EA-NORTH EAST
LEAPs

3949

local environment agency plan

SOUTH YORKSHIRE AND NORTH EAST DERBYSHIRE

CONSULTATION REPORT

AUGUST 1997

HO
ENVIRONMENT AGENCY
Information Services Unit
Please return or renew this item by the due date
Due Date

ENVIRONMENT AGENCY

YOUR VIEWS

Welcome to the Consultation Report for the South Yorkshire and North East Derbyshire area which is the Agency's view of the state of the environment and the issues that we believe need to be addressed during the next five years.

We should like to hear your views:

- Have we identified all the major issues?
- Have we identified realistic proposals for action?
- Do you have any comments to make regarding the plan in general?

During the consultation period for this report the Agency would be pleased to receive any comments in writing to:

The Environment Planner
South Yorkshire and North East Derbyshire LEAP
The Environment Agency
Olympia House
Gelderd Road
Leeds LS12 6DD

All comments must be received by 31st December 1997.

All comments received on the Consultation Report will be considered in preparing the next phase, the Action Plan. This Action Plan will focus on updating Section 4 of this Consultation Report by turning the proposals into actions with timescales and costs where appropriate.

All written responses will be considered to be in the public domain unless consultees explicitly request otherwise.

Note: Whilst every effort has been made to ensure the accuracy of information in this report it may contain some errors or omissions which we shall be pleased to note.

The Structure of this Consultation Report

This Consultation Report is divided into two parts, Part I and Part II. A brief description of each can be found below.

PART I

Consists of an introduction to the Agency, an overview of the South Yorkshire and North East Derbyshire area, key partnerships the Agency has with other bodies and proposals to address the important environmental issues in the area.

PART II

Detailed consideration is given to the state of the environment of the South Yorkshire and North East Derbyshire area. Supporting information can be found here to help you make an informed decision as to the validity of the issues and proposals in Part I.

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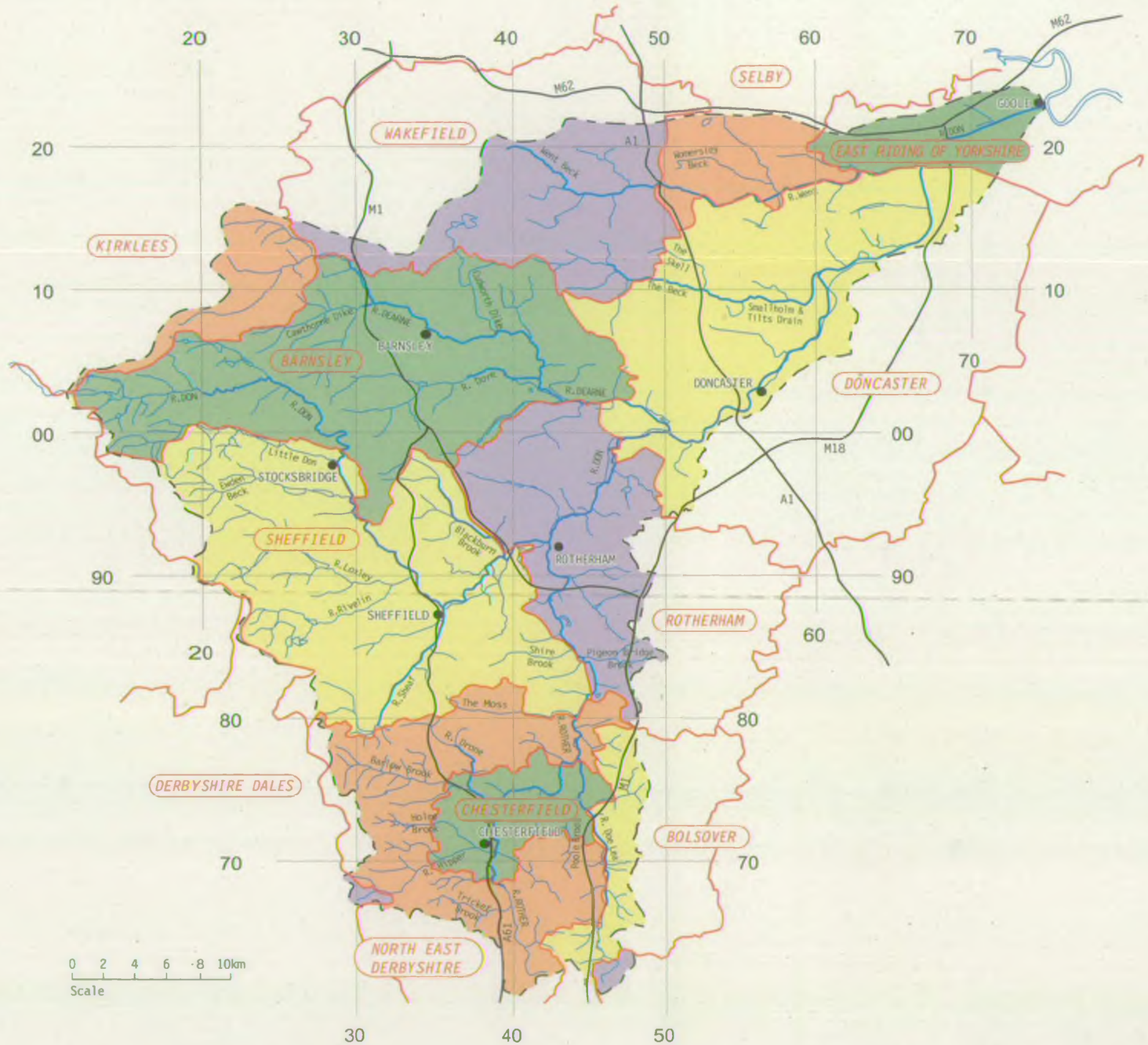

SOUTH YORKSHIRE AND NORTH EAST DERBYSHIRE AREA

ADMINISTRATIVE BOUNDARIES

KEY

- CATCHMENT BOUNDARY
- RIVER
- ADMINISTRATIVE BOUNDARY
- MAIN ROAD

Figure 1

EA - North East LEAPs

FOREWORD

The Environment Agency is one of the most powerful environmental regulators in the world. We have a duty to contribute towards the objective of Sustainable Development, which necessitates taking an integrated approach to all our activities concerned with water management and pollution prevention and control.

It is important that the community is fully involved in protecting and enhancing the environment. Local Environment Agency Plans (LEAPs) provide a vehicle for consultation and partnership for setting priorities, solving problems and realising opportunities in a co-ordinated way. The consultation report for the South Yorkshire and North East Derbyshire LEAP has been prepared with this in mind. It will lead to the development of a practical Action Plan, which will be implemented with progress being regularly reported for comment.

This, and other LEAPs for the constituent parts of the North East Region, will represent a shared vision for the future. It will provide a vital role in the protection and enhancement of our environment, whilst recognising the importance of balancing conflicting activities and the need to take into account both the costs and the benefits of the proposals.

Tony Edwards
Ridings Area Manager.

DRAFT VISION FOR THE SOUTH YORKSHIRE AND NORTH EAST DERBYSHIRE AREA

The South Yorkshire and North East Derbyshire LEAP covers the catchment areas of the rivers Don, Rother and Dearne. It is an area of some 1849 km^2 stretching from Chesterfield to Goole and to the moorlands of the Peak District National Park above Sheffield and Stocksbridge encompassing a range of contrasting rural and urban settings. The population numbers some 1.4 million people with major centres at Doncaster, Barnsley, Rotherham, Sheffield and Chesterfield.

The area has a legacy of pollution and contaminated land from its industrial and coal mining past. Dramatic improvements have been made in the past five years, particularly in water quality. The challenge during the five year life of this plan is to maintain this established momentum in support of the local environment and realise its full potential for the benefit of the whole community.

KEY OPPORTUNITIES

- Further improve the quality of our environment by reducing pollution from industry, contaminated land and sewage treatment systems.
- Encourage waste minimisation initiatives to achieve national waste reduction targets.
- Reduce the incidence of illegal waste tipping (flytipping) through education and enforcement of legislation.
- Physically improve river channels and create habitats for wildlife in collaboration with local communities and environmental groups.
- Manage the impact of water abstraction and compensatory flows to optimise the benefit for all existing and potential users.
- Recognise and develop the importance of the area for recreation particularly for local people.
- Maintain and improve protection of people and property from flooding.
- Maintain effective links with the land use planning system to achieve integration of the aims of this plan with strategic and local land use plans.

In order to achieve this vision and the full potential of the local area the Agency will work with Local Authorities, industry, agriculture, local action groups and the public in order to:-

achieve a balanced approach to all activities,
be capable of a flexible response to the community at large,
and achieve a sustainable use of the environment.

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PART I

The purpose of this section of the LEAP is to introduce the role of the Environment Agency, to examine the area covered by the Plan in terms of natural and physical features, and to highlight some of the partnerships in which the Agency is involved to protect our environment.

The principal section of Part I identifies a number of issues and proposals for action which will form the basis for consultation.

PART 1

		Page Number
1.0	**INTRODUCTION**	
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1.0 INTRODUCTION

1.1 THE ROLE OF THE ENVIRONMENT AGENCY

The Environment Agency for England and Wales was established in April 1996, when the Environment Act 1995 brought together the former National Rivers Authority, Her Majesty's Inspectorate of Pollution, the Waste Regulation Authorities and several units from the Department of the Environment. This new Agency is taking action to improve land, air and water in an integrated manner, with an increased level of public participation. This will help the Agency and the community contribute to the world-wide environmental goal of sustainable development.

Our vision is:

'A better environment in England and Wales for present and future generations.'

The overall responsibility for the work of the Agency rests with the Board established under the Environment Act 1995. A network of Statutory Regional Advisory Committees enables the Agency to consult with its customers and interest groups over the range of interests for which it is responsible. There are four such Committees in the North East Region:-

The **Regional Environment Protection Advisory Committee (REPAC)** advises the Agency generally as to any proposals relating to the manner in which the Agency carries out its functions in the region.

The **Regional Fisheries Advisory Committee (RFAC)** advises the Agency on the manner in which it discharges its duty to maintain, improve and develop the salmon, trout, freshwater and eel fisheries, and sea fisheries as appropriate; as well as recreation, navigation and relevant conservation issues in its region.

The **Regional Flood Defence Committees (RFDCs) (one for Northumbria and one for the Yorkshire part of the Region)** are responsible for discharging all flood defence functions of the Environment Agency in the Region. These Committees have extensive executive powers in relation to the planning and funding of land drainage and flood defence activities.

In addition to the Statutory Committees, a number of non-statutory **Area Environment Groups (AEGs)** advise the Agency on proposals and priorities for Local Environment Agency Plans and on the importance of other environmental issues in the locality. The South Yorkshire AEG has been involved in the preparation of this Consultation Report.

1.2 LOCAL ENVIRONMENT AGENCY PLANNING - THE PROCESS

The aim of this Plan is to identify, prioritise and cost environmentally beneficial actions which the Agency, its partners and ordinary citizens will work together to deliver.

