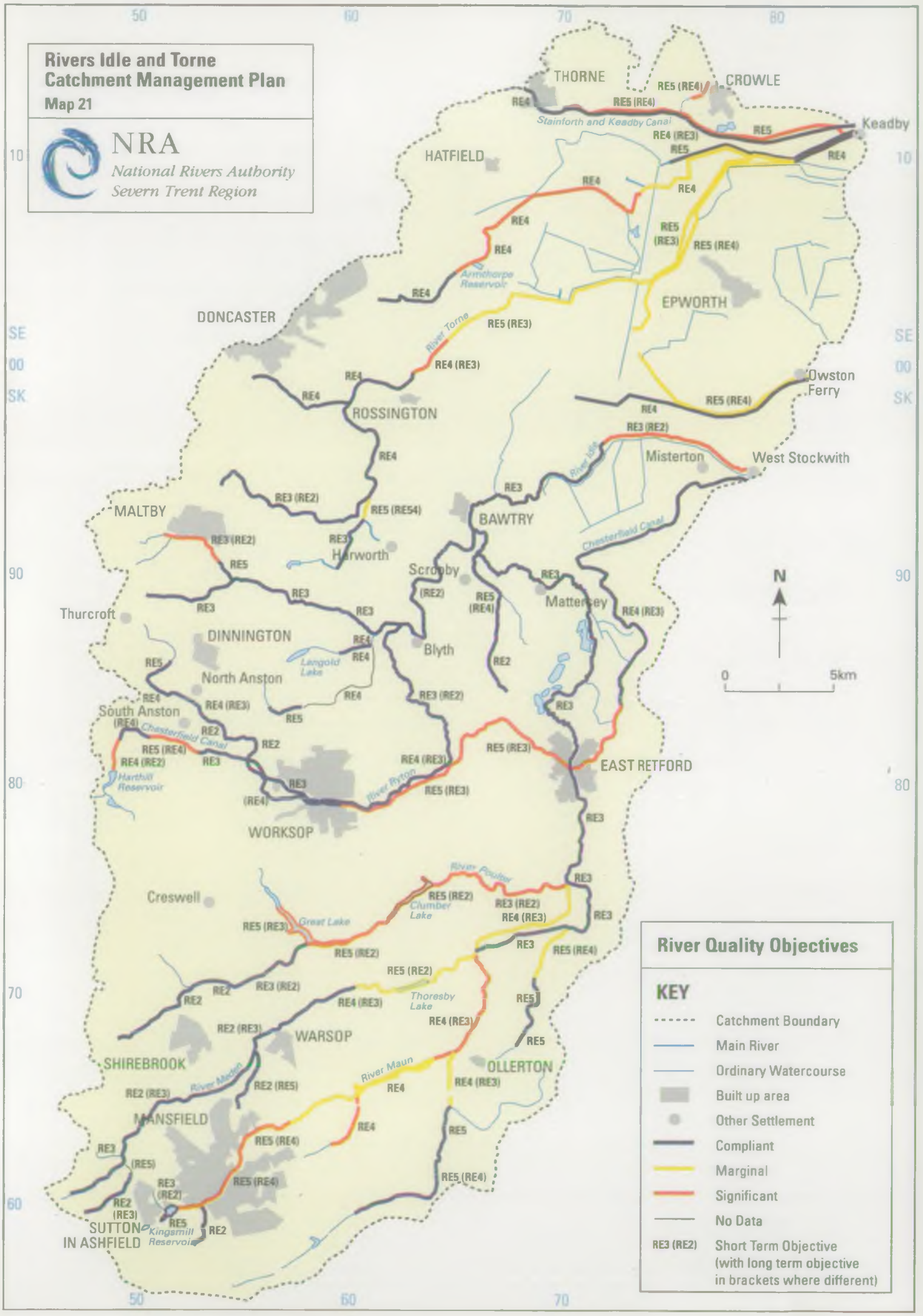

Rivers Idle and Torne
Catchment Management Plan
Map 21
NRA
National Rivers Authority
Severn Trent Region
THORNE
CROWLE
Keadby
Stainforth and Keadby Canal
HATFIELD
Armthorpe Reservoir
EPWORTH
DONCASTER
River Torne
Owston Ferry
ROSSINGTON
Misterton
West Stockwith
River Idle
MALTBY
BAWTRY
Chesterfield Canal
Harworth
Scrooby
Mattersey
Thurcroft
DINNINGTON
Blyth
North Anston
Langold Lake
South Anston
Harthill Reservoir
EAST RETFORD
River Ryton
WORKSOP
River Poulter
Creswell
Clumber Lake
Great Lake
Thoresby Lake
WARSOP
SHIREBROOK
River Maun
River Meden
OLLERTON
MANSFIELD
SUTTON IN ASHFIELD
Kingsmill Reservoir
N
0
5km
River Quality Objectives
KEY
Catchment Boundary
Main River
Ordinary Watercourse
Built up area
Other Settlement
Compliant
Marginal
Significant
No Data
RE3 (RE2) Short Term Objective (with long term objective in brackets where different)

TABLE 6 - FRESHWATER FISHERIES DIRECTIVE REPORTING 1994

Watercourse	Site	Det	EQS µg/l	No fails/ No samples	Reason
Millwood Brook	Exit Welbeck	pH	6-9*	5/14	Algal Blooms (see Issue 15)
River Torne	Auckley	ammonia	0.78	3/12	Suspect discharge from STP. Under investigation (see Catchment Targets Section above)
Three Rivers	Keadby	ammonia	0.78	8/14	Problem from Armthorpe STP. Improvements to ensure compliance funded under AMP 2

* NB not µg/l

Pollution Incidents

Information about the pollution incidents which have occured in the catchment in 1994 are detailed in Table 7 below:

TABLE 7 - POLLUTION INCIDENTS 1994

Location	Total Pollution Incidents	Type of Pollution														
		Agriculture			Industry			Sewage			Unknown			Other		
		1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
R. Maun, Meden and Poulter	137	0	1	0	0	15	36	0	6	23	0	1	46	0	1	5
R. Idle	21	0	0	1	0	0	9	0	0	2	0	0	8	0	0	1
R. Ryton	88	0	1	3	0	15	32	0	4	6	0	0	21	0	1	5
R. Torne	88	0	0	0	0	10	19	0	4	9	0	0	28	0	0	11
TOTALS	334	0	2	4	0	40	96	0	14	40	0	1	103	0	2	22

5.1.2 Groundwater quality

General

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

It deals in particular with:

* control of groundwater abstractions
* physical disturbance of aquifers and groundwater flow
* discharges to underground strata
* waste disposal to land
* disposal of slurries and sludge to land
* contaminated land
* diffuse pollution
* unacceptable activities in high risk areas

The implementation of the policy relies in part on the construction of a series of maps. The maps to be produced are to reflect the groundwater vulnerability (resource protection).

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

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

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

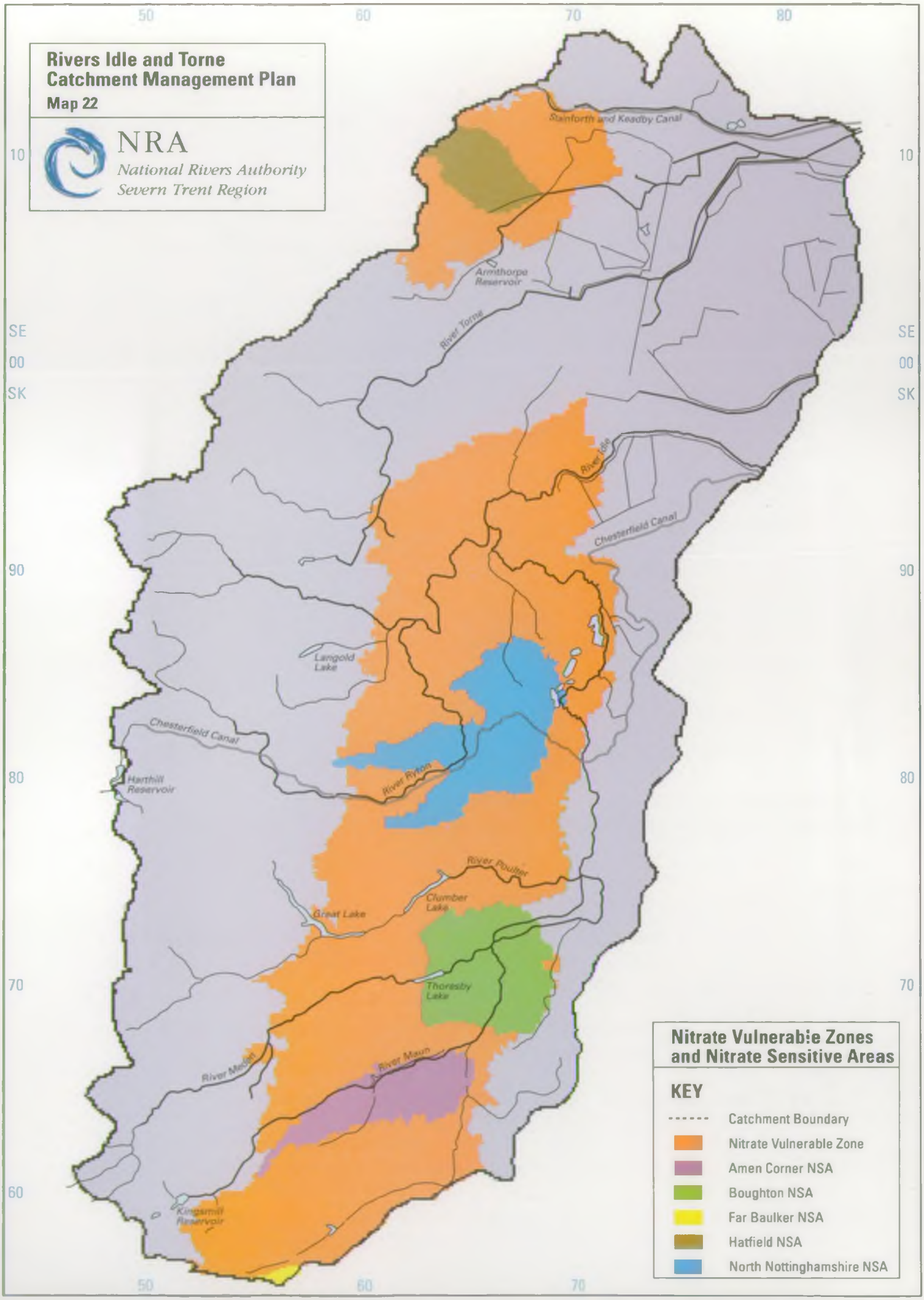
Zone III (Source Catchment): The complete catchment area of groundwater source.