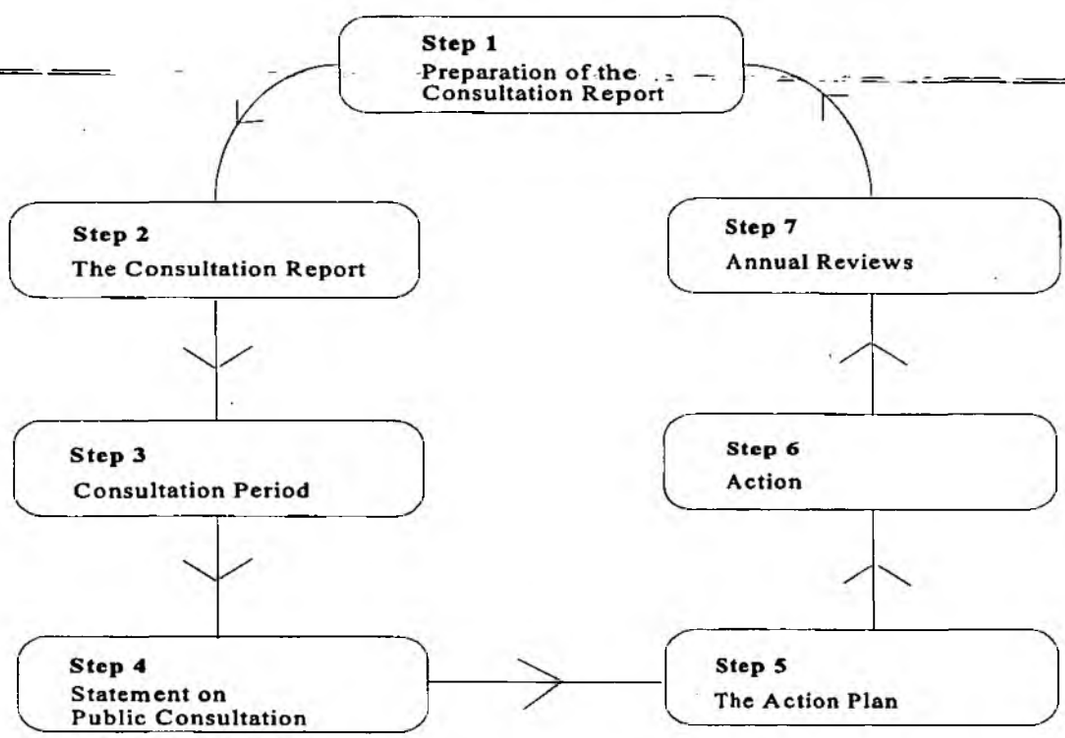
This will be achieved by:

- focusing attention on the environment of a specific area;
- involving all interested parties in planning for the future of the area; and
- establishing a plan of action for managing land, air and water issues in the local environment over the next five years.

The Agency seeks active input into Local Environment Agency Planning from individuals and organisations concerned with the environment, and would further wish to see the document used to influence and/or assist in the planning processes of others whose decisions may impact on the management of the environment.

Local Environment Agency Plans (LEAPs) are the successors to the Catchment Management Plans produced by the National Rivers Authority for water management. These Plans do not replace local authority local plans, but may perhaps be regarded as complementary to them.

Figure 2 Diagram of the LEAP Process



The stages of the LEAP process are outlined below:-

The Consultation Report

This Local Environment Agency Plan will form one of several plans to be produced by the North East Region of the Environment Agency.

The publication of this consultation report marks the start of a four month period of formal consultation enabling external organisations and the general public to work with the Agency in planning the future of the environment of the South Yorkshire and North East Derbyshire area. A selection of organisations have already been consulted on the issues. Those which responded are listed in *Appendix A*.

This report gives information about the area and the state of the local environment, and identifies environmental issues and proposals for action in order to address them.

The purpose of the consultation phase is to:

- establish the current state of the local environment;
- obtain views on the issues facing the environment;
- begin the process of identifying and implementing an Action Plan (see below).

The Action Plan

The Local Environment Agency Action Plan will include:

- a vision for the South Yorkshire and North East Derbyshire area;
- a policy framework based on identified issues for the management of the environment over a five year period;
- actions to address identified issues, with costs where possible.

These elements will only be prepared once the period of consultation on this document has been completed and full consideration has been given to the responses received.

The Agency will monitor the implementation of the plan through regular consultation both internally and with committed parties. Although these plans are non-statutory, their aim is to provide a framework for the integrated management of the local environment between ourselves and other bodies.

The Annual Review

The Agency will be jointly responsible, with other identified organisations and individuals, for implementing the Action Plan. Progress will be monitored and reported annually, by means of a review document which will be publicly available.

The review document will contain the following information:

- a comparison of actual progress against planned progress;
- identification of :
  - i) additional actions necessary to maintain progress in the light of changes in the area;
  - ii) the need to remove/amend actions where they are no longer appropriate;
- consideration of the need to update the LEAP.

1.3 SUSTAINABLE DEVELOPMENT AND THE ENVIRONMENT AGENCY

Environmental sustainability requires ***"Development that meets the needs of the present without compromising the ability of future generations to meet their own needs."*** This requires a full consideration of environmental, social and economic issues during the decision making process. This is an approach that has been backed by the Rio Earth Summit, European Union and the UK government.

At the 1992 United Nations Conference on the Environment and Development (the Rio Summit), the UK signed up to Agenda 21 and the Biodiversity Convention. The Department of the Environment then published "Sustainable Development the UK Strategy" and "Biodiversity the UK Action Plan" (Department of the Environment (DoE*) 1994). The Government objective of securing sustainable development has been reinforced by the Environment Act 1995 and various planning policy guidance notes, for example PPG 12 "Development Plans and Regional Guidance" (DoE, 1992) which states that;

"The Government has made clear its intention to work towards ensuring that development and growth are sustainable."

The Agency has a duty to work towards sustainable development. The preparation of LEAPs contributes to this by adopting an integrated approach to environmental protection and enhancement; by delivering environmental goals without imposing disproportionate costs on industry or society as a whole; and by developing a close and responsive relationship with the public. The full list of objectives for working towards sustainable development is included in *Appendix B.*

* DoE now known as DETR (Department of Trade, Environment and the Regions).

2.0 THE LOCAL ENVIRONMENT

This Section gives an overview of the local area and highlights some of its key features.

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2.0 THE LOCAL ENVIRONMENT

2.1 INTRODUCTION TO THE LEAP AREA

The South Yorkshire and North East Derbyshire LEAP covers the catchment areas of the Rivers Don, Rother and Dearne - some 1849km^2. The population numbers about 1.4 million with major centres of population at Doncaster, Barnsley, Rotherham, Sheffield and Chesterfield. The area also has many smaller relatively self-contained communities which developed around the mining industry.

The River Don and its principal tributaries, the Rivers Dearne and Rother flow through some very scenic areas, particularly in their upper reaches. Within these areas, there are designations of local or national importance for conservation and a variety of leisure and recreational facilities. The upper reaches of the rivers are extensively impounded with 19 reservoirs used for public water supplies.

This LEAP area is also a densely populated and industrialised area has a long history of pollution. In particular steel, coal mining and fuel production have left a legacy of contaminated land, poor air and water quality.

Progress in recent years on improved sewage treatment works and industrial effluents has enhanced water quality. However, a number of the towns and cities still have inadequate sewerage systems, and there are major discharges to watercourses of industrial and sewage effluents which can contain heavy metals and complex organic chemicals. (*See Issue 4; figures 9 & 10; Section 5.8*)

Domestic solid fuel burning, major traffic arteries, thermal power generation and other activities can cause severe air quality problems, though the source of the pollution can often originate from many miles away. Sulphur dioxide, oxides of nitrogen and particulate matter require continued controls and data collection in order to monitor and address levels of emission. Industrial areas have already seen very considerable improvements in air quality (after a history of problems) following the passing of the Clean Air Act in 1956 and subsequent legislation. (*See Issue 7*)

The LEAP area also generates large quantities of waste, some of it hazardous. However, until twenty five years ago, there was no specific legislation to regulate the disposal of these wastes, and sites operated with little regard for their long term effect on the environment. The disposal of these wastes is now carefully monitored and controlled by the Agency. (*See Issue 13*)

The demise of the coal industry is a complex issue because minewaters, which can cause pollution in their own right, also provide dilution for sewage effluents. When pumping of this minewater ceases, local pollution problems can arise from the loss of this dilution. It can also take many years for the water table to rise in the closed mines, with the water eventually surfacing elsewhere, and this may cause further significant new pollution. Parts of the area have suffered from this impact for many decades as evidenced by many the red iron oxide staining many of the local streams. (*See Issue 2*)

Dewatering at mines and quarries can affect groundwater flow which can then affect groundwater abstraction, springs, and surface water features by reducing inflow and lowering the water table. Mining subsidence can also affect flood defences and the level of protection provided.

Regeneration and redevelopment of derelict and contaminated land provides an opportunity to optimise nature conservation and recreational potential, as well as enabling contamination to be removed or stabilised to lessen the risk of pollution. Difficulties associated with these sites include ownership of the land, cost and responsibility for clean-up, and determining acceptable background levels for future use. (*See Issue 1*)

Fisheries in the catchment have historically been affected by human activity, such as impounding and canalising watercourses, land drainage, and industrial pollution. As water quality continues to improve there is an increasing need to address the physical damage inflicted on the catchment if diverse fish populations are to be restored. (*See Issues 5 & 19*)

Although water powered industry is virtually extinct in the area, the physical infrastructure remains often surprisingly intact. There are few better locations to understand the area's industrial heritage than from its riverbanks.

With steep-sided headwater valleys the rivers respond rapidly to rainfall. The tidal influence of the Humber Estuary reaches to Doncaster and parts of the catchment lie three metres below the highest recorded tide levels. These factors, combined with the urbanised nature of much of the catchment, make defence against flooding vital and there is an extensive network of defences including flood banks, washlands and control structures to safeguard people and property.

2.2 TOPOGRAPHY

The boundary of the LEAP area includes all the land from which surface water drains to the River Don and its tributaries. It includes those parts of the Sheffield and South Yorkshire Navigation which fall within the catchment area. The Don/Rother/Dearne catchment is bounded by the Pennines to the west, the Calder and Lower Aire catchments to the north, and the Trent catchment to the east and south.

As *Figure 3* shows, the main river Don flows east from the Pennine heights to its confluence with the river Ouse in the lowlands around Goole. The combined waters of the Ouse and Don then flow into the Humber Estuary.

The River Rother has its headwaters in the Peak District National Park where its tributary the River Hipper rises. It soon flows through urban and industrial areas around Chesterfield and Rotherham before its confluence with the river Don just east of Sheffield. The Dearne drains the high ground to the south and east of Huddersfield and the west of Barnsley. The steep sided Dearne Valley opens out at Bretton Hall Country Park before passing through Barnsley, Wath and Mexborough joining the main river Don at Conisbrough.

West Beck
Mexborough Beck
R. Went
The Stell
Ea Beck
Cudworth Dike
Cawthorne Dike
R. DEARNE
BARNSLEY
R. Dove
R. DEARNE
DONCASTER
R. DON
R. DON
Little Don
STOCKSBRIDGE
Ewden Beck
R. DON
Blackburn Brook
ROTHERHAM
R. Loxley
R. Rivelin
SHEFFIELD
Shire Brook
Pigeon Bridge Brook
R. Sheaf
The Moss
R. DERWENT
R. Doone
Barlow Brook
Holme Brook
CHESTERFIELD
Poole Brook
R. Doe Lea
R. Hipper
Trickley Brook
R. DERWENT
0 2 4 6 8 10km
Scale