The controls to be exerted on a given activity will be more stringent the more vulnerable the resource and the nearer the source. These protection zones apply to major aquifers and to

Rivers Idle and Torne Catchment Management Plan

Map 22

NRA
National Rivers Authority
Severn Trent Region



Nitrate Vulnerable Zones and Nitrate Sensitive Areas

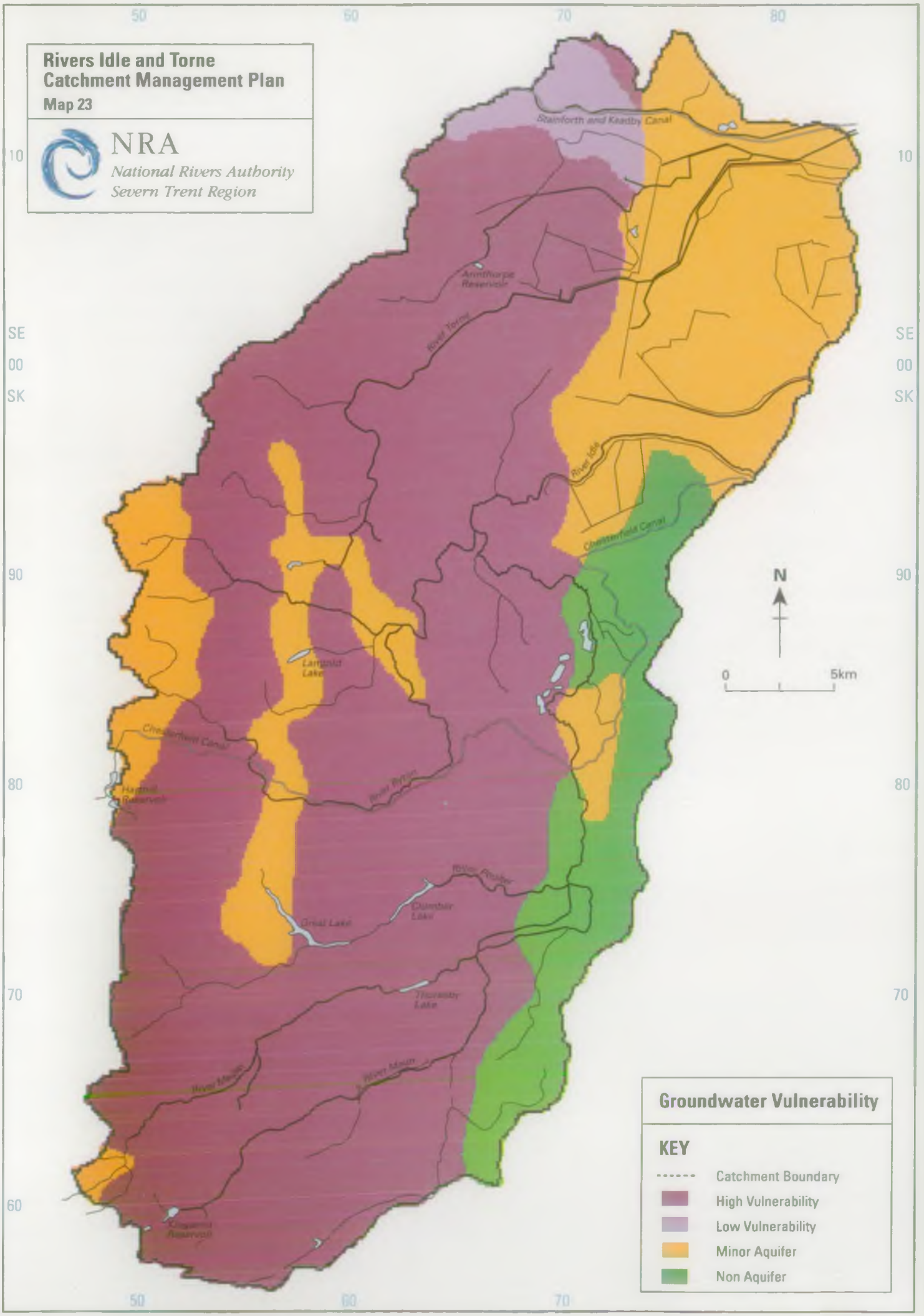
KEY

- Catchment Boundary
- Nitrate Vulnerable Zone
- Amen Corner NSA
- Boughton NSA
- Far Baulker NSA
- Hatfield NSA
- North Nottinghamshire NSA

Rivers Idle and Torne Catchment Management Plan

Map 23

NRA
National Rivers Authority
Severn Trent Region



minor aquifers where the aquifer provides a critical resource.

Catchment Targets

The high vulnerability of the groundwater over much of the catchment means that pollution prevention and maintaining or even improving the water quality is important.

Catchment audits indicating all potentially polluting activities within Source Protection Zones are vital in this regard. In addition, control of all types of development by ensuring appropriate pollution prevention measures are incorporated in planning permission can help to achieve this aim.

State of the Catchment

The groundwater vulnerability map for much of this catchment has been published and highlighted the very high vulnerability across the Triassic Sherwood Sandstones and Magnesian Limestone aquifers.

Generally, there are few point source pollution problems in this area. However, high nitrate concentrations are a widespread problem across the Triassic sandstones aquifer. This has resulted in much of the area being designated as a Nitrate Vulnerable Zone (NVZ) by DoE and MAFF. This will mean that agricultural practices which cause high nitrate leaching will be controlled in the future.

Much of the Major Aquifer supports strategic public water supply abstractions and the water is of generally high quality.

5.2 WATER QUANTITY

5.2.1 Surface water quantity

General

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

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

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

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

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

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

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

The NRA has analyzed information on water use and has prepared a Regional Water Resource

Strategy. Forecasts of future demands will be reviewed to try and anticipate needs for water resources and to consider ways of meeting those future demands.

Catchment Targets

Targets have been set for two routes to achievement: by negotiation; and through abstraction licensing. Sometimes it is difficult to separate the two.

Targets which do not receive much support through legislation include:

* agreement of water distribution between the River Ryton and the Chesterfield Canal.

* reduction of actual abstraction from the Sherwood Sandstone aquifer to a level which provides an environmental fraction between abstraction and recharge rates, such that flows in overlying surface watercourse are preserved.

* acquisition of sufficient knowledge about the hydraulic relationship between rivers (especially the Poulter and the Ryton) and some public water supply boreholes.

* acceptance by mineral extractors that dewatering of workings should have minimal environmental effects.

* increasing flows in Rainworth Water or deleting the watercourse from the national list of lowflow rivers.

* optimising pumping from collieries to benefit flows.

State of the Catchment

The catchment is one of the 'Policy Areas' for which policies for the issue and operation of licences have been drafted for the protection of surface water resources.

There is limited resource availability in the catchment during the summer season to support surface abstractions. The current policy is to refuse new licence applications for summer abstractions for the following sub catchments:

* River Maun
* River Meden
* River Poulter
* River Idle to East Retford
* River Ryton
* River Torne upstream of Candy Farm Pumping Station

The reasons for this are that additional abstractions will prolong the periods of low flows unacceptably. The levels of licence restrictions are also such that on many rivers, new abstractions would frequently be prohibited at an early stage of the summer.

The current levels of restriction at the main catchment control points and the associated number of licences at each threshold are shown in Table 8.

TABLE 8 - LEVELS OF RESTRICTIONS ON ABSTRACTION LICENCES

RIVER	RESTRICTION	NO. OF LICENCES
Maun and Meden	Primary	16
	Secondary	7
	Tertiary	11
	Quaternary	1
Poulter	Primary	13
	Secondary	1
	Tertiary	3
Ryton	Primary	6
	Secondary	4
	Tertiary	2
Torne	Primary	7
	Secondary	5
	Tertiary	2
	Quaternary	2
Three Rivers	Primary	11

Applications for new licences for the River Idle downstream of East Retford are currently being considered. They would however be subject to restrictions when water levels fall below a prescribed level at West Stockwith Pumping Station.