SOUTH YORKSHIRE AND NORTH EAST DERBYSHIRE AREA

TOPOGRAPHY

KEY

CATCHMENT BOUNDARY

RIVER

HEIGHT ABOVE SEA LEVEL

BELOW 10M

10M TO 30M

30M TO 50M

50M TO 150M

150M TO 250M

250M TO 350M

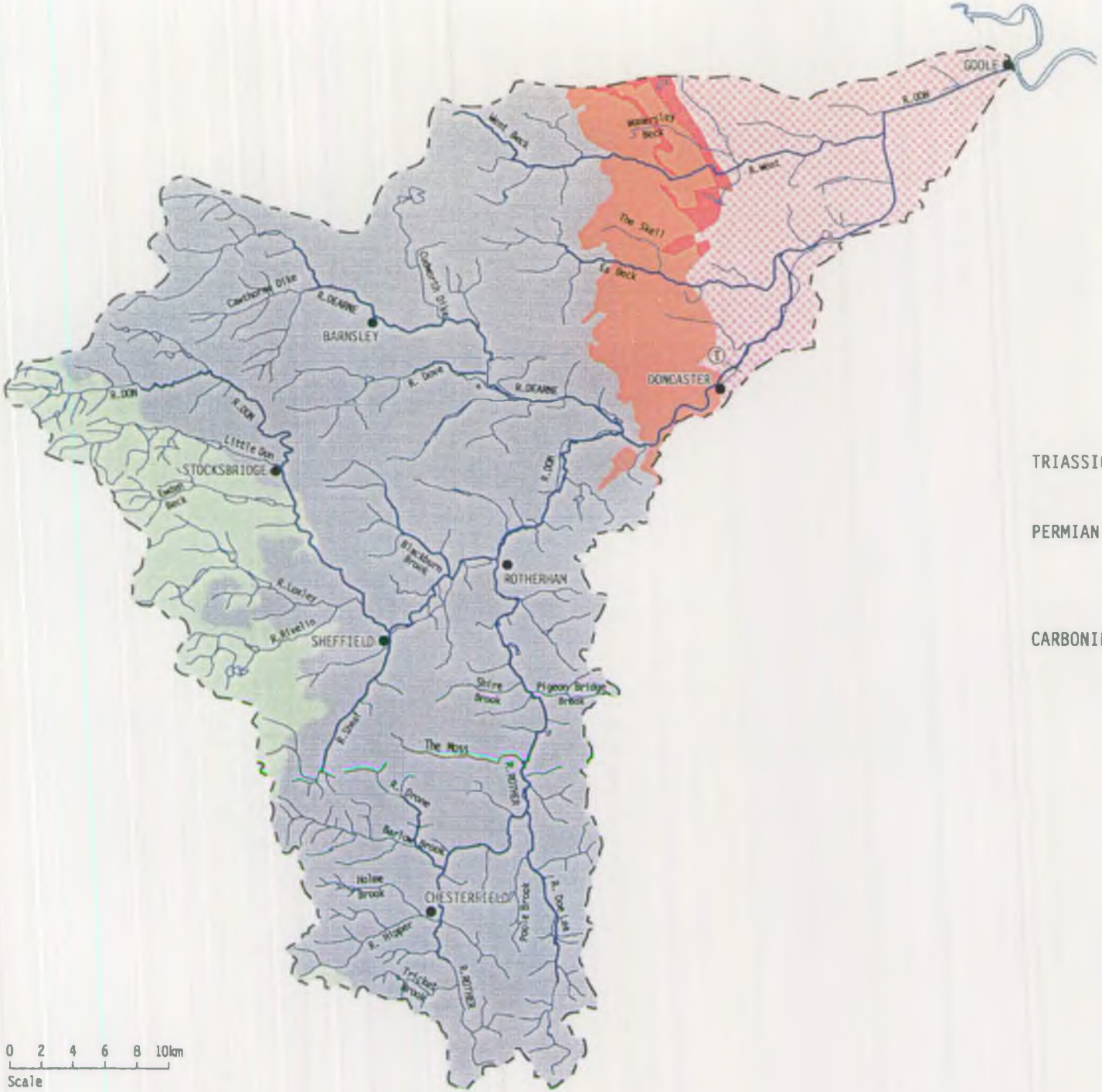
350M TO 450M

ABOVE 450M

Figure 3

SOUTH YORKSHIRE AND NORTH EAST DERBYSHIRE AREA

GEOLOGY



0 2 4 6 8 10km
Scale

KEY

- CATCHMENT BOUNDARY
- RIVER
- TIDAL LIMIT

TRIASSIC	SHERWOOD MUDSTONE GROUP
PERMIAN	PERMIAN MARL
	MAGNESIAN LIMESTONE
CARBONIFEROUS	COAL MEASURES
	MILLSTONE GRIT SERIES
	CARBONIFEROUS LIMESTONE SERIES

Figure 4

2.3 GEOLOGY

As detailed in *Figure 4*, the characteristic moorlands of the Pennines are formed in the Millstone Grit, a sequence of sandstones and mudstones. These are the oldest rocks of the catchment, of Carboniferous age, and they are overlain eastwards by successively younger rocks. All geological units dip eastwards beneath the North Sea and have been extensively faulted.

The Coal Measures, also of Carboniferous age, overlie the Millstone Grit and are a sequence of grey mudstone, siltstone, sandstone and coal seams. Some of the thicker sandstone units produce ridges of higher ground such as the Woolley Edge rock. Coal mining has been extensive in the past, especially in the area of outcrop and more recently moving eastwards into deeper Coal Measures. Many coal seams have been mined, one of the most notable being the thick Barnsley seam.

The Magnesian Limestone that overlies the Coal Measures has an approximately 6km wide outcrop that forms a gentle ridge running north-south between Castleford and Sprotborough. The ridge forms the eastern edge of the Rother catchment and controls drainage patterns as the waters of the Don, Rother and Dearne are channelled through narrow valleys in the limestone between Rotherham and Doncaster. The permeable nature of the limestone also gives rise to a characteristic absence of watercourses on the limestone outcrop.

The Sherwood Sandstone forms the low lying floodplain between Doncaster and Goole where there are also extensive areas covered by Recent glacial and alluvial clays, sands and gravels up to twenty metres thick.

2.4 HYDROGEOLOGY

The sandstones within the Millstone Grit and Coal Measures are the main water bearing horizons in the western part of the LEAP area and form complex minor aquifers. These aquifers have not been extensively utilised for water supply as borehole yields are often low and there may be naturally occurring high levels of iron and manganese.

Drainage of deep coal mines has taken place extensively and has affected groundwater flows within the catchment. The gradual recovery of groundwater levels after deep mine dewatering has ceased will have a significant impact on groundwater quality, causing increased sulphate, chloride, iron and other metals content in particular. (*See Issue 12*)

The Magnesian Limestone and Sherwood Sandstone are both major aquifers and are extensively used for industrial, agricultural, spray irrigation and bottling and public and private potable water supply. The Sherwood Sandstone is a regionally important aquifer, particularly as the main Yorkshire Water well fields are located south of Selby and south of Doncaster.

There are a number of large industrial abstractions in the Doncaster area. Yields of boreholes in the Sherwood Sandstone are generally high, producing up to six thousand cubic metres per day. The groundwater quality in both Magnesian Limestone and Sherwood Sandstone aquifers is generally good, although in some areas nitrate from agricultural sources and naturally occurring iron and manganese may limit the suitability for certain uses.

2.5 RAINFALL AND FLOW MONITORING

The Agency manages a regional rainfall monitoring network which includes 30 rain gauge sites in the Don catchment. These enable the variations in long term average to be calculated. The annual rainfall ranges from a high of 1580 mm on the Pennines to 580 mm in Doncaster. In the east of the catchment the effective rainfall after evaporation is zero during the summer months.

Table 1: Typical Rainfall in the LEAP Area.

RAINFALL GAUGES	Annual Ave mm	Maximum mm	Minimum mm
Ingbirchworth	980	1227	669
Redmires Filters	1090	1338	738
Woodhouse Mill	660	863	426
Cannon Hall	754	942	482
South Elmsall	644	760	458

In addition to the rainfall gauges there is a network of eleven river gauging stations which provide information on river flows and levels throughout the catchment. The data from these stations are used to produce flow statistics both on a long term and annual timescale. There are more than twenty sites at which only river level is monitored. Almost all the river gauging and level stations and eight of the rainfall sites are connected to the Regional Telemetry System which allows up to the minute information to be gathered by computers at Agency offices from outstations within the catchment. (See *Figure 5*).

Wentworth Beck
Wensley Beck
R. Went
The Skell
Ea Beck
Cawthorne Dike
R. DEARNE
Cudworth Dike
BARNSLEY
R. Dove
DONCASTER
R. DON
R. DON
Little Don
STOCKSBRIDGE
Ewden Beck
R. DON
Blackburn Brook
ROTHERHAM
R. Loxley
R. Rivelin
SHEFFIELD
Shire Brook
Pigeon Bridge Brook
The Moss
R. Sheaf
R. Drone
Barlow Brook
Holme Brook
CHESTERFIELD
Poole Brook
R. Doe Lea
R. Rother
Cutthorpe Brook
R. ROTHER
0 2 4 6 8 10km
Scale

SOUTH YORKSHIRE AND NORTH EAST DERBYSHIRE AREA

HYDROLOGY

KEY

- CATCHMENT BOUNDARY
- SUB-CATCHMENT BOUNDARY
- RIVER
- TIDAL LIMIT
- RIVER LEVEL STATIONS
- RIVERFLOW GAUGING STATIONS
- RAINFALL STATIONS
- CLIMATE STATION

Figure 5

2.6 KEY DETAILS

Table 2: Key Details

Area:	1849km^2
Population:	1,400,000
Local Authorities:	Administrative boundaries are shown on the map in the front cover
Main towns:	Barnsley, Chesterfield, Doncaster, Goole, Rotherham, Sheffield
Water companies:	Yorkshire Water plc Severn Trent Water plc
National park:	Peak District National Park
Navigation authorities:	British Waterways
Navigations:	Chesterfield Canal (navigable downstream of Worksop) Sheffield and South Yorkshire Navigation

Water Quality

Figure 6: Length of River and Canal Classified 1996

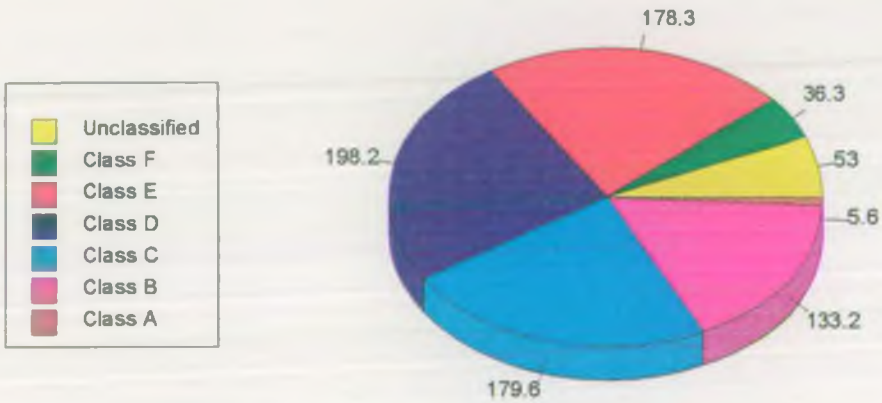


Table 3: Authorisations

Number of licensed surface water abstractions March 1997	142
Number of licensed groundwater abstractions March 1997	183
Number of licensed spring abstractions March 1997	60
Total number of trade discharges	349
Total number of sewage discharges (plc and domestic)	967

Water Resources

Table 4: Typical River Flows (m^3/sec)

Location	Summer	Winter	Summer minimum
Meadowhall	3	9	1.0
Doncaster	8	28	3.5
Woodhouse Mill (River Rother)	2	7	0.7
Adwick (River Dearne)	2	5	0.7

Flood Protection

Length of Main River		264km.
Length of Flood Defences on Main River		185km.
Number of People and property protected from flooding		8080 house equivalents
Major installations	river regulators	5
	outfall sluices	5
	pumping stations	5

Waste Management (figures are for South Yorkshire)

Number of licensed sites		306
Broken down to:	landfill	81
	transfer stations	92
	scrapyards/vehicle dismantlers	100
	civic amenity sites	21
	treatment plants	7
	storage facilities	4
	incinerators	1
Number of facilities claiming exemption Includes 24 exempt scrapyards		567
Number of registered waste carriers		1657
Number of special waste movements (estimated)		1078

3.0 PROTECTION THROUGH PARTNERSHIP

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3.0 PROTECTION THROUGH PARTNERSHIP

3.1 INTRODUCTION

The Agency is well placed to influence many of the activities affecting the environment through the Environment Act 1995 and other legislation. Much of the routine work undertaken to fulfill our statutory duties and responsibilities is not generally covered in the LEAP issues. There is a great deal of informal co-operation with partner organisations between officers in the field.

The Agency has a number of Memoranda of Understanding with other groups and organisations such as English Nature, The Ministry of Agriculture, Fisheries and Food (MAFF), local government, Internal Drainage Boards (IDBs), the Health and Safety Executive and RJB Mining. These establish a mutual understanding and common purpose in partnership with the Agency. The Agency has signed an Accord with the Association of National Park Authorities which set out the commitment and the shared objectives of the parties.

A number of partnerships address longer term management of the South Yorkshire and North East Derbyshire area. The Agency must work in partnership to ensure that many of the proposals in Section 4 are implemented and that the key objectives and the long term vision can be realised. The Agency works closely with local authorities in particular to ensure this happens. Ridings Area also seeks to increase the number of partnership opportunities with statutory and non-statutory groups, to carry out improvement projects and develop a wider public awareness of environmental issues.

The following sections primarily cover the partnership between local authorities and the Agency in relation to land use planning, air quality, waste management and flood defence and also recognise some of the key groups and organisations which play a crucial role in protecting the local environment.

3.2 LAND USE PLANNING

3.2.1 Development Planning

Land use is an important influence on the environment. Control of land use change is achieved through implementation of the Town and Country Planning Acts and a range of Government Planning Guidance. This guidance highlights the importance of communication between Local Planning Authorities (LPAs) and the Agency, and the relationship between land use and development and environmental issues.

The Agency is committed to developing close working relationships with LPAs to promote effective links between planning and environmental protection. To assist in this the Agency published a document entitled 'Environment Agency Liaison with Local Planning Authorities' in March 1997. This document explains the role of the Agency and our contribution to the land use planning system in England and Wales. Planning liaison links the Agency's functions and the local authority planners. (*See Section 5.1*)

3.2.2 Development Plans

Regional Planning Guidance for Yorkshire & Humberside (RPG12) was issued by the Department of Environment Trade and the Regions (DETR) in March 1996 after consultation with the Local Planning Authorities and other interested organisations. It sets out the following broad objectives:-

- to promote economic prosperity;
- to conserve and enhance the environment;
- the regeneration and renewal of urban areas;
- rural diversification; and
- to encourage efficient use of available resources and energy.

Regional Planning Guidance for the East Midlands (RPG8) issued in March 1994 sets out similar broad objectives.

Development Plans must be produced by planning authorities. They set out the Council's land use objectives and are prepared in accordance with the RPG. They provide a framework for land use change and are a key consideration in the determination of planning applications. The Agency is a statutory consultee for all of these Plans, allowing our views to be considered by the LPA when formulating local development plan policies and allocating land for development. The Agency encourages LPAs to adopt policies which protect the environment from any of the potentially harmful effects of development.

The Agency has published "Guidance Notes for Local Planning Authorities on the Methods of Protecting the Water Environment through Development Plans" (1994). These statements provide a general guide to LPAs on what policies should be included and why they are important. The Agency will prepare additional guidance to reflect the full Agency remit, in the future.

3.2.3 Development Control

The Agency is also a statutory consultee on certain categories of planning application, and Local Planning Authorities have discretionary powers regarding the referral of other matters. This allows the Agency's views to be considered by the LPA prior to individual planning applications being determined.

LPAs are responsible for the operation of the land use planning system within a defined statutory framework. In determining individual planning applications within this framework, LPAs and the Agency must be mindful of not duplicating the controls of other statutory legislation related to the environment, or indeed of other statutory bodies. (*See Issue 17*)

It is primarily land use change in the long term, and the opportunities presented by redevelopment that will help to tackle the issues of urban run-off, contaminated land and the renewal of river corridors.

3.3 LOCAL AGENDA 21

Agenda 21 was one of four main agreements signed at the Earth conference at Rio by representatives of 150 countries including the UK government. It is intended to be:-

"A comprehensive programme of action needed throughout the world to achieve a sustainable pattern of development for the next century"

Local Agenda 21 (the UK Government's response to Agenda 21, requires LPAs to produce their own locally based agenda 21 for their area) includes initiatives to further the concept of sustainability and includes waste management issues and promotion of environmental awareness. In 1994 the Government produced a national sustainable development strategy and action plan for the UK. At the local level, local authorities are working with local communities to produce their own Local Agenda 21 programmes, to promote sustainable development and to improve quality of life. The Agency will seek to work with them to protect and improve the local environment and LEAPs provide proposals for action which can feed directly into Local Agenda 21 Action Plans.

3.4 AIR QUALITY

Under the Environment Act 1995 (EA 95) Local Authorities are given responsibility for, and have a duty to assess the local air quality. They also regulate releases to air from thousands of industrial premises under Part I of the Environmental Protection Act 1990. These are premises with a lesser potential to pollute than those the Agency regulates and the processes concerned are known as 'Part B' processes. The Agency has responsibility for the large complex and potentially most polluting industries ('Part A' processes) under a scheme of regulation known as Integrated Pollution Control (IPC).

Local authorities will be required to review present and future air quality against air quality standards and objectives prescribed in regulations set out by the Government. Reviews are in the form of Local Air Quality Plans for which the Agency will be a consultee. The Agency will seek to produce an air quality strategy for 'Part A' processes in the South Yorkshire and North East Derbyshire area which will input into local air quality plans. (*See Issue 7*)

3.5 WASTE MANAGEMENT

Local authorities are key players within the waste management system, and as the planning authority, determine the location of waste management facilities in accordance with policies contained in their development plan. Planning Policy Guidance requires the Agency and local planning authorities to work closely together in regional planning fora so that regional waste management requirements can be determined. It is essential that the Agency continues to work closely with planning authorities in order to further the concept of sustainable waste management.

The land use planning system also has a role to play in the provision of waste management activities. It considers the need for that facility, and the impact likely to be imposed on the environment by the facility, by the traffic generated, and on local amenity through visual intrusion, litter, dust, noise, odour and vibration. It considers the impact on wildlife and conservation needs and on future development and also considers the benefits to be gained from, for example, the restoration of former mineral workings or the reclamation of derelict or contaminated land. The proposed after-use of the site is also of paramount importance, and the planning system ensures that only environmentally acceptable proposals are pursued.

3.6 ENVIRONMENTAL QUALITY MANAGEMENT

The Agency is keen to promote with agriculture, industry and the utilities the benefits of water conservation, waste minimisation and pollution prevention and to encourage their participation in collaborative campaigns and projects. In addition the uptake of accredited environmental management schemes such as EMAS, ISO 14001 and BS7750 encourages active environmental management and duty of care. (*See Issues 13 to 16; 18 & 19*)

Industry, particularly coal mining, has played a major role in determining the quality of our environment, and the Agency has entered into Memoranda of Understanding with the Coal Authority, English Partnerships and RJB Mining towards a more sustainable management approach. These deal with issues relating to cessation of pumping, monitoring minewater rebound, contaminated land etc and establish a mutual understanding and common purpose for the organisations involved.

Similar arrangements exist with other organisations including English Nature, local government and the Health and Safety Executive as well as with the Emergency Services; Fire Brigade and Police; specifically designed to ensure effective and efficient co-ordinated response to pollution incidents.

3.7 WATER RESOURCES

The legislation relating to Water Resources is found in the Water Resources Act, 1991. Yorkshire Water have a significant impact on the water resources through their abstractions, import of water supplies into the catchment, and its subsequent discharge back into the river system. Close liaison with the Water Companies and other major industrial and agricultural abstractors will be maintained to improve and manage water resources in the catchment. (*See Issues 11 & 12*)

The Protection of Groundwater Resources is outlined in the Agency's Policy and Practice for the Protection of Groundwater, 1992 - a guidance document that outlines the wide range of liaison required to protect groundwater, most often through local authority planning and development control.

3.8 FLOOD DEFENCE

The Agency has specific powers relating to 'main' rivers which enable us to carry out maintenance, improvement works, construct flood defences and control work by others. The Agency has a general supervisory duty over all flood defence matters which requires working in close partnership with other drainage authorities. Local authorities and Internal Drainage Boards (IDBs) are responsible for flood defence on 'ordinary' watercourses. (*See Issues 8 to 10*)

The powers of the IDBs and the Agency relating to flood defence activities are clearly defined by the Land Drainage Act 1991 and the Water Resources Act 1991. Within an Internal Drainage District the IDB supervises all matters relating to land drainage. These powers do not extend to any main river. Agency staff work in partnership with the IDBs to assist them with promoting environmentally sensitive management practices. Local authorities have similar responsibilities for non main river watercourses in their area.

The flood defence activities of the Environment Agency are funded differently to other Agency activities. Most of the finance comes from a levy on Local Authorities. There are also contributions from the IDBs. The Ministry of Agriculture, Fisheries, & Food pay a grant towards the cost of capital projects. This currently stands at 25% for river defences and flood warning, and 45% for coastal defences.

The local authorities, MAFF, and the IDBs, are all represented on the Regional Flood Defence Committee which directs the flood defence work of the Agency.

Although declining, the mining industry still has a significant impact on flood defences in the area. Deep mining activity causes subsidence at the surface. Where this occurs beneath an existing flood defence or at a flood prone location, a flood defence scheme is developed. The cost of this is met by the mining company, in this area usually RJB Mining.

To provide an effective flood warning service, the Agency works in liaison with local authorities to develop Dissemination Plans for flood warnings which feed into the LA's Emergency Plans. There are also close links with the emergency services. (*See Issue 10*)

3.9 CONSERVATION

The Yorkshire Wildlife Trust manages a number of important wetland sites in the catchment. Several, including those at Denaby Ings on the Dearne and Woodhouse Washlands on the Rother, are flood storage areas which are important to the overall flood protection strategy of the Don system. Sensitive management and maintenance of these areas is of paramount importance and opportunities to enhance the ecological status of the sites is kept under constant review. (*See Issues 11 & 19; & Section 6.6*)

The recent joint application by the Environment Agency and Yorkshire Wildlife Trust for Millennium funding for a major improvement scheme at Woodhouse Washlands is an example of the collaborative efforts which are being made throughout the catchment. Though unsuccessful on this occasion, the two organisations will continue to seek funding for the necessary work.

Collaboration with local authorities is also eagerly sought by the Agency. Recent agreement reached with Barnsley Council has resulted in the commencement of a scheme which will rehabilitate a canalised section of the River Dearne at Old Moor. The restoration of this degraded channel will complement the excellent work carried out by the Council to create a 100 acre wetland nature reserve out of a disused colliery site.

The Agency has a close working relationship with many landowners in the area. We have promoted a number of joint project to improve fisheries and protect habitats either directly or through the Farming and Wildlife Advisory Group (FWAG).

3.10 FISHERIES

In fulfilling its Fisheries function, the Agency recognises the need to consult with angling interests in the area. This is principally achieved through regular meetings with the Don Fisheries Consultative Committee, a statutory body set up to represent the interests of all fishery users. Through this body the Agency consults on issues affecting the sport of angling and seeks a consensus view on how it should exercise its fishery management role in a sustainable manner. (*See Issues 11 & 19*)

3.11 EDUCATION

The Environment Agency seeks to educate and influence individuals, groups and industries to promote best environmental practice. We will work in partnership with statutory and voluntary groups to carry out improvement projects and develop a wider public awareness of environmental issues.

The Agency's overall remit of protecting and enhancing the whole environment contributes to the worldwide goal of sustainable development. To do this we will work through schools and other educational establishments to develop in our children an ethos of caring for their whole environment.

3.12 LOCAL COMMUNITY

The recovery of the catchment from the damage cause by industry has led to the establishment of many voluntary groups eager to assist in improving their local environment. For example, through the efforts of the members of the Five Weirs Walk Trust, several of the most severely damaged sections of the river and its frontage in the east end of Sheffield have been restored. These now provide access to the public to enjoy the river and examples of its industrial heritage.

The community has its own aspirations of what it wants from its environment. In order to protect the environment the Agency needs the support of local voluntary and special interest groups and the general public to tackle pollution and environmental protection and enhancement. We seek to support these groups and to work in co-operation with them.

4.0 ISSUES AND PROPOSALS

During the preparation of the Consultation Report a number of issues have emerged which require consideration by all those with an interest in the South Yorkshire and North East Derbyshire area. The issues have been identified by:

- Comparing the current state of the local environment against local and national targets and directives;
- Consulting informally with selected organisations including the South Yorkshire Area Environment Group;
- Considering specific incidents and public complaints;
- Using local knowledge of Agency staff and others;

These issues and proposals are the views of the Environment Agency and those consulted and do not constitute policy statements.

Each issue is presented in the following format:

ISSUE	The perceived problem.
Background	Why the Agency believes it is important and how it affects the LEAP area.
Proposals	Proposals which could be developed to address the issue.
Who is involved	This ranges from those with formal responsibility to those involved through partnerships and collaboration.

Each issue should not be viewed in isolation. They all contribute towards a single vision - the future environmental well-being of the South Yorkshire and North East Derbyshire area.