The licensing policy for summer abstractions from the Torne catchment downstream of Candy Farm Pumping Station is currently under review. This includes a study to determine the resource availablility.

Applications to abstract water during the months from November to March for winter storage to support summer abstraction will be considered. They will normally be subject to a winter prescribed flow or level.

Studies are currently being carried out to determine the minimum flow requirements on

the River Trent to support existing uses and environmental requirements. There is also an overriding policy that all new licences involving a net loss of more than $20m^3$/day will be issued subject to a time limit of 10 years, pending the formulation and introduction of control rules for the River Trent.

A large number of surface water abstraction licences, on the Rivers Torne, Ryton, Poulter, Maun, Meden and Idle, have special clauses which tie in the authorised ability to abstract to prescribed flows as measured at major gauging stations. In a few other cases, and especially some licences at the headwaters of tributaries of the aforementioned watercourses, the clauses often refer not to major gauging stations, but to local measuring structures and gauge boards.
New gauging stations on the Rivers Maun and Meden, at Whitewater Bridge and Perlethorpe, respectively, have been commissioned and it may be more realistic to relate the existing licences, currently tied to the gauging stations at Haughton and Bothamsall to flows at these new stations. If this is the case, then it will be necessary to set new prescribed flows, which will have to take into account environmental quality and fisheries and conservation aspects, as well as surface water abstraction demands. If however, the new gauging stations are not appropriate to be used, then a revision of the existing prescribed flows at the retained old gauging stations will be necessary.

5.2.2 Groundwater Quantity

General

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

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

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

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

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

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

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

Catchment Targets

* Revision of the Sherwood Sandstone Groundwater Units to reflect the more accurate understanding available about groundwater flows

* protection of baseflow support from Magnesian Limestone in the west of the catchment to rivers which rise in that area.

State of the Catchment

The resource management of the Sherwood Sandstones aquifer, covering an area between Nottingham and Doncaster, is based upon groundwater units defined in 1979 using geological and hydrogeological information. A mathematical model designed specifically for this area by the University of Birmingham has presented a more accurate understanding of groundwater flows and the revision of the unit boundaries is now being considered. Before any revisions are adopted, the likely ramifications should be investigated, both in terms of resource management and defensibility of resulting decisions.

These main groundwater units defined within the Torne and Idle Catchments are shown on Map 8. These represent subdivisions of the Triassic Sherwood Sandstones, the Permian Magnesian Limestone and the Carboniferous Coal Measures. The seven aquifer units covering the Sherwood Sandstones and the Lower Magnesian Limestone, have been assessed to define the groundwater resource capacity and the potential available for further development. The policy formulated relating to any further development of the groundwater resource, within the seven units, takes into consideration a number of factors including the location and magnitude of existing licensed and actual abstractions and the need to give protection to the water-based environment which is dependent on groundwater, especially baseflow in watercourses and wetlands which exist due to the presence of a high water table.

The three remaining units cover the Upper Magnesian Limestone (Tickhill Unit) and the Coal Measures (Kiveton Park and Alfreton Units).

The Lower Magnesian Limestone is very thin and is considered to be a minor aquifer in terms of its groundwater resources. Similarly the few sandstone bands which occur within the Coal Measures strata are minor aquifers in view of their limited recharge capacity.

The current state of the seven aquifer units covering the Sherwood Sandstone and Lower Magnesian Limestone is now summarised:

a) Sherwood Sandstones

Doncaster Unit
Historically this unit has been both over-licensed and over-abstracted. Licensed abstraction

currently exceed the assessed long term rate of recharge by almost 12 Ml/d (14%) with actual levels of abstraction slightly lower at 2% above replenishment.

As a result of the very high rate of abstraction, over at least the last 20 years, groundwater levels have fallen over most of the unit with resultant adverse effects on watercourses, dependent during dry weather on baseflow discharge from the sandstones, and some wetland areas which have dried out due to the lower levels. A reduction in the Yorkshire Water Services licences, implemented in 1994, should help to arrest the decline in groundwater levels but this will not lead to a widespread recovery in levels resulting, with time, in a recovery in river flows and regeneration of affected wetlands. A further reduction in abstraction, to a level well below the rate of recharge, may be necessary. No further development of resources can therefore be considered and every opportunity should be taken to reduce the current high rate of abstraction.

Ranskill Unit

The unit is over-licensed with authorised levels of abstraction exceeding the long term rate of recharge by almost 10 Ml/d (16.5%); actual abstractions amount to some 80% of recharge. There is however a need to protect the remaining baseflow in the Idle catchment and the policy is to refuse applications for new licences, or an upward variation in existing licences. Any proposed variations to existing licences, such as the inclusion of additional boreholes often needed to improve operational flexibility, will only be permitted where there is no increase (and preferably a decrease) in actual abstraction levels.

Clumber Unit

This unit is similar to the Doncaster unit in that it is grossly over-licensed and over-abstracted. Licences, in total, are almost 30 Ml/d (43%) higher than the long term rate of recharge and actual abstractions are almost 10% above recharge. Groundwater levels are falling over most of the unit and there is virtually no baseflow in the watercourses draining the aquifer with the River Poulter being a good example. No further increase in the current level of licences can be considered and variations to existing licences applied for will be looked at critically with the aim of reducing abstractions.

Clipstone Unit

Actual abstractions represent 80% of the total licensed volume but the latter figure exceeds the assessed recharge by over 5 Ml/d (6%). Groundwater levels have fallen over most of the unit and baseflow discharge to watercourses, such as the Rainworth Water, has virtually disappeared. No new groundwater developments can therefore be considered and any applications to vary existing licences, such as the need to drill additional boreholes, will be critically looked at in order to ensure that such a variation will not lead to an increase in actual abstraction.

The development of a groundwater model in 1994, of the South Yorkshire/Nottinghamshire Sherwood Sandstones, is resulting in a review being carried out of the approach to licensing of groundwater resources from the aquifer. It is considered that the aquifer will be reviewed as a more dynamic system with a single resource and abstraction applications will be assessed in relation to long term sustainability of aquifer levels and the impacts on river flows and

environmentally sensitive areas.

It must be recognised however that virtually all of the aquifer is either over-developed or fully developed and any future development will probably be highly selective and confined to very small areas.

b) Lower Magnesian Limestone

The three groundwater management units (Maltby, Bolsover and Mansfield), which are sub divisions of this aquifer in the Idle/Torne catchments, are all relatively underdeveloped. Licensed volumes amount to no more than 15% of the assessed recharge and actual abstractions are slightly lower. The widespread lack of development is very largely a function of low borehole yields and variable water quality. It is recognised that baseflow discharge from these units greatly assists in ameliorating problems associated with low flows and quality in watercourses crossing the Sherwood Sandstone further to the east.

Applications for new groundwater licences will therefore be favourably considered only if such development does not cause any local derogation issues and/or baseflow is not adversely affected.

c) Other geological strata

The groundwater resource of the Tickhill unit (Upper Magnesian Limestone) and the Kiveton Park and Alfreton units (Coal Measures) have not been assessed and are likely not to be assessed in the future. For all three units the current rates of licensed groundwater abstractions are extremely low, reflecting the minor aquifer status of the strata.

Applications for new licences in these three units are currently considered on a case by case basis and in general new licences will be considered provided that there are no derogation issues.

5.3 PHYSICAL FEATURES

General

This section considers targets for physical features on rivers and river corridors in the catchment and includes fishery, conservation and recreational matters and flood defence works.

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

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

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

Water Level Management Plans (WLMPs) are to be prepared for all water dependant SSSIs over the next few years. The preparation of these plans to protect water dependant habitats, will be undertaken by the Responsible Authority. The NRA is this body in some cases and where a WLMP is required in the short term, it will appear in the CMP.

Water Level Management Plans are being prepared for:-

* River Idle from Retford downstream, incorporating Idle Washlands SSSI

* Hatfield Chase pumped drainage area, involving all main rivers in the area, surrounding Hatfield Moors SSSI

There are several other water related SSSIs in the catchment and it is probable that these will be undertaken by the relevant IDB. The affected SSSIs are Misson Line Bank, Mother Drain at Misterton, Potteric Carr, Thorne Crowle and Goole Moors, Eastoft Meadow, Epworth Turbary, Haxey Grange Fen and Haxey Turbary.

5.3.1 Flood Defence

General

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

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

Catchment Targets

Flood Defence targets nearly all relate to physical features and the requirement for the river channel to contain certain specified flows at different points in its length. The current state of the catchment has been assessed by looking at flood histories and areas known to flood (Map 24 and Table 9). Standards are set according to land use.