Detailed Action Plans, including costs and timetables, will be established after the consultation phase.

Material contained within this document may be subject to change, in line with the Agency's altered priorities and the availability of funding.

SUMMARY OF ISSUES

Table 5 (i)

POLLUTION OF LAND, AIR AND WATER. The environment is vulnerable to pollution from many sources. The prevention and control of pollution is a key Agency objective. Whilst all sources are important, this area faces a number of specific risks posed by the legacy of industrial pollution and these are considered in more detail below.	**Issue**
Contaminated Land Contaminated land poses a pollution risk to the environment and has a potential to cause significant harm to human health, property and local amenity value.	1
Minewaters Groundwater and rivers continue to be polluted by minewater from long-abandoned mines and are threatened by further pollution from the more recent and future closures of mines.	2
Industrial discharges The biodiversity of the environment can be restricted by the toxic effects of industrial discharges that are not controllable by simple chemical limits.	3
Sewage treatment works and combined sewer overflows Rivers can have limited biodiversity and restricted uses as a result of discharges from sewage treatment works and unsatisfactory combined sewer overflows.	4
Pollution incidents The environment is threatened by pollution incidents from industry and agriculture. Poorly controlled land spreading of waste poses a particular risk which has increased as a result of recent legislative changes.	5
Illegal tipping of waste Illegal tipping of waste is widespread throughout the area. This problem has increased following the introduction of the Landfill Tax and is not only unsightly but may cause environmental pollution.	6
Air quality Air quality improvements are dependent upon the close co-ordination of air quality measurements to support local air quality management plans.	7

Table 5 (ii)

WATER MANAGEMENT Provision of defence against flooding and management of water resources are important Agency functions. This area is particularly at risk from flooding because of the rapid response of the rivers to rainfall, the heavy urbanisation in many parts, extensive low lying areas, and the tidal influence downstream of Doncaster. There are many reservoirs in the Don catchment and good water management is important to balance the needs of water users - industry, agriculture, public water supply, and navigation - with the need to maintain a healthy, diverse ecosystem.	**Issue**
Risk of Flooding The risk of flooding at some locations is unacceptably high because they are unprotected or are protected by defences which are either below standard or ageing.	**8**
Washland areas Washland areas might be more effectively used for storage of flood waters and as sites for nature conservation.	**9**
Flood forecasting and warning The flood forecasting and warning service could be further improved.	**10**
Management of abstractions, reservoirs and water levels The health and diversity of wetland and river ecology including fisheries is severely affected by the management of abstractions, releases from reservoirs, and water levels.	**11**
Groundwater resources Groundwater resources require careful management to ensure long term sustainability.	**12**

Table 5 (iii)

TOWARDS SUSTAINABLE INDUSTRY There are many opportunities for the Agency and partners to work towards more environmentally-sustainable activities in the area. In addition the Agency has specific statutory responsibilities for Integrated Pollution Control, and Waste Management including producer responsibility for packaging waste.	**Issue**
Sustainable waste management More sustainable waste management practices as identified in the draft National Waste Management Strategy should be implemented.	**13**

Waste Minimisation Industry and the environment would benefit from expansion of the current Don waste minimisation project and pursuance of the aims and practice of the 3Es programme within the area (3Es:- Emissions, Efficiency and Economics).	**14**
Energy and water use Overall energy and water use could be reduced by promotion of waste minimisation campaigns.	**15**
Promotion of sustainable Technologies Environmentally detrimental substances and fuels, radioactive technologies, and less efficient technologies are sometimes used in industrial and domestic processes when more benign technologies are available.	**16**

Table 5 (iv)

TOWARDS A SUSTAINABLE ENVIRONMENT As the environment of the LEAP area improves there is increasing attention on conservation and protection and on enhancement wherever the opportunity arises. This is particularly the case where development is taking place or existing assets are being replaced. There is much scope for the Agency to work in partnership with local planning authorities and other organisations to contribute to the Government's aim of sustainability.	**Issue**
Land Use Planning Future development could impact adversely on the environment unless the Agency maximises its influence on the land use planning system in liaison with local planning authorities.	**17**
Recreation and Heritage Protection Recreational facilities and access could be improved and features of archaeological and heritage interest must be protected and conserved.	**18**
Conservation of Species and Habitats Species and habitats, particularly where they are rare or declining, require conservation, enhancement and rehabilitation to promote the development of a healthy and diverse ecosystem.	**19**

4.1 POLLUTION OF LAND, AIR AND WATER.

4.1.1 ISSUE 1 - Contaminated Land

Background

Previous industrial activity has left a legacy of land contaminated with a variety of chemicals. In this area this is particularly true of sites involved with coal, coking, chemicals and steel production. These sites already cause pollution of several kilometres of river and pose an ongoing threat of pollution. Particular examples of this are:

- Tar oil and ammonia entering the Rother in Chesterfield;
- Phenols, ammonia and dissolved metals seeping from sites of former coking works;
- Heavily contaminated leachate escaping from former colliery tips .

Many sites have stabilised over the years reducing the ongoing pollution but they continue to pose a long term risk to future generations. Attempts have been made in the past to address this problem but the land has often been poorly restored, with little vegetation present, and this has had an adverse impact on the amenity of the area.

The Environment Act 1995 conveys new powers and duties on the Agency and local authorities for dealing with contaminated land. This offers the opportunity to collaborate with others to improve these sites, to enhance the environment, and to provide sites for development and job creation as part of an overall regeneration strategy. However, the risk of pollution is increased when land is disturbed for redevelopment. The Agency should ensure that remediation work is carefully planned and managed.

There has been significant progress in recent years with contaminated land remediation which is expected to increase over the next few years. This is particularly the case in this area where English Partnerships now have ownership of and are committed to restoring and redeveloping a total of over 1,000 hectares of former British Coal land.

Additionally, a number of substantial closed landfill sites which no longer have licences, continue to give rise to landfill gas and polluting leachate. This problem is likely to continue for several decades after tipping has ceased.

Proposals

- Implement the new statutory contaminated land regime and associated duties outlined in Section 57 of the Environment Act 1995 in liaison with Local Authorities. In particular develop a programme for the assessment of the risks of pollution of controlled waters by contaminated land in order to provide a consistent basis for prioritising both the environmental impact and the benefits from any remediation. This is subject to review by the new Government.

- Identify contaminated land which poses a significant risk to the environment and, in liaison with local authorities, prioritise the need for remedial action at sites, and secure their remediation as appropriate.

- Secure, in partnership with local authorities, industry, developers and consultants the remediation of contaminated land via:

  - Planning controls implemented during redevelopment of 'brown field sites';
  - Promoting the benefit of environmental action for responsible parties;
  - Statutory enforcement under S.57 of the Environment Act 1995 or S.161 of the Water Resources Act 1991.

  (*See Sections 3.1 & 3.6*)

- Secure, in association with English Partnerships, RJB Mining (UK) Ltd. and others, the remediation and redevelopment of former British Coal contaminated land via an agreed programme prioritised on the basis of environmental and economic regeneration factors.

- Identify contaminated land for which liable parties do not exist (ie 'orphan sites'), prioritise the need for remedial action at these sites and secure funds for the Agency to undertake the required works. In particular, provide efficient and effective regulation of designated 'Special Sites' which have a significant impact on sensitive controlled waters, or contain chemicals of significant hazard to the environment, in order to secure their appropriate remediation.

- Provide expert advice, information and reports, and promote research and development on contaminated land to ensure the best practical environmental improvements are achieved during site remediation. Contribute to projects and seek funds from all available sources, to develop the essential expertise, tools and techniques.

Who is involved

Environment Agency, local authorities, landowners and developers, English Partnerships, RJB Mining (UK) Ltd.

4.1.2 ISSUE 2 - Minewaters

Background

The long history of mining in the catchment not only means a legacy of large areas of contaminated and despoiled land, but also polluted mine waters. As coal mines close and the pumping of minewater ceases, the water builds up in the mine and becomes contaminated over time with red iron oxide, chlorides and ammonia. These rust-coloured discharges from abandoned mines have for decades caused many of the local streams to run orange and be depleted of animal and fish life as the iron deposits blanket the bed of the river. A total length of over 30 kilometres is affected and particularly bad examples are to be found on the river Don at Bullhouse (Penistone) and the Little Don at Sheephouse Wood (Stocksbridge).

There is a threat of further pollution from the more recently closed mines where the pumps have been switched off, thus allowing the groundwaters to rise. These will produce new minewater outbreaks in the near future. The story could be repeated again in the more distant future when operational pumping from active mines will ultimately cease.

While no organisation has a strict liability and responsibility for dealing with these discharges, the Coal Authority has, in close liaison with the Agency, agreed a national list of those discharges having the most significant impact. Schemes designed to tackle the problem have been proposed and the first ones - including one to deal with Bullhouse minewater which has now received funding and planning permission - will commence during 1997/98. The Bullhouse scheme has in part been funded by RECHAR - the European fund for regeneration of coal mining areas, and is the result of a successful partnership between the Agency, Barnsley MBC, Hepworth Building Products and the Coal Authority, clearly demonstrating the benefits of working jointly.
(*See Section 5.6*)

Proposals

- Continue to evaluate the impact of abandoned mines on the quality of controlled waters and promote sustainable solutions for their remediation with the Coal Authority based on sound science and with the priority ranked by appropriate cost/benefit analysis.

- Continue to monitor, in liaison with the Coal Authority, the rising level of minewaters in former deep mine workings and expand the monitoring network to the shallow aquifers at most risk of contamination.

- Evaluate and develop strategies for dealing effectively with the predicted environmental consequences of the recent rise in minewater levels and plan to minimise the possible implications of any future closure programmes using controlled pumping where necessary.

- Promote and seek funding in partnership with others for the remediation of pollution from abandoned mines and rehabilitation of previously affected habitats particularly for Sheephouse Wood minewater.

Who is involved

Environment Agency, Coal Authority, RJB Mining (UK) Ltd., local authorities, industry, various Government departments and European funding schemes.

4.1.3 ISSUE 3 - Industrial discharges

Background

The Government has signed several conventions with other countries bordering the North Sea to significantly reduce inputs of the most dangerous substances. Since 1985 there has been considerable progress towards meeting the targets set, both in terms of local Environmental Quality Standards and in the overall load reduction. This has been achieved predominantly by the simple method of control which limits the concentration of substances in the discharge. However, it has become apparent that there are certain circumstances where this method may not, on its own, provide adequate protection for the local environment. This primarily applies to discharges that have a toxic impact which cannot be predicted or adequately controlled by this simple method.

A wide range of complex mixtures of chemicals is found in effluents discharged to the environment within this area, and many might require additional control based upon the effluents' toxicity to life found in rivers. Stringent controls on discharges to controlled waters already exist for prescribed (Part A) industrial processes which are authorised under the Environmental Protection Act 1990. The Agency can use these powers and information to identify those discharges where further improvements could benefit the environment, subject to this being technically and economically feasible. This could also include the control of discharges from Yorkshire Water sewage treatment works which receive complex trade effluents; and the direct control, where possible, of trade effluents discharged to sewer.

The use of 'toxicity-based consents' has become more relevant to this catchment as the river water quality has improved over the past 10 years to such an extent that the main rivers are now thriving fisheries. The objective of this further method of control is to ensure that a greater diversity of biological life can be sustained. The current evidence is that the biology is still limited and for more than 50 kilometres of the river it does not reflect the chemical water quality classification. (See *Figure 24*).

The problem can also be the result of long-term persistent pollutants present in river sediments. High levels of dioxins, considered to be some of the most harmful substances, have been found in the fine sediments of rivers Doe Lea, Rother and Don. The Agency has undertaken extensive monitoring and evaluation of the most environmentally-

acceptable method of dealing with this legacy and concluded that the sediment poses less risk if left in the rivers. This and other contaminants can affect navigation activities by limiting the options available for the removal and ultimate safe disposal of some of the more highly contaminated sediments. Any such removal, whether for navigation or environmental purposes, needs careful monitoring and consideration.

Proposals

- Monitor fish populations within the system to quantify the chronic and acute effects of toxic and persistent polluting substances.
- Monitor the fate of persistent substances in sediments and evaluate the environmental impact in order to plan for action where these results are considered unacceptable. This particularly applies to the ongoing commitment to the Dioxin Monitoring Programme.
- Reassess the impacts of those discharges to rivers where the biology does not reflect the chemical quality, in order to establish a priority list of effluents requiring action and promote their improvements through toxicity based targets.
- Review the progress of the Dangerous Substances Reduction Programme for the area and establish new targets and actions for the next five year period.
- Assist British Waterways in evaluating the best practical environmental options for dealing with contaminated sediments impacting on the navigation.

Who is involved

Environment Agency, angling clubs and fishery owners, industry, research institutes, DETR, British Waterways, English Nature, Yorkshire Water Services.

4.1.4 ISSUE 4 - Sewage treatment works and combined sewer overflows

Background

Despite improved capital investment over the past five years by Yorkshire Water, the lack of investment in sewerage infrastructure over many decades has resulted in some systems becoming severely overloaded. This can result in combined sewer overflows (CSOs), originally designed to operate only in periods of heavy rainfall, operating in dry weather. The rivers downstream of these CSOs can be grossly polluted as a result, with unpleasant aesthetic effects such as faecal matter and sanitary materials being deposited on vegetation. In addition there is an adverse impact on water quality and aquatic life. It is recognised that, at current levels of investment, it is likely to take twenty years to bring all the recognised unsatisfactory CSOs up to standard.

The rivers have benefitted from the additional investment by Yorkshire Water in sewage treatment but a substantial number of works require further improvement to meet the needs of the rivers and their users.

The required investment is subject to periodic review every five years by negotiation between Yorkshire Water and OFWAT, in consultation with the Agency. The result is known as the Asset Management Plan (AMP) which determines what the Water Companies will spend to upgrade their infrastructure and what they can charge for their services. The latest round, AMP3 covering the years 2000 - 2005, is currently being negotiated and will determine the commitment and timetable to carry out the work needed to improve the quality of the discharges and hence the river quality.

Yorkshire Water is currently operating many sewage works at a better performance than that required by the consent conditions, and this has contributed significantly to the substantial improvements in river quality and fisheries status of the rivers. This is particularly true for ammonia which, whilst most works manage to achieve a significant reduction, is currently consented at only a few works. This lack of effective control on ammonia is a persistent threat to water quality and the biology and the fisheries of the rivers, and must be addressed if the long term benefits of the current improvements are to be realised.
(See *Section 5.8*)

Proposals

- Influence the negotiations for the Water Company's Asset Management Plan (AMP 3) in order to ensure that the economic arguments are fairly balanced against the benefits of environmental improvements and their value to the community at large.

- Ensure that the benefits are fully quantified for those stretches of river that have been improved by the Water Company currently operating sewage treatment works to higher standards than those required by the legal consent conditions.

Where these are considered essential to protect the environment, promote the maintenance of the current levels of performance. This applies particularly to the discharge of ammonia in effluents.

- Evaluate the costs and benefits of all significant schemes in order to maximise the environmental gains from the finite resources available.

- Enforce consents rigorously including taking legal action when required in order to protect the rivers from unacceptable deterioration or pollution.

Who is involved

Environment Agency, DETR, OFWAT, water companies.

4.1.5 ISSUE 5 - Pollution Incidents

Background

Industry and agriculture pose a threat of pollution when oil and chemicals are transported, handled, used and finally disposed of. This might result from accidents, inappropriate practices, vandalism or fires. Agriculture poses additional threats from the storage and disposal to land of slurries, farmyard manures and silage liquors. Some industrial wastes such as food waste, blood and gut contents from abattoirs, and paper-waste sludge, can have beneficial soil-conditioning and fertilising effects when spread on land and this is exempt from normal licensing requirements. These wastes are also potentially polluting.

All these legitimate activities, if not properly controlled, pose an increasing threat of significant pollution to our rivers which have improved dramatically in quality over the past five years leading to the return of viable, and on certain lengths thriving, fisheries. This success, in such an urbanised catchment, means that what were once considered minor pollution incidents have now become significant and could result in major fish kills.

While water from the Don is not abstracted for potable supplies, except from the upland reservoirs, it is used to water livestock, for spray irrigation and industrial use and these uses are adversely affected by pollution incidents.
(See *Section 5.2*)

Proposals

- Improve the understanding of all the community of the benefits of a thriving natural environment and the need for increased vigilance in protecting it from the risks of pollution incidents.

- Promote greater awareness in agriculture and industry of the benefits, both environmental and financial, of pollution prevention measures relating to the storage, handling and disposal of potentially polluting substances, including wastes: this could be achieved by campaigns targeted at both individual pollution issues and specific industrial sector activities. In addition, provide practical advice on how to minimise pollution risks.

- Evaluate incident data and target key problem areas for investigation and enforcement action for repeat offenders. This will raise awareness of the significance of pollution, of the need to prevent pollution, and of the fact that prevention is the cheapest solution under the principle of 'the polluter pays'.

- Improve liaison with those involved when waste is applied to land, including waste producers, contractors, farmers, landowners and ADAS in order to influence their activities towards best environmental practices.

- Increase monitoring, inspection and enforcement action where needed and continue to implement the Groundwater Protection Policy to safeguard groundwater resources and quality from land spreading as well as other industrial and agricultural activities.

- Provide input into education at all levels promoting awareness of environmental issues, particularly for the key stage requirements in science, in order to increase understanding of environmental issues in future generations.

Who is involved

Environment Agency, water companies, industry, agriculture, the public, waste producers, contractors, farmers, landowners, ADAS, educational establishments, emergency services.

4.1.6 ISSUE 6 - Illegal tipping of waste

Background

Illegal tipping, or 'fly-tipping', occurs at a many locations around the area. The types of materials vary, consisting mainly of household and builders' waste, but can include industrial and commercial wastes such as tyres, garage wastes and chemical drums.

Because of the ubiquitous nature of the problem, fly-tipping affects many people. It detracts from the amenity of their environment and in some cases might cause land and water pollution.

There is evidence that fly-tipping is an increasing problem. This may in part be a result of the introduction of the tax on wastes going to landfill which was introduced in October 1996. There is now a greater incentive to tip waste illegally and thereby avoid paying both the disposal charge and the tax.

It is often difficult to identify and find the culprits and in many case the tipping is cleared at considerable expense by the local authority or the landowners.

Proposals

- Monitor the incidence of fly-tipping to obtain more accurate information on the scale of the problem, the quantities involved and the geographical locations, in order to target resources for surveillance, to obtain evidence for prosecution of offenders, and to measure the impact of the new Landfill Tax.

- Improve pro-active response to incidents of fly-tipping by increasing vehicle stop campaigns to check on compliance with legislation on the transport, handling and disposal of waste.

- Initiate and implement campaigns in liaison with local authorities, police and other bodies designed to improve public awareness and discourage fly-tipping, including the use of freephone facilities and the development of publicity literature.

- Raise awareness of the far-reaching implications of the concept of duty of care within the legislation reinforcing this with media coverage of any high profile court cases that occur.

Who is involved

Environment Agency, local authorities including education, landowners, industry, the public, the Police, magistrates, voluntary organisations.

4.1.7 ISSUE 7 - Air quality

Background

In planning any improvements to the environment there is a need for up to date high quality information on the current state. Data that is currently collected by a number of parties on a local, regional and national basis could be better co-ordinated.

Data is available from many sources, the most useful of which are the fixed DETR and local authority monitoring points. Others provide specific regular or irregular measurements and meteorological data which also are useful. The identification and co-operation of available providers of data and other interested parties, possibly academic contributors and certainly local authorities who have the responsibility for local air quality plans, could promote a more constructive use of available data giving rise to more focused air quality planning.

Consideration should be given to means by which the Agency could provide more support to local authorities on local air quality plans, particularly in terms of the trans-boundary issues, modelling support and cooperative action programmes. The Agency's remit does not include issues such as traffic pollution, though this is an important factor in urban areas. The Agency and the public should be aware of the background level of pollutants from whatever cause, so that the relative importance of different pollution factors can be monitored. (*See Sections 3.4, 5.2 & 6.1*)

Proposals

- Provide information for public information and discussion on current air quality performance and standards within the area and the surrounding areas for the pollutants of most concern in the area - probably sulphur dioxide, oxides of nitrogen and possibly particulate matter, lead and volatile organic materials.

- Set up a project to examine the coverage, reliability and usefulness of air quality and meterological data, and make recommendations for improvement of data supply, collection or presentation/availability. This could include examination, where possible, of the extent to which 'critical loads' of pollutants are currently exceeded. ('critical load' see glossary).

- In partnership with local authorities, identify the major sources of emissions within the area and the trans-boundary effects of air pollution. Consider these as part of the overall background contribution to pollution and contrast with the contribution from traffic and domestic sources. This work can usefully be linked to the ongoing work on a protocol to identify and follow up pollution 'episodes' where guideline values are exceeded for specific pollutants.

Who is involved

Environment Agency, local authorities.

4.2 WATER MANAGEMENT

4.2.1 ISSUE 8 - Risk of Flooding

Background

Some vulnerable areas, such as Dronfield, experience relatively frequent flooding and are in need of flood alleviation schemes. Such undefended areas frequently suffer flooding causing damage to property, the closure of roads, and inconvenience and stress to inhabitants.

Other areas, such as Stainforth and Ea Beck near Doncaster, have flood defences which were built over 40 years ago, are nearing the end of their design lives and will soon have to be rebuilt. Areas defended by ageing flood defences may begin to suffer more frequent flooding and an increased risk of sudden flooding from structural failure of the defences.

Flood defences have been built on rivers in the Don Catchment for hundreds of years. Over the last 50 years a system of flood banks, washlands, and regulators has been developed. There are now several river regulating gates which are nearly 50 years old and nearing the end of their design lives, such as at Crimpsall and Woodhouse Mill. These regulators, which control the flow of water, will have to be renovated or rebuilt to ensure compliance with current standards and continued operational effectiveness.

If the structures are not replaced or renovated they will eventually fail. For a regulator gate this might mean that the washlands will not operate, increasing the risk of flooding. A significant level of maintenance is required to ensure that flood defences continue to offer the standard of protection for which they were designed.

Most of the flood defence structures were built in times when the rivers were unable to support fish life and therefore were constructed without consideration of the development of fisheries and their supportive natural habitat.

The Agency has for some years had a duty to enhance and conserve the environment. Consequently consideration of conservation issues and identification of environmental enhancements is an integral part of all flood defence activities.

Some of these ageing flood defences have become established as valuable wildlife habitats in their own right, and washlands frequently include wetland habitats of considerable nature conservation interest. Renovation of flood defences and provision of new defences must be planned carefully to ensure protection and enhancement of the environment.

At the downstream end of the Don catchment from Doncaster to Goole, large agricultural and urban areas are protected from tidal flooding. Sea levels are predicted to rise as a result of the effects of climate change and land levels are slowly falling because of the effects of the last Ice Age. (See *Sections 3.8 & 5.11*)

Proposals

- Operate a programme of prioritised maintenance using the Flood Defence Management System and incorporating environmental considerations through liaison and co-ordination with interested bodies.

- Implement new flood defence schemes in vulnerable areas such as Dronfield and Ea Beck, incorporating environmental benefits where possible

- Renew ageing flood defence structures such as regulators in Doncaster and Woodhouse Mill, tidal outfalls, floodbanks, and floodwalls at Stainforth, incorporating environmental improvements where possible, especially with regard to restoring fishery interest and improving fisheries.

- Extend the length of 'main river' to allow the Agency to use powers to carry out flood defence works, and have more control over works by others.

- Investigate opportunities to provide environmental enhancement of previous flood alleviation works.

- Review and improve the standard of flood defences in areas influenced by tidal activity such as Goole Docks.

Who is involved

Environment Agency, landowners, conservation bodies, MAFF, IDBs, local authorities.

4.2.2 ISSUE 9 - Washland areas.

Background

The severe flooding of 1947 in Doncaster prompted the development of a system of washlands to protect the town from future floods. The washlands are engineered to cream off the highest flood peaks from the Rivers Rother, Dearne and Don. The major washlands are controlled by regulator gates in the rivers to hold back water and cause it to flow into the washlands.