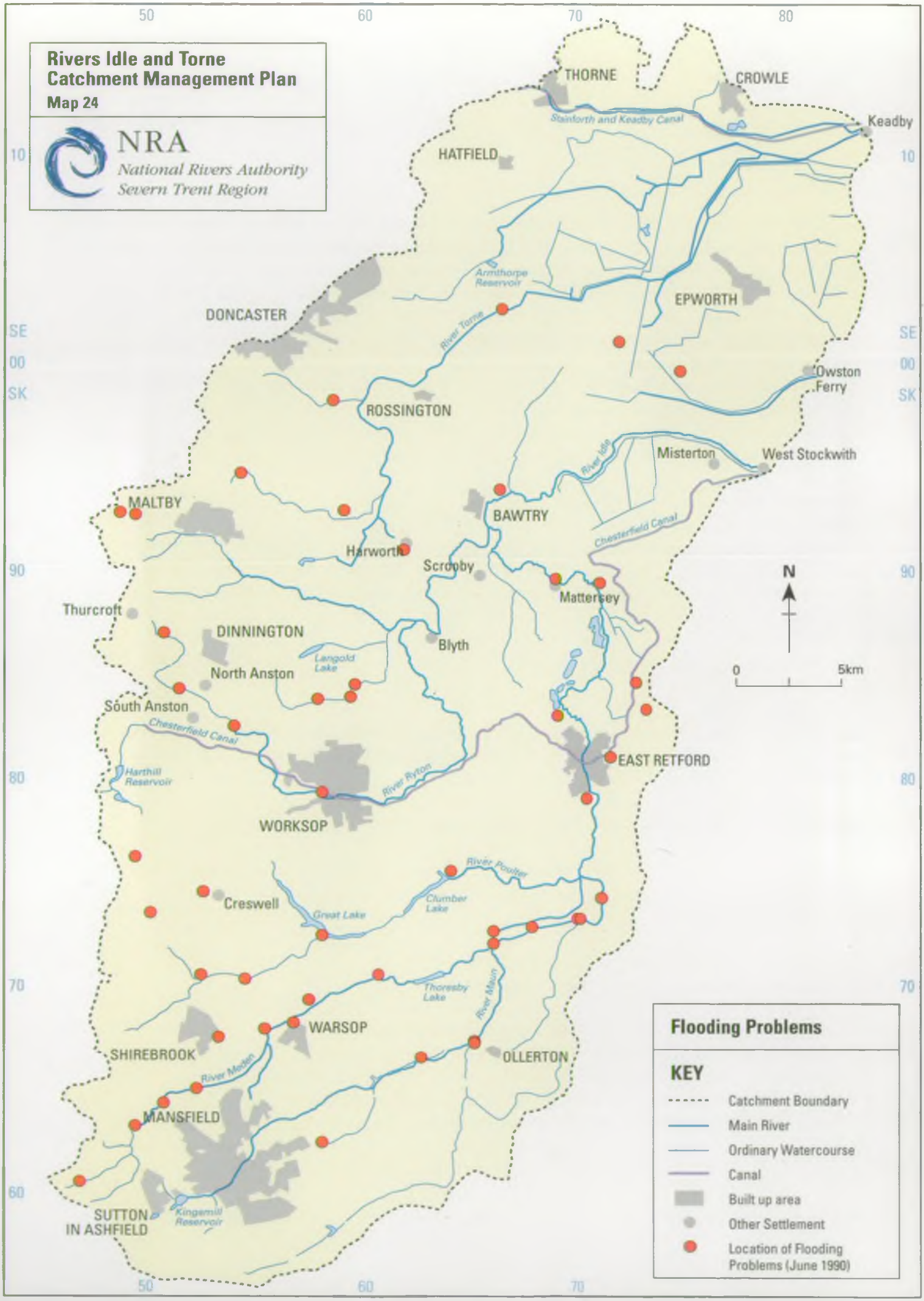
Map 24 shows the land use bands for main river in this catchment, and full definitions are given in Table 10.

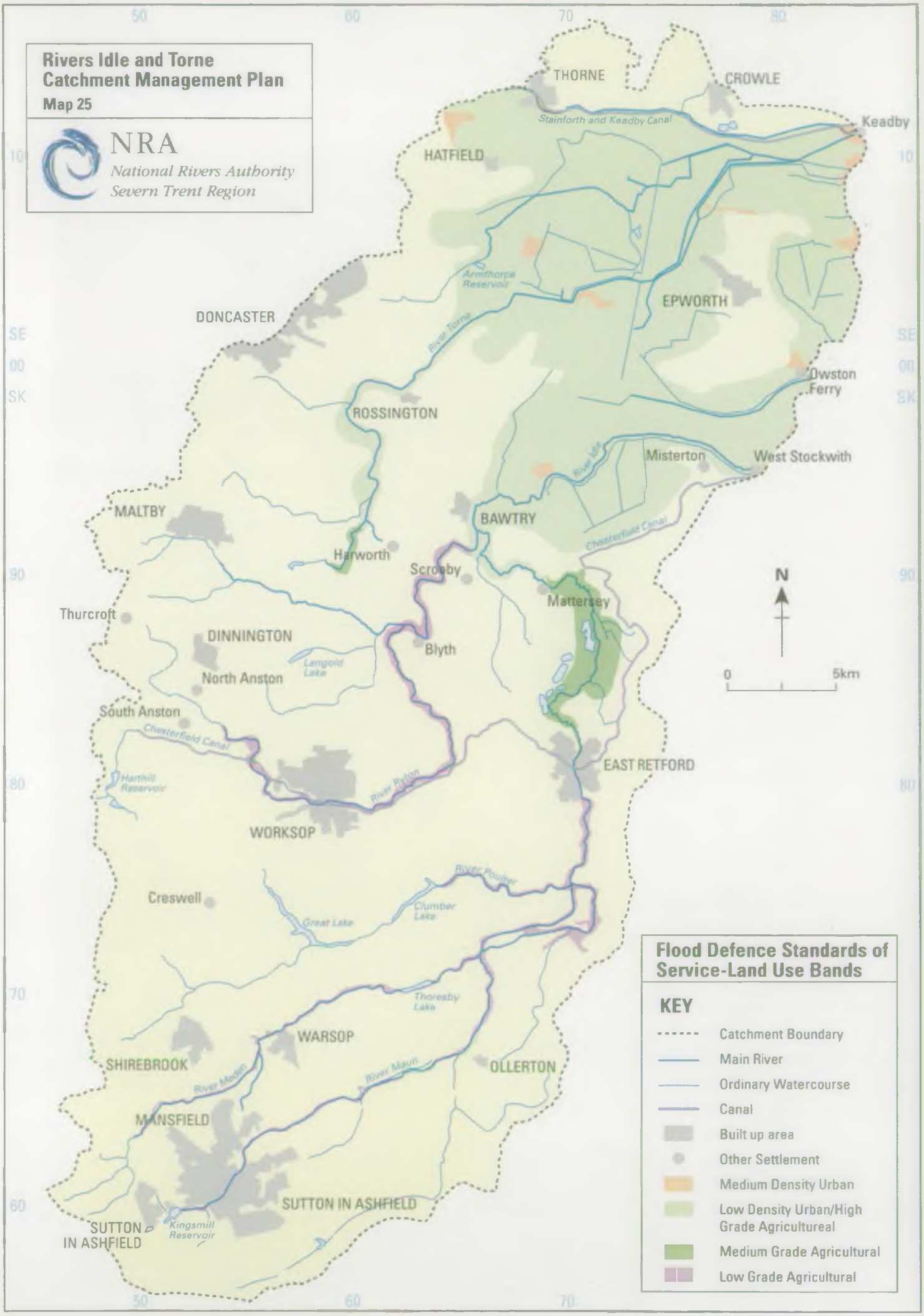
Improvement and maintenance works are targeted towards those watercourses which do not meet their SOS, particularly where the higher land use bands (A to C) are involved.

Preservation of Flood Plain and Flood Risk Management

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

* No loss of flood plain flow or storage capacity.
* No increase in flood risk as a result of development.
* No new development in an area where the existing level of service is considered below the standard required for the type of development proposed.
* Provision of suitable access for maintenance of the river channel.
* The carrying out of remedial works to compensate for mining subsidence.
* The standard of protection is commensurate with adjacent land use.
* Provision of flood warning in areas at risk from flooding.
* Management of water levels within pumped catchments to balance needs of all interests.