Since the design of these washlands many more years worth of river level data has been collected and there have been advances in hydraulic modelling. It is therefore thought that the operation of the washland system should be reviewed. This will involve a detailed analysis of all available data referenced to rainfall data and development of a detailed mathematical model of river flows and washland operation. If the operation of the washlands is not optimised flooding could occur more frequently and be more severe than need be.

Many of these washlands are valuable sites for nature conservation or offer potential for wetland rehabilitation. They also present opportunities to develop recreational and amenity interests. Wherever possible agreements are reached with Local Authorities, or conservation bodies to utilise the washlands while maintaining their primary function as flood storage. For Sites of Special Scientific Interest, Water Level Management Plans are developed to manage the various operational interests. Any washland system review must consider impacts of changes on the environment, and the potential for creation of new wetland features. (See *Sections 3.8, 5.11 & 5.13*)

Proposals

- Review the operational effectiveness of the Don catchment washland system by a modelling study on the catchment hydrology and river system.
- Utilise the model to prioritise a programme of work which might be identified by the study.
- Investigate opportunities to protect and enhance washlands as nature reserves and identify sites suitable for recreational use.

Who is involved

Environment Agency, landowners, conservation bodies, MAFF, IDBs, local authorities.

4.2.3 ISSUE 10 - Flood forecasting and warning

Background

The Agency aims to provide a flood warning service which comprises:

a) A 24 hour alarm-handling service to receive warnings of adverse weather conditions, and rainfall and river level alarms;
b) Flood monitoring and forecasting to predict possible flooding;
c) The issue of flood warning alerts to the public at risk at least 2 hours before the onset of any flooding;
d) The provision of further warning information to the public and the utilities via the news media and a recorded message system;
e) The issue of flood warnings to the Police, local authorities and emergency services;
f) A public awareness campaign aimed at raising the awareness of actions that can be taken by the public in a flood event.

Although the existing service covers the great majority of flood risk sites, it does not cover them all. The service is not currently offered for flood risk areas where it has not been technically feasible to predict flooding - for example in the upstream river reaches

which respond very quickly to heavy rainfall on the catchment. In addition, most flood risk sites which are not on a designated main river - and which often fall into the former category - do not currently have a flood warning service. Many flood risk areas are now protected by flood defences, and these generally have no flood warning service.

The potential benefits of improving and extending the flood warning service are significant, as warnings allow people to lessen or prevent flood damage by taking preventative action. (See *Sections 3.8 & 5.11*)

Proposals

- Carry out a survey of all flood risk sites to identify where warnings need to be improved, and where new warnings are needed. This will involve improvements to flood forecasting systems, dissemination systems (the systems which send out the flood warning alerts), and public awareness.

- Prioritise and implement improved flood warnings as identified in the surveys proposed above.

- Examine the use of weather radar as an input to flood forecasting models, and as a direct rainfall forecasting tool.

Who is involved

Environment Agency, MAFF, the Police, local authorities, the news media - both local and national, the public.

4.2.4 ISSUE 11 - Management of Abstractions, Reservoirs and Water Levels

Background

During the 19th century and early 20th century many tributaries on the Don system were reservoired to provide for industrial and drinking water supply. The compensation flow amounts set for the reservoirs were determined primarily by the industrial needs of downstream users and were not designed to protect the river's wildlife nor indeed to optimise the yields of any associated water supply reservoirs. There is thus significant potential for changes that would benefit both the environment and public water supply.

During the recent drought conditions of 1995/96 Yorkshire Water, in order to maintain public water supplies, were permitted to reduce the releases from the compensation reservoirs by up to two-thirds. Such reduction in flows can threaten the sustainability of a natural ecosystem. In reducing the flow; the water levels are reduced which lessens the wetted area available to support life; the depth and flow rate are reduced altering the balance between species; the temperature can increase affecting fish life; and there is reduced dilution available for effluents thus affecting water quality and the aquatic life dependent on it.

Resulting from its development as a navigation in the early 18th Century much of the lower River Don was canalised and was eventually severed from its natural course. Creating a canal which transferred much of the water of the Don to the Trent at Keadby. To take excess water a flood relief channel was created which flowed to the Ouse at Goole. This channel has, over the last century and a half, developed into a semi-natural river habitat. The improvements to water quality which have been achieved over the last decade have resulted in this channel becoming an important fishery. It is also the route through which salmon would have to pass if they were, in the future, to become re-established in the Don system.

Water taken from the river to support navigation has an effect on the main river similar to that of the reduced compensation flows. On some sections of the river the consequences are potentially worse as there is no control on the amount of water taken for the purposes of navigation. The diversion of the Don's flow to serve the needs of the navigation can, under low flow conditions, pose an additional threat to the fishery habitat in the flood relief channel as a result of increased siltation of spawning gravels.

Water management, including abstraction and flood protection, can not only affect river water levels, but also levels within adjacent wetland habitats. Adequate water level management is required to protect these habitats. Water level management plans are currently being produced for some sites e.g. Denaby Ings SSSI and Sprotborough Flash SSSI requiring agreement from all interested parties.
(See *Sections 5.9 & 5.13*)

Proposals

- Improve the hydrological data collected from the river system in order to establish the links and possible causal relationships between the flow regime and the river ecology.

- Evaluate the impact of the current compensation reservoir releases and those that occurred in the drought and establish revised release levels that afford the best environmental protection while meeting the legitimate needs of the water company.

- Establish effective arrangements with British Waterways Board (BWB) leading to a review of the impact of the current operating regimes on the ecology and proposals for more environmentally friendly options where these can be established whilst meeting the legitimate needs of BWB.

- Develop and promote with all interested parties revised water-level management plans designed to protect the wetland habitats.

- Formulate water level management plans for SSSI sites which serve a flood defence function.

Who is involved

Environment Agency, English Nature, Wildlife Trusts, British Waterways, Yorkshire Water Services.

4.2.5 ISSUE 12 - Groundwater resources

Background

The Sherwood Sandstone and Magnesian Limestone, occurring in the northeast of the area, are major aquifers used extensively for water supply, for agriculture, industry and for potable supply. There are major public water supply well fields in the Sherwood Sandstone in the Selby and Doncaster areas just outside the boundary of the area. These abstractions have caused a lowering of groundwater levels in the sandstone aquifer and might have implications for groundwater resources in the long term. A computer model of the Sherwood Sandstone aquifer in Yorkshire is being developed to assist resource assessment and predict long-term implications of the current abstraction regime. Routine monitoring of groundwater levels in the Sherwood Sandstone is an integral part of aquifer resource management.

Groundwater Protection Zones (GPZs) defined for the Selby and Doncaster well fields extend into this area and Groundwater Vulnerability Mapping across the area will continue to be used to protect the quality of these groundwater supplies via Planning Control and various enforcement measures.

Predominant rural land use over the major aquifers causes groundwater resources to be vulnerable to contamination from agricultural sources, such as nitrate leaching from agricultural fertilizers. Rising nitrate levels have been observed at some public water supply boreholes. To protect supplies, surrounding areas have been designated as Nitrate Sensitive Areas (NSAs) where the farmers will be compensated for changing agricultural practice to grow crops that will reduce nitrate leaching. Nitrate Vulnerable Zones (NVZs) have also been implemented to cover all NSAs and also additional supply sources that might exceed the European Drinking Water Directive on Nitrate by the year 2010. NSAs and NVZs centre on groundwater supplies outside the area, but the designated zones extend into this area and will influence its agricultural land use.

Groundwater baseflows from the Magnesian Limestone aquifer in the River Went catchment provide an important contribution to surface water flows within the catchment. Most groundwater currently abstracted from the limestone is used for spray irrigation. Granting of further licensed abstractions from the Magnesian Limestone within the catchment should be carefully controlled to safeguard groundwater baseflow contributions to the River Went flows.

Aquifers in the central and western parts of the area have limited groundwater resource value compared to those in the north-east: nevertheless they might still provide important supplies. The Carboniferous Coal Measures, though classed as a minor aquifer, might locally provide good borehole yields and many industrial supplies rely on them. The Carboniferous Millstone Grits, that form the hill country in the west of the area, provide numerous small public and private sources often used as drinking water supplies and for agriculture. (See *Section 5.10*)

Proposals

- Continue to control groundwater resources of the Sherwood Sandstone aquifer via a regional Sandstone aquifer management program involving on-going appraisal of abstraction licence policy, monitoring data, refinement of a computer groundwater resource model and development of Groundwater Protection Zones (GPZs) and Groundwater Vulnerability Maps.

- Protect groundwater quality in the Sherwood Sandstone aquifer via the NSAs implemented in 1995, Agency enforcement of the NVZ measures to be introduced in 1999 and on-going investigation and monitoring of three-dimensional groundwater quality changes.

- Continue to protect groundwater resources and quality from the impacts of mineral extraction and landfill via Planning Control, Waste Regulation licensing and a proposed expansion to the groundwater monitoring network.

- Carefully manage groundwater resources in the Magnesian Limestones of the River Went Catchment to protect the groundwater baseflow contribution to surface waters.

- Expand the groundwater monitoring networks in the Carboniferous Millstone Grit, Coal Measures and Magnesian Limestone aquifers in order to assess background water quality, pollution impacts and groundwater levels.

- Carry out further research and continue monitoring in order to evaluate potential effects of groundwater abstraction on wetland habitats and establish environmentally sustainable levels of groundwater abstraction.

Who is involved

Environment Agency, Yorkshire Water, farmers, landowners, local authorities.

4.3 SUSTAINABLE INDUSTRY

4.3.1 ISSUE 13 - Sustainable waste management

Background

Traditionally, solid waste has been disposed of in holes in the ground, above ground or incinerated, producing leachate, gases and particulates that have a potential to pollute the atmosphere and groundwater.

In response to waste management problems, Governments have proposed a strategy that aims to apply the principles of sustainable development to waste management. The strategy for sustainable development is outlined in the government White Paper 'Making Waste Work'. This uses the concept of the waste management hierarchy, with its emphasis on minimisation, re-use and recovery, with disposal being used only as a last resort. Targets are set in the strategy for achieving sustainable development and three key objectives have been drawn up for achieving effective waste management.

a) To reduce the amount of waste that society produces.

b) To make best use of the waste that is produced.

c) To choose waste management practices which minimise the risks of immediate and future environmental pollution and harm to human health.

The Agency recognises the potential for reclassification of waste materials for recycling, recovery, alternative use or conversion to fuels. Considerable advantage to the economy can perhaps be gained by the reclassification of some waste materials and the re-routing of some materials between industries to ensure the best use of resources in conversion, re-use and transport. Re-use or reconversion of materials could be promoted with waste management regulators and waste producers.

More sustainable waste management would reduce the need for disposal facilities, minimise the impact of those facilities we have and reduce the demand on our natural resources.

Implementation of the Strategy at a local level relies on the provision of sound information to inform local decision makers. Such information has been gathered for a number of years by many different responsible authorities. The data needs improving in quality and gathering in a consistent manner to allow it to be collated. (See *Sections 5.3 & 5.7*)

Proposals

- Promote the reduction of waste by encouraging industry to optimise processes and use technology so that there is less material in products and less waste produced in manufacture. The promotion of the waste management hierarchy will be our central strategic tool.

- Ensure that any future waste disposal facilities which are required are suitably located with adequate technical and management controls in place to prevent unacceptable risks to the environment.

- Provide training in waste management techniques and develop tools for use by staff so that they can more effectively promote and achieve the aims of sustainable waste management throughout industry.

- Liaise with local industry to identify any areas where the definition of waste might restrict recycling, reconversion or re-use, with the aim of influencing policy.

- Continue implementation of the Groundwater Protection Policy to safeguard groundwater resources and quality from current and proposed waste disposal facilities and activities.

Who is involved

Environment Agency, industry, business support organisations.

4.3.2 ISSUE 14 - Waste minimisation

Background

Many linked problems of waste creation and transport, fuel use and air pollution, recycling and environmentally friendly operation can be tackled by systematic study of alternatives to existing methods of working and operation. The promotion of this strategy is seen in the Environment Act 1995 and can be mutually beneficial to operators, the Agency and the public.