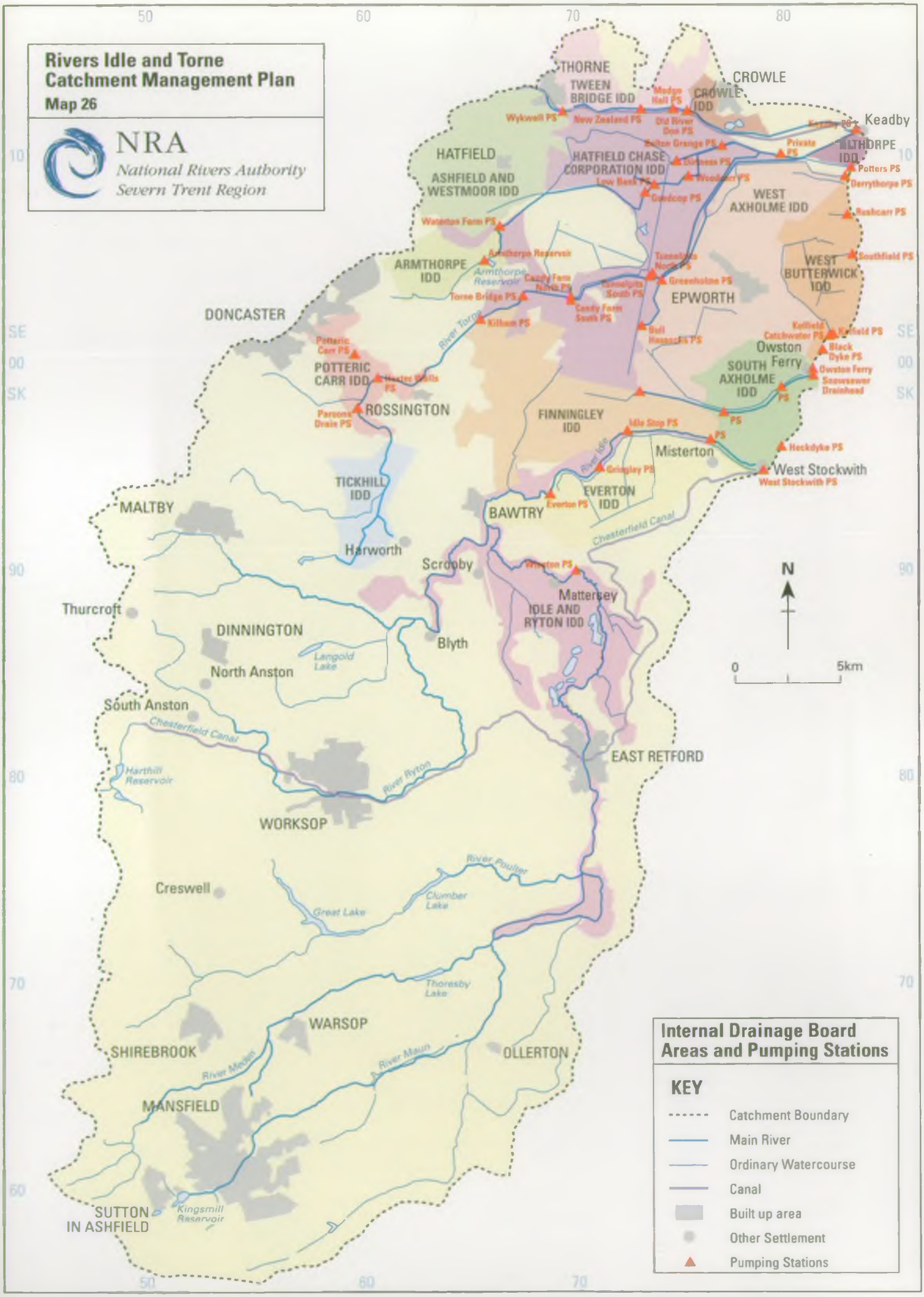

Rivers Idle and Torne
Catchment Management Plan
Map 24
NRA
National Rivers Authority
Severn Trent Region
50
60
70
80
10
SE
00
SK
90
80
70
60
THORNE
CROWLE
Keadby
Stainforth and Keadby Canal
HATFIELD
Armthorpe Reservoir
EPWORTH
DONCASTER
River Torne
Owston Ferry
ROSSINGTON
River Idle
Misterton
West Stockwith
MALTBY
BAWTRY
Chesterfield Canal
Harworth
Scrooby
Mattersey
Thurcroft
DINNINGTON
Blyth
Langold Lake
North Anston
South Anston
Chesterfield Canal
Harthill Reservoir
River Ryton
EAST RETFORD
WORKSOP
River Poulter
Creswell
Great Lake
Clumber Lake
Thoresby Lake
River Maun
WARSOP
SHIREBROOK
River Meden
OLLERTON
MANSFIELD
SUTTON IN ASHFIELD
Kingsmill Reservoir
N
0
5km
Flooding Problems
KEY
Catchment Boundary
Main River
Ordinary Watercourse
Canal
Built up area
Other Settlement
Location of Flooding Problems (June 1990)


Rivers Idle and Torne
Catchment Management Plan
Map 25
NRA
National Rivers Authority
Severn Trent Region
THORNE
CROWLE
Keadby
Stainforth and Keadby Canal
HATFIELD
Armthorpe Reservoir
EPWORTH
DONCASTER
River Torne
Owston Ferry
ROSSINGTON
River Idle
Misterton
West Stockwith
MALTBY
BAWTRY
Chesterfield Canal
Harworth
Scrooby
Mattersey
Thurcroft
DINNINGTON
Blyth
Langold Lake
North Anston
South Anston
Chesterfield Canal
Harthill Reservoir
River Ryton
EAST RETFORD
WORKSOP
River Poulter
Creswell
Great Lake
Clumber Lake
Thoresby Lake
WARSOP
SHIREBROOK
River Meden
River Maun
OLLERTON
MANSFIELD
SUTTON IN ASHFIELD
Kingsmill Reservoir
SUTTON IN ASHFIELD
N
0
5km
Flood Defence Standards of Service-Land Use Bands
KEY
Catchment Boundary
Main River
Ordinary Watercourse
Canal
Built up area
Other Settlement
Medium Density Urban
Low Density Urban/High Grade Agricultureal
Medium Grade Agricultural
Low Grade Agricultural

Rivers Idle and Torne Catchment Management Plan

Map 26

NRA
National Rivers Authority
Severn Trent Region



Internal Drainage Board Areas and Pumping Stations

KEY

- Catchment Boundary
- Main River
- Ordinary Watercourse
- Canal
- Built up area
- Other Settlement
- Pumping Stations

TABLE 9 - SCHEDULE OF FLOODING PROBLEMS - JUNE 1990 SURVEY

District/Borough Council	Total	Main River	Ordinary Watercourse
Ashfield DC	2	-	2
Bassetlaw DC	20 (2 resolved)	7 (1 resolved)	13 (1 resolved)
Bolsover DC	5	-	5
Boothferry BC	2	-	2
Doncaster MBC	5 (1 resolved)	1 (resolved)	4
Gedling BC	-	-	-
Mansfield DC	4 (1 resolved)	3 (1 resolved)	1
Newark & Sherwood DC	7	4	3
Rotherham MBC	5	-	5
TOTALS	50 (4 resolved)	15 (3 resolved)	35 (1 resolved)

State of the Catchment

The standard of service provided to the main rivers within the catchment has been assessed and shown to be in line with the target Standards of Service determined by the NRA as acceptable for the adjacent land use. Regular and periodic maintenance is undertaken on the main rivers and associated structures and where it is worthwhile, to ensure that the appropriate Standard of Service is retained.

Asset Surveys

A comprehensive survey of the condition of all of the raised flood defences and other flood defence structures on main river within the Idle catchment is currently being carried out as part of a detailed Regional Asset Condition Survey. The flood defences and structures on main river in the Torne catchment will be surveyed in the future. Any remedial work identified by the asset surveys will be appraised for inclusion in the Capital or Revenue programmes.

At the present time an ongoing programme of restoration and refurbishment of the flood defences and pumping stations in the Torne catchment is being undertaken.

Flooding problems

While most main river urban flooding has been reduced by flood alleviation schemes, the

flooding from ordinary watercourses still exists (see Flooding Report dated June 1990 of the survey carried out under Section 136 of the Water Resources Act 1989). The locations and details of the flooding problems identified in this report are shown on Map 24 and Table 9.
Whilst some of the problems have been resolved since 1990, as shown on the table, it may be difficult to resolve most of the outstanding problems, due to low benefit/cost ratios for the works involved.

A detailed description of flooding problems was first undertaken in 1980 to satisfy Section 24(5) of the Water Act 1973. This was most recently updated in 1990 (now under Section105 of the Water Resources Act 1991). Table 9 indicates, by local authority, the number of riverine flooding problems during the 1980 - 1990 period, split between main river, where the NRA is empowered to undertake remedial works and ordinary watercourses where the local authority has similar powers. In the low lying areas where IDBs have been set up, the IDBs have the same powers as the NRA, but these apply only to those watercourses within the drainage district, which are not designated as main river. Drainage is generally maintained to a high standard within these areas. Internal Drainage Board Areas and the main land drainage Pumping Stations are shown on Map 25.

Flood Warning

There are no flood warning schemes currently operating for the CMP area. There are at present two gauging stations located on each of the Rivers Idle, Torne, Maun, Ryton, Poulter and Meden and one on Oldcotes Dyke. The location of these gauging stations is shown on Map 6.

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

TABLE 10 - FLOOD DEFENCE STANDARDS OF SERVICE LAND USE BANDS AND TARGETS

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

A A reach containing the urban elements of residential and non-residential property distributed over a significant proportion of its length, or densely populated area over some of its length. Any agricultural influence is likely to be over-ridden by urban interests. Recreational uses such as parks and sports fields may be prominent in view of the flood plain's proximity to areas of population density.

B Reaches containing residential and/or non-residential property either distributed over the full length of the reach or concentrated in parts but characterised by lower densities than Band A.

C Limited numbers of isolated rural communities or urban fringe at risk from flooding, including both residential and commercial interests. Intensive agriculture use could also be included.

D Isolated, but limited number of residential and commercial properties at risk from flooding. 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.

E There are likely to be very few properties and major roads at risk from flooding in these reaches. Agricultural use will be the main customer interest with either extensive grassland or, where the flood plain extent is small, arable cropping being the most common land uses. Amenity interests are likely to be limited to public footpaths along or across the river.

5.3.2 Fisheries

General

The general aim for all fisheries is a sustainable level of exploitation by the rod fishery whilst conserving the natural history of the stock. Trends in fish stock abundance can be identified and comparisons made with 'expected' abundances based upon habitat characteristics.

General targets are to:

* Control illegal fishing by use of a bailiff force.

* Maintain an abundance of fish (where they presently exist) which is related where possible to the carrying capacity of the catchment based upon habitat characteristics.

* Maintain existing high quality fishery habitats in the catchment and where possible restore damaged fishery habitats.

* Provide access, where appropriate, for salmon, trout and coarse fish to all suitable spawning and nursery areas.

* Maintain a monitoring programme which quantifies accurately stock abundance.

Catchment Targets

* Provide an improved fishery habitat on the River Idle. The creation of suitable fish holding habitats for larger fish would provide a nucleus for future breeding stocks. Refuge areas for young fish are also needed to achieve a balanced age structure within the population.

* Maintain an abundance of fish which is related where possible to the carrying capacity of the catchment based upon habitat and water quality characteristics.

* Maintain existing fishery habitats in the catchment and where possible restore damaged fishery habitats.

* Maintain a monitoring programme which quantifies accurately stock abundance.

* Maintenance of the natural brown trout fisheries in the upper reaches of the rivers Poulter, Meden and Ryton. In accordance with the findings of the National working party on genetic integrity.

* The creation of suitable areas or swims for fishing should be attempted in conjunction with the Conservation and Recreation initiatives.

* To assist and contribute where possible to the Research and Development work on cormorant predation (reference Pilcher 6/96).

State of the Catchment

River Idle

The River Idle suffers from habitat degradation throughout its whole length. Minewater discharges also impacts on the fishery. Both factors contribute to the lack of adequate natural recruitment. Fish populations are at best moderate, both in terms of numbers and species diversity.

River Torne

The River Torne below Rossington supports a healthy mixed fishery. Little is known about the river fishery above this point. Despite channel degradation, the presence of good macrophyte growth provides a good fish holding habitat. In addition it is exploited as a spawning media and also provides a refuge area for fry of all species. Natural recruitment has been successful in recent years. A good number of eels are migrating up river.

River Meden

The River Meden provides a high quality, riverine fishery, along most of its length. The upstream reaches above Thoresby Lake support a good natural brown trout population.

Downstream a mixed coarse fishery is present.

River Maun

The River Maun suffers from water quality and habitat degradation problems. An impoverished fish population exists in the upper reaches of the river. Downstream the fishery improves and provides a moderate mixed coarse fishery.

River Poulter

The River Poulter provides some of the finest riverine fishery within the CMP area, with good healthy fish stocks present throughout its length. The upper reaches are dominated by an excellent natural brown trout population. Downstream, a good mixed coarse fishery exists.

Both numbers of fish and species composition is habitat dependant. This is most notable at Elkesley, where poor habitat and insufficient water depth has led to a relatively poor fishery.

River Ryton

The River Ryton fishery is variable, both in species composition and population size. The upper reaches contain a good natural brown trout population. Downstream at Scofton an excellent mixed coarse fishery exists. Over- abstraction and habitat degradation have a major effect on the fishery between Hodsock and the confluence with the River Idle. Population size is relatively low, compared to the coarse fishery upstream.

The general aim for all fisheries is a sustainable level of exploitation by the rod fishery whilst conserving the natural history of the stock. Trends in fish stock abundance can be identified and comparisons made with the 'expected' abundances based upon habitat characteristics.

Information on the number and density of species found in a fishery survey in 1994 are shown in Table 11.

TABLE 11 - FISHERY SURVEY INFORMATION 1994

RIVER	SITE	No OF SPECIES	BIOMASS g/m^2
Torne	Torne Bridge	4	7.4
	Wroot	5	1.9
	Stockholes Turbary	6	2.2
	Epworth Bridge	5	10.5
	Westgate Bridge	8	4.2
	Candy Farm P.S.	3	11.6
	Rossington Bridge	4	19.3
Idle	Eaton	3	<0.1
	Tiln	2	9.0
	Mattersey Priory	2	27.3
	Bawtry	6	4.9
	Misson	2	<0.1
Ryton	Shireoaks	2	3.9
	Scofton	6	36.9
	Scrooby	6	15.0
	Hodsock	5	2.9
Poulter	Langwith Junction	2	15.6
	Nether Langwith	2	6.2
	Cuckney	2	6.1
	Norton	4	133.0
	Carburton	5	25.7
	Crookford	5	18.2
	Elkesley	8	11.5
Meden	Bothamsall	5	15.1
	Warsop	6	23.5
	Littlewood	3	5.7
	Bevercotes	7	11.8
	Thoresby	7	66.1
	Meden Vale	6	21.6
	Budby	8	29.5
Maun	Edwinstowe NCB	1	<0.1

TABLE 11 - CONTINUED

RIVER	SITE	No OF SPECIES	DENSITYg /m²
Maun	Cavendish Bridge	3	1.6
	Edwinstowe STP	8	31.5
	Lound Hall	8	19.1
	Whitewater Bridge	8	20.7
	Haughton	7	35.6

5.3.3 Conservation (including wildlife, landscape and archaeological interest)

General

General targets include:

* Ensure that future development does not reduce the conservation value of the river corridor and where possible improves it.

* Undertake environmental assessment of all NRA works and identify opportunities for increasing the conservation value of rivers and wetlands and for improving the quality of the water-related landscape in association with these works.

* Carry out NRA consenting practices and respond to development proposals in a manner that ensures that natural features such as emergent vegetation, meanders, pools and the landscape are preserved and enhanced where appropriate, and features of archaeological, architectural and historic interest are preserved.

* Seek opportunities for the NRA to carry out capital projects to protect or improve the physical character of the water environment.

* Liaise with other bodies to promote and support initiatives for the maintenance of wetland, wet meadows, in-stream and bankside habitats.

* Seek opportunities, where appropriate, to control livestock access to river banks, thus minimising bank damage and allowing regeneration of bankside vegetation in order to maintain habitat, shade cover and natural vegetation for the benefit of wildlife in the river corridor.

Catchment targets

* Improve degraded state of riverine habitats

* Investigate water pollution problems affecting SSSIs

* Investigate effect of falling groundwater levels on wetland and archaeological sites

* Preserve wildlife interest by means of site management plans for Armthorpe Balancing Reservoir and other NRA sites

* Enable inundation of Idle Washlands SSSI by undertaking a Water Level Management Plan (WLMP)

* Plan restoration of peat bogs by investigating the groundwater levels under Hatfield and Thorne Moors

* Identify sites of invasive plants by means of surveys and draw up strategy for eradication

* Determine otter movements through the catchment by means of surveys

* Seek to improve the ecology of low flow watercourses

* Seek to retain subsidence flashes caused by deep coal mining

State of the Catchment

Rainworth Water flows into Rufford Lake SINC and the watercourse has been identified as a low flow watercourse. The quality of the ecology is affected by a lack of dilution of sewage effluent.

Deep coal mining in the vicinity of the Rivers Idle, Meden, Maun and Poulter have caused subsidence, often resulting in 'flashes'. One, at Gamston is now an important area for breeding wildfowl.

Japanese Knotweed and Himalayan Balsam, invasive alien plants are found in the River Idle catchment. Azolla, an exotic water fern, has grown very extensively on the Warping Drain and Chesterfield Canal.

Major flood alleviation schemes on the Rivers Idle and Torne have resulted in degraded habitats on the banks and in stream and investigations are required to establish a programme of enhancements.

Potteric Carr, Maltby Low Common, Roche Abbey Woodlands, Sandall Beat and Anston Stone Wood SSSIs are all affected by water quality problems which require investigation.

Creswell Crags SSSI/SAM has been proposed as a World Heritage Site, but the presence of Creswell STP adjacent is affecting the decision process. It has been suggested that the STP should be moved elsewhere.

Armthorpe Balancing Reservoir, situated alongside Diggin Dyke (also known as Fores Drain) is important for breeding birds, particularly little ringed plover. It was designed to relieve flood flows arising from urban development in Doncaster. The reservoir rarely fills by flood water, and water has, from time to time, been diverted by manual operation of a sluice gate, into the balancing area, to prevent colonisation of plants and scrub.

The reservoir is currently dry as there are concerns over the seepage of poor quality water from Diggin Dyke into the underlying aquifer.

The site is important for many species of birds, particularly the little ringed plover. A shingle bank has been created to allow optimum nesting on the site, especially for when the water levels are high.

The River Idle washlands have been inundated with floodwater several times in the past two winters, but the sites should be as wet as possible during both winter and summer. The WLMP should address this.

Hatfield Moors, a raised peat mire, is currently being mined for peat and has been extensively drained. The long term future of the moors is dependant on the regional groundwater level and investigations are required to determine the underlying geology of the moors to identify areas that may be restored to wetland sites and thence to regeneration of the peat.

There has been a considerable amount of habitat improvement work carried out in the Hatfield Chase area. This work has included tree planting along farmers drains and IDB watercourses, provision of ponds and new footbridges. There has also been an input into the future of the peatbogs on Hatfield and Thorne Moors. The proposed WLMP for the area will pull together the work of the NRA and IDBs. It may be that an interpretive centre could provide information on the history of the site and the involvement of the many agencies concerned in the recent past, together with a vision for the future.

It is suspected that otters run through the catchment, possibly on route from Lincolnshire to Yorkshire. However very little evidence is available to show which rivers they may use. Further information is required to establish rivers that would benefit from improvement to vegetation for cover.

5.3.4 Recreation

General

General Targets are to:-

* Collect data on the recreational resource to help resolve existing conflicts and to plan for the future.