The Agency and its predecessor bodies have sponsored a number of successful projects on waste minimisation in particular. A current initiative is the Don Waste Minimisation project which follows on from the success of the Aire and Calder project. Other projects include Project Catalyst, based on the Mersey Basin and the Leicestershire Waste Minimisation Initiative. These projects, carried out in a number of companies, have demonstrated how waste minimisation techniques can reduce operational costs, save on raw materials, water and energy, and reduce waste outputs.

Industry and the environment would benefit from expanding the current Don Waste Minimisation Project and pursuing the aims and practice of the 3Es programme within the area (3Es is Emissions, Efficiency and Economics).

One of the main difficulties is that while the initiatives have been taken up by the larger firms they have not to any great extent been adopted by the small and medium enterprises. There is much scope for promoting increased uptake by these smaller enterprises, and identifying further sites and processes. (See *Sections 5.3 & 5.8*)

Proposals

- Continue to promote the Don Waste Minimisation Project and the associated waste minimisation methodology, including the identification of potential partners who would support further waste re-use, minimisation and recycling projects.
- Promote the use of the 3Es methodology in further companies and investigate development of the methodology for application on smaller companies.
- Support the adoption by industry of environmental management systems
- Liaise with local industry to identify any areas of control or regulation which might impede the development of sustainable industry.

Who is involved

Environment Agency, industry, business support organisations.

4.3.3 ISSUE 15 - Energy and Water Use

Background

Certain US electricity supply utilities have already demonstrated that by backing energy conservation campaigns they can reduce the need to invest in a new generating plant and thus reduce capital cost and pollution. This type of programme could be capitalised on by the Agency by tackling wasteful energy practices and turning the spotlight on water pumping and usage costs. There is a strain on aquifers and water resources in general caused by over-abstraction and practices such as the use of sprinklers and inappropriate spray watering techniques. The effect of merely preaching conservation practices has been shown to be fairly marginal and what is needed is active, positive and targeted programmes to get results first by discussion with appropriate bodies, followed by joint action plans.

Proposals

- Work with business, the Government Office and other agencies to promote conservation measures and efficient energy use practices. These might include efficient controls of heating, automatic lighting controls and high efficiency equipment for boilers, light sources and controls. 'Thermal pollution' and 'light pollution' should be more widely recognised and brought to public notice.

- Advocate firmer action to enforce licensing or metering for sprinklers and swimming pools (no prosecutions for example to date). These are areas of heavy water use and we need the controls now available to work everywhere.

- Encourage local councils to show the way with their own building stock, including schools, to cut energy and water use. Cooperation in education and publicity should be made available by the Agency.

- Seek the energetic participation of local groups in translating the conservation and sustainability messages from a corporate to an individual scale where small efforts by many can be made to produce big overall benefits.

Who is involved

Environment Agency, electricity, water, and gas utilities, local authorities, local environment and nature groups, business support organisations.

4.3.4 ISSUE 16 - Promotion of Sustainable Technologies

Background

Some of the historic and ongoing problems in the area are caused by the technologies in use which in some cases now have alternatives. The Agency is uniquely placed to take an overview of the environmental effects and consequences and the sustainability of processes which it regulates. Many improvements will also benefit the users of technology. Idea or information transfer programmes (of which there are some national examples such as the Environmental Technology Best Practice Programme) can increase the use of good practice with industry but it is important that effort be made to show that environmental gains can be made in addition to process improvement for operational or profitability reasons.

Proposals

- Provide an input to new business and business development and support initiatives at the local planning stage of projects with support tailored to local conditions and available techniques.

- Investigate provision and distribution of information on the benefits/disbenefits and sustainability of solvents and pesticides, use of fuels and their effects in a form useful for local distribution ie. through local councils, advice centres and environmental health departments.

- Investigate and promote replacement processes in the following or other industries *(suggestions requested during the consultation period)*.

  a) The use of prescribed chemicals in timber preservation. Work to change processes to more benign alternatives.

  b) Look at use of plating technology to reduce use of prescribed or undesirable materials (such as cadmium) and metal recovery systems.

  c) Look at mercury use: reduce in particular, emissions from dentists and industrial processes including caustic soda production use. (And crematoria?)

  d) Examine the glass industry's use of materials and fuels, recycling and recovery with respect to efficiency and sustainable practices.

  e) Examine the plastic industry's use of material and fuels, recycling and recovery with respect to efficient and sustainable practices.

- Promote ECO labelling of products and assess items producing heavy disposal or return costs for future action programmes.

- Look at barriers to using waste as a fuel and promote control and recovery practices via information supply and pricing structure towards good practice.

Who is involved

Environment Agency, local authorities, local industry, trade associations.

4.4 SUSTAINABLE ENVIRONMENT

4.4.1 ISSUE 17 - Land Use Planning

Background

Development proposals can be made without due consideration of the impacts or potential impacts on the environment. If problems are manifested after development has taken place, solutions can often be difficult and expensive to achieve. Local Planning Authorities control development through the land use planning system and consult the Agency within a defined statutory framework. This does not extend to the impact of development and transport on the environment for example. A positive approach by the Agency and developers to development control at the planning stage can enable measures to be incorporated into planning consents such that development will benefit the environment and improve the protection of people and property.

Development which takes account of the environment can reduce the risk of pollution to air, land and water from uncontrolled processes and inappropriate storage of chemicals on industrial sites. This is particularly the case where specific legal powers fall short of the duties placed on organisations like the Agency. The risk of flooding can also be reduced by development which would otherwise cause rapid surface water run off in urban areas or take up flood storage capacity. The conservation of water resources, the protection of wildlife habitats and reduction of the danger to people and property from the migration of landfill site gases are other goals which can be achieved through the control of development.

A specific issue is the overloading of sewers and sewage treatment works in urban areas leading to the pollution of watercourses. In the area severe overloading of sewers and sewage treatment works exist for example, in Rotherham and parts of Sheffield. Although the Environment Agency is active in proposing limited future development in such areas until adequate infrastructure is provided, it is recognised that areas might have already been designated for future residential, commercial or industrial development in line with local plans. It is essential therefore that the Agency gives advice at a local level and regional level in order that our commitment and duties to protect and improve the environment are achieved.

Without a considered involvement in the land use planning system the Agency will not be able to achieve its commitment to sustainable development or its duty to protect the Environment. There are close links between this issue and all other issues.
(See *Section 3.2*)

Proposals

- Work with local planning authorities to include policies within their strategic plans which will assist the Agency in protecting and improving the environment.

- Integrate Development Plans (i.e. Local Plans, Unitary Development Plans and Structure Plans) and Asset Management Plans of the water companies with the LEAP Action Plan.

- Participate fully in the development control process in order to safeguard the environment and encourage enhancement as part of the Agency's duties.

- Carry out survey work under Section 105 of the Water Resources Act 1995 on watercourses identified as being under pressure from development.

- Undertake proactive campaigns of education to promote understanding of how to achieve development which is in tune with the natural environment.

- Enhance understanding of the Agency's flood defence policy on floodplain by promoting the new guidance document 'Policy and Practice for the Protection of Floodplains' (1997).

Who is involved

Environment Agency, local authorities, developers, water companies.

4.4.2 ISSUE 18 - Recreation and Heritage Protection

Background

The improving environment of the Don catchment has once again raised awareness of its potential as a source of recreational opportunity. As owners of considerable land assets on and adjacent to the rivers of the system, the Agency can provide opportunities for increased recreational use by collaborating closely with other organisations.

Improving access, leasing fishing rights and developing facilities are all issues which are actively being addressed with particular emphasis being placed on the need for disabled access and use.

Throughout the area there are sites of archaeological and heritage interest which are worthy of protection. The rivers' link to the industrial development of the area is of particular importance and many opportunities exist through collaboration with other organisations for the Agency to assist in the protection or restoration of such sites. (See *Sections 5.16 & 5.17*)

Proposals

- Investigate opportunities to agree formal leases for fishing arrangements on property owned by the Agency ensuring that day ticket facilities are available to the general public.

- Provide permissive access to the public onto Agency owned land where this is practicable and can be enjoyed in safety.
- Support initiatives to protect the architectural and heritage value of the catchment.
- Investigate opportunities to facilitate the use and enjoyment of the catchment by disabled and disadvantaged groups.

Who is involved

Environment Agency, local authorities, local action groups, conservation bodies, Yorkshire Water.

4.4.3 ISSUE 19 - Conservation of Species and Habitats

Background

For almost nine hundred years industrial activity in the catchment has had an impact on the ecological diversity of the river system. These impacts, both chemical and physical reached a peak in the middle of the 19th century and were perpetrated throughout most of this millennium resulting in the almost total destruction of the river ecosystem.

Recent improvements to water quality have allowed many species to naturally re-colonise or be re-introduced to the system. However, further chemical improvements and much physical rehabilitation, along with protection of existing valuable habitats, is required to achieve the ecological diversity of the pre-industrial catchment. The loss of important natural habitats has a limiting effect on the restoration or re-establishment of certain species such as the otter and the salmon, and has a degrading effect on the ecosystem as a whole.

Despite past deleterious impacts, the area does still hold populations of declining species such as the White-clawed Crayfish and the Water Vole. As well as habitat protection and enhancement, monitoring is required, along with research and education, in order to reduce other threats to uncommon species.

Particularly limiting to fish populations are the large number of weirs and other obstructions which inhibit free movement within the system. These have the effect of preventing certain species from reproducing successfully by preventing them from reaching suitable spawning areas. The removal of the structures, or the provision of suitable ascent facilities is essential if the fishery potential of the catchment is to be fully realised. Account would need to be taken of the views of anglers on the development of the Don as a salmonid fishery, which would also have major implications for resources for water quality and for enforcement for the Agency and others.

Another problem is non-indigenous species and non-endemic disease organisms which pose a threat to established flora and fauna. Non-indigenous plant species such as Japanese Knotweed and Himalayan Balsam have become well established in the catchment resulting in the elimination or restriction of more acceptable indigenous species.

With the re-introduction of fish into the catchment the risk of transfer of disease organisms, which could pose a threat to future populations, is ever present. This threat is also present from the transfer of fish by angling clubs and fishery owners to still waters which are connected to the river system.

Inappropriate or poor management of fish populations in enclosed waters throughout the area threatens the overall ecology of such waters. The maintenance of a balanced ecosystem is essential for the healthy development of fish populations in still waters. Overstocking of waters or the introduction of unsuitable species can result in damage to, or the complete elimination of indigenous species, of plants, invertebrates and fish.

In recognition of the overall benefits to the community the Agency will be exploring opportunities to enter into collaborative projects with local authorities and others to achieve the maximum sustainable benefit. (See *Section 5.13*)

Proposals

- Undertake monitoring of the catchment's ecosystem to establish priorities for future management and investment.
- Investigate the effects of in-channel obstructions such as weirs on fish movements and prepare priorities for the provision of fish passage facilities.
- Promote the ecologically sound management of still water fisheries through the provision of advice designed to protect the whole water environment.
- Work closely with Flood Defence on capital and maintenance work to protect and enhance the ecological status of all sites.
- Work with farmers and landowners via the area's joint project with the Farming and Wildlife Advisory Group.
- Develop collaborative projects to improve the environment with local authorities and other agencies for example, the Countryside Commission Dearne 2020 initiative.
- Work with Flood Defence to establish water level management plans to protect wetland sites throughout the catchment.

- Work in collaboration with English Nature and Local authorities to address joint responsibilities under Biodiversity Action Plans, the Natural Areas Programme and as part of the Agenda 21 programme.

Who is involved

Environment Agency, local authorities, navigation authorities, private owners, fishery owners.

PART II

Part II is divided into two sections plus Appendices, and provides background information to support Part I.

Section 5 identifies the uses, activities and pressures on the environment in the South Yorkshire and North East Derbyshire area.

Section 6 examines the current situation, measuring the environmental quality of the area against measured targets (if available).

5.0 USES. ACTIVITIES AND PRESSURES

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5.0 USES, ACTIVITIES AND PRESSURES

5.1 URBAN DEVELOPMENT

Background

The broad objective