* Promote suitable access and associated facilities appropriate for identified recreational uses.

Catchment Targets

* Improve, where possible, the network of public paths along rivers.

* Support any footpaths initiatives.

* Work with other agencies to identify areas requiring improved recreational access and facilities.

* Identify rivers that would benefit by provision of disabled anglers platforms.

* Maximise recreational potential of NRA land through Site Management Plans.

State of the Catchment

There is a need to develop footpath links throughout the catchment. Although there are many circular routes in the Sherwood Forest area, further north these routes are intermittent. A link along the Idle to the Trent Valley Way would provide an excellent river route.

The Chesterfield Canal is being restored upstream of Worksop and may be restored all the way to Chesterfield. Water quality and quantity issues may affect the restoration proposals.

The River Idle navigation runs from West Stockwith to Bawtry. The NRA can permit boats to proceed through the pumping station gate when water levels permit, but there is no navigation authority for the river. There is no mooring provision on the river.

The Stainforth and Keadby Canal lies in very open country, prone to wind. A programme of planting has begun between the South Soak Drain and the canal.

The River Torne downstream of Hurst Priory has very steep banks that are difficult for anglers to access and could benefit by the provision of bays designed for angling.

PART III

APPENDICES

APPENDIX 1 - REFERENCES/BIBLIOGRAPHY

Ashfield DC	1994	Ashfield Local Plan Draft
Bassetlaw DC	1995	Bassetlaw Local Plan Deposit Draft
Bolsover DC	1995	Bolsover Local Plan Consultation Draft
Boothferry BC	1994	Boothferry Borough Local Plan Deposit Draft
Derbys CC	1995	Minerals Local Plan Consultation Draft
Derbys CC	1995	Structure Plan Review Consultation Draft
DoE	1992	Development and Flood Risk Circular 30/92
DoE	1992	Forestry Guidance Circular 29/92
DoE	1994	Regional Planning Guidance for the East Midlands RPG8
DoE/WO	1992	River Quality: The Government's Proposals
Doncaster MBC	1994	Doncaster Unitary Development Plan Deposit Draft
EU	1976	Directive on Dangerous Substances
EU	1978	Directive For Freshwater Fisheries
EU	1991	Directive on Nitrates
EU	1994	Funding Programme
EU	1991	Urban Waste Water Treatment Directive 91/271/EEC
Gedling BC	1990	Gedling Borough Local Plan
HMSO	1991	Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) Regulations
HMSO	1991	Land Drainage Act
HMSO	1975	Salmon and Freshwater Fisheries Act
HMSO	1995	Environment Act
HMSO	1963	Water Resources Act
HMSO	1989	Water Act
HMSO	1991	Water Resources Act
HMSO	1981	Wildlife and Countryside Act
Humberside CC	1994	Humberside Structure Plan Replacement Consultation Draft
MAFF	1991	Code of Good Agricultural Practice for the Protection of Water
Mansfield DC	1993	Mansfield Local Plan Consultation Draft
Newark & Sherwood DC	1995	Newark & Sherwood Local Plan Deposit Draft
Notts CC	1993	Minerals Local Plan Deposit Draft
Notts CC	1994	Nottinghamshire Structure Plan Review Deposit Draft
NRA	1993	Guidance Notes for Local Planning Authorities on the Methods of Protecting the Water Environment through Development Plans
NRA	1990	Flooding Survey
NRA	1995	Hatfield Chase Water Level Management Plan Interim Statement Consultation Report
NRA	1994	NRA Conservation Strategy
NRA	1994	NRA Fisheries Strategy
NRA	1994	NRA Flood Defence Strategy
NRA	1994	NRA Recreation Strategy
NRA	1994	NRA Water Resources Strategy
NRA	1993	Planning Liaison with Local Planning Authorities - NRA Severn-Trent Region
NRA	1992	Policy and Practice for the Protection of Groundwater (and Regional Appendix Severn Trent Region)
NRA	1991	Proposals for Statutory Water Quality Objectives
NRA	1993	Regional Fisheries Strategy - Severn-Trent Region
NRA	1993	Regional Water Resources Strategy - Severn-Trent Region
NRA	1994	The Quality of Rivers and Canals in England and Wales (1990 to 1992) Water Quality Series No 19
NRA	1994	Water Quality Objectives : Procedures used by the National Rivers Authority for the purpose of the Surface Waters (River Ecosystem) (Classification) Regulations 1994
NRA	1995	Water Resources Local Policy Summaries - Tidal Trent
Severn-Trent Water Authority	1979	River Trent Basin Survey

APPENDIX 2 - ORGANISATIONS COMMENTING ON DRAFT ISSUES

Anglian Water (Environment Protection)
Bircotes Angling Society
Bolsover District Council (Technical Services)
British Canoe Union
British Trust for Ornithology
British Waterways (North East)
The Chesterfield Canal Society
Clean Rivers Trust
The Coal Authority (Property and Environment)
Country Landowners Association (Derbys, Lincs, Notts)
Country Landowners Association (Yorks)
Countryside Commission(Mids)
Countryside Commission(Yorks and Humberside)
Derbyshire County Council (Environment Section)
English Nature (East Midlands)
English Nature (Humber-Pennines)
Gate Inn Angling Club
Government Office for Yorkshire and Humberside
Grantham, Brundel & Farran
Harthill with Woodall Parish Council
Hatfield Coal Company Ltd.
Hatfield Town Council
Haxey Parish Council
The Inland Waterways Association (East Mids. Region)
International Waterfowl and Wetlands Research Bureau
Knitting Industries Federation Ltd.
The Lincolnshire Trust for Nature Conservation
Lound Parish Council
Ministry of Agriculture, Fisheries and Food
Markham Main Colliery Ltd.
Newark and Sherwood District Council (Planning)
Nottingham Friends of the Earth
Nottinghamshire Constabulary (Emergency Planning)
Nottinghamshire County Council (Waste Regulation Authority)
Nottinghamshire County Council (Planning and Economic Development)
Nottinghamshire County Council (Development)
Nottinghamshire Wildlife Trust
National Farmers Union (E.Mids)
Nether Langwith Parish Council
The Otter Trust
Railtrack
Rivers Idle And Ryton Internal Drainage Board
R. J. B. Mining (U.K.) Ltd.
Rotherham Metropolitan Borough Council (Planning)
The Royal Society for the Protection of Birds
The Salmon and Trout Association
Scrooby Parish Council
Sports Council (East Midlands)
Sustrans
Tarmac Quarry Products Ltd.
Thoresby Estates Management Ltd.
Tickhill Town Council
Wadworth Parish Council
Whitwell Parish Council
The Wildlife Trust

APPENDIX 3 - NATIONAL AND EUROPEAN LEGISLATION

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

3.1 National Legislation

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

3.1.1 Water Resources Act 1991 (WR Act 1991)

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

1. The NRA is specifically responsible for water quality in all *controlled waters* which comprise surface freshwaters, underground waters and coastal waters to the three-mile limit in England and Wales. The main duties and powers are:

    - Once statutory Water Quality Objectives are established, the NRA is under a duty to use its powers to ensure that these objectives are achieved and the extent of pollution is monitored.
    - The discharge of an effluent without the consent of the NRA or HMIP is an offence. The NRA is required to enforce the provisions and has the power to prosecute.
    - The NRA may issue consents for discharges to controlled waters.
    - The NRA must maintain and make available to the public, a register recording applications for consents to discharge; records of consents given; samples of water or effluent; other related information (s.189).
    - If the Secretary for State issues regulations obliging precautionary measures to prevent pollution, their enforcement is an NRA duty.

2. The NRA has a duty to conserve, redistribute or otherwise augment water resources and to ensure the proper use of those resources having special regard to the requirements for public supply (s.19). It is specifically responsible for licensing abstractions made from water held in natural underground storage and from all surface waters above the tidal low water mark. Other duties and powers are:

    - The NRA must publish information about the demand for water and available resources.
    - The NRA may ask the Secretary of State to set minimum acceptable flows, levels or volumes for inland waters.

- The NRA may apply to the Secretary of State for drought orders, which enable taking measures to cope with water shortages.
- The NRA is responsible for enforcing the legislation that deals with abstraction licensing.

3. The NRA has a duty to exercise a general supervision over all matters relating to flood defence and has been given a duty to carry out surveys of the areas in relation to which it carries out flood defence functions (s.105).

- Prior consent must be obtained from the NRA before any structure in, over or under main river is erected (s.109 &110).
- The NRA may undertake maintenance works and improve defence systems on main river and on sea defences to reduce the incidence of flooding to property (s.165).
- The NRA has powers to provide and operate flood warning systems on all watercourses and tidal/sea defences in England and Wales (s.166).

4. The NRA has a general duty to maintain, improve and develop salmon, trout, freshwater fish and eel fisheries under its jurisdiction (s.14). It can regulate fishing by a system of licensing.

- The NRA may make bylaws to regulate fishing methods and times.

5. Section 16(1) imposes upon the NRA a number of duties which include:

- to exercise any power so as to further the conservation and enhancement of natural beauty, in respect of proposals relating to the NRA's functions. The expression 'to further' implies a positive obligation toward conservation;
- to take into account the effect any proposals relating to the NRA's functions would have on the beauty and amenity of, and access to, any rural or urban area so affected;
- to exercise the rights which the NRA has to use water, or land associated with that water, in such a way that such water or land is made available for recreational purposes.

6. Section 16 (2) imposes a general duty to promote:

- the conservation and enhancement of the natural beauty and amenity of inland and coastal waters and of land associated with such waters;
- the use of such waters and land for recreational purposes.

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

3.1.2 Land Drainage Act 1991

This act brings together legislation relating to Internal Drainage Boards and local

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

3.1.3 Salmon and Freshwater Fisheries Act 1975

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

3.1.4 Other Legislation

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

3.2 European Legislation

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

Dangerous Substances Directive (76/464/EEC)

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

Freshwater Fisheries Directive (78/659/EEC)

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

Surface Water Abstraction Directive (75/440/EEC)

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

drinking water.

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

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

Nitrate Directive (91/676/EEC)

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

APPENDIX 4 - GLOSSARY

Abstraction	Removal of water from surface water or groundwater, usually by pumping.
Abstraction Licence	Licence issued by the NRA under S.38 of the Water Resources Act 1991 to allow water to be abstracted.
ADAS	Agricultural Development and Advisory Service
ALF	Alleviation of Low Flows
Algae	Microscopic (sometimes larger) plants, which may be floating or attached. Algae occur in still and flowing water.
Ammonia	A chemical compound found in water often as a result of pollution by sewage effluents. It is widely used to determine water quality. Ammonia detrimentally affects fish.
AMP2	Asset Management Planning process - the water company investment programme 1995 - 2000
AMP3	Asset Management Planning process - the water company investment programme 2000 - 2005
AOD	Above Ordnance Datum. Equivalent to mean sea level.
Aquifer	A water bearing bed of rock, geological strata containing exploitable quantities of groundwater (see page 130)
AWS	Anglian Water Services
Base Flow	The flow in a river derived from groundwater sources.
BC	Borough Council.
BCU	British Canoe Union.
Blue green algae	Natural inhabitants of many inland waters. If the water is enriched with nitrogen and phosphorus, numbers may become excessive. Referred to as **BLOOMS**. They can adversely affect the appearance, quality and use of water bodies.
Blackburn Building	Blackburn was an architect who designed, among others

	Boughton Pumping Station.
BOD	Biochemical Oxygen Demand. A measure of the consumption of oxygen due to organic pollution. ATU(Allyl Thio Urea) is added to suppress the effect of ammonia.
BW	British Waterways.
CC	County Council.
Coarse Fish	Freshwater fish other than salmon and trout.
CSO	Combined Sewer Overflow.
Dangerous Substances	Substances defined by the European Commission as in need of special control because of their toxicity, bio-accumulation and persistence. The substances are classified as List I or ListII according to the Dangerous Substances Directive.
DC	District Council
Derogate	To depreciate or diminish - used in abstraction licensing where a proposed new licence would reduce resources to an existing authorised abstraction.
Diffuse Pollution	Pollution from widespread activities with no one discrete source.
Discharge consent	A legal authorization (under Schedule 10 of the Water Resources Act 1991) to discharge effluent, which, if complied with, acts as a defence against prosecution for pollution offences.
DO	Dissolved Oxygen - the amount of oxygen dissolved in water. Oxygen is vital for life so this measurement is an important, but highly variable, indicator of the health of a stretch of water. It is used to classify waters.
DoE	Department of the Environment.
DWF	Dry Weather Flow - for rivers, the DWF is taken to be what is known as the 95 - percentile flow (or Q95), which means that this flow is exceeded for 95 % of the time. For STPs, the DWF is calculated by adding estimates of the domestic sewage discharge (population multiplied by the per capita consumption), plus any

	industrial discharges and also any infiltration into the sewer.
EC/EU	European Community/ European Union.
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 group of plants or animals which live together within a certain type of surrounding or habitat (ie woodland or pond).
Effluent	Any water borne contaminating substances that enter the environment, normally waste waters from processes.
EN	English Nature.
ESA	Environmentally Sensitive Area.
Eutrophication	The biological effects of an increase in plant nutrients on aquatic ecosystems.
Evapotranspiration	Water lost by evaporation and water taken up and lost by plants.
FA	Forestry Authority.
Fauna	Animal life.
Ferruginous	Iron stained.
Flash	Water filled depression caused by mining subsidence.
Floodplain	All land adjacent to a watercourse over which water flows (or would flow but for flood defences), in times of flood.
Flora	Plant life.
FWAG	Farming and Wildlife Advisory Group.
Gauging Station	A site where the flow of a river is measured.
GQA	General Quality Assessment of water.

Groundwater	Water which flows or is stored below the surface of the land.
Groundwater Protection Policy	NRA policy to protect groundwater recharge areas by controlling activities having the potential to pollute underground water.
Habitat	The customary and characteristic dwelling place of a species or community.
HE	House Equivalents.
HMIP	Her Majesty's Inspectorate of Pollution.
Humberhead Levels	Area noted for finds from Palaeolithic Period through Bronze Age, Iron Age and Roman to Post Medieval Period. This peat area has preserved many remains.
Hydrology	The study of water on and below the earth's surface.
IDB	Internal Drainage Board.
IDO	Interim Development Order
LA	Local Authority.
Landfill	Site used for waste disposal into or onto land.
Leachate	Liquid emanating from solid matter.
Leaching	Removal of soluble substances by action of water percolating through soil, waste or rock.
LNR	Local Nature Reserve.
LPA	Local Planning Authority.
Macroinvertebrates	Animals visible to the naked eye without backbones.
Macrophytes	Plants visible to the naked eye.
MAFF	Ministry of Agriculture, Fisheries and Food.
Main River	Watercourses shown on the statutory Main River maps held by the NRA and MAFF. The NRA has permissive powers to carry out works of maintenance and improvement on these rivers.

Mg/l	Milligrams per litre.
Ml/d	Megalitres per day. There are 1000 cubic metres or one million litres in one megalitre.
µg/l	Micrograms per litre
NH_3	Ammoniacal Nitrogen.
NNR	National Nature Reserve.
NRA	National Rivers Authority.
NSA	Nitrate Sensitive Area.
NVS	Nitrate Vulnerable Zone.
OCCS	Open Cast Coal Site.
OFWAT	Office of Water Services.
Ordinary watercourse	A watercourse that does not form part of a main river.
OT	Otter Trust.
PFA	Pulverised Fuel Ash.
Piscivorous	Feeding on fish.
Potable Water	Water of quality suitable for drinking.
PPPG	Policy and Practice for the Protection of Groundwater.
Prescribed Flow	A flow set to protect lawful downstream users and the aquatic environment.
PWS	Public Water Supply.
Reach	A length of a river.
Recharge	Water which percolates downward from the surface into groundwater.
Residual Flow	The flow remaining in the watercourse after abstractions have taken place.

Riparian	Of or on land contiguous to the river.
River Corridor	A term which describes a stretch of river, its banks and a varying amount of adjacent land that is affected by the presence of the river.
River Ecosystem (RE)	A system for identifying water quality objectives.
RL	Riparian Landowners.
RQO	River Quality Objective - the level of water quality that a river should achieve in order to be suitable for it's agreed uses.
RSPB	Royal Society for the Protection of Birds.
SAC	Special Area for Conservation.
SA(E)	Sensitive Areas (Eutrophication).
SAM	Scheduled Ancient Monument - The key sites for archaeology, designated by the Secretary of State for National Heritage, through English Heritage. Statutory; designated under the Ancient Monuments and Archaeological Areas Act 1979.
SINC	Site of Importance for Nature Conservation.
SMR	Sites and Monuments Register.
SOS	Standards of Service.
Spray Irrigation	The watering of crops by spraying. Can have a high impact on water resources.
SSSI	Site of Special Scientific Interest - the best examples of the national heritage of wildlife habitats, geological features and landforms, designated by English Nature. Statutory; notified under the Wildlife and Countryside Act 1981.
SS	Suspended Solids.
STP	Sewage Treatment Plant.

STW Ltd	Severn Trent Water Limited.
Surface Water	Water which flows or is stored on the surface of the land.
Sustainable	Capable of being maintained at a steady level without exhausting natural resources or causing ecological damage.
Sustainable Development	Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.
Sustrans	The Railway Path and Cycle Route Construction Company - a national charity.
Telemetry	River levels, rainfall, temperature and wind run are recorded on data loggers connected to the telephone network. These telemetry outstations can be automatically downloaded by forecasting and data archive systems to provide real-time and historical information.
Trade Effluent	Effluent derived from a commercial process/ premises.
Transfer Station	Waste disposal facility where waste is collected prior to transport to final disposal point.
Underground Strata	Mainly a legal term used to signify geology under the surface soil layer. If groundwater exists, or if water is being discharged to the ground, the geology underneath the soil layer is known in the various Acts of Parliament as 'underground strata'.
UWWTD	Urban Waste Water Treatment Directive
Water Table	Top surface of the saturated layer within the aquifer.
Wetland	An area of low lying land where the water table is at or near the surface for most of the time, leading to characteristic habitats.
WLMP	Water Level Management Plan.
WO	Waste Operators.
WRA	Waste Regulation Authority.

The National Rivers Authority

Guardians of the Water Environment

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

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

The main functions of the NRA are:

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

NRA EMERGENCY HOTLINE

0800 80 70 60

24 hour emergency telephone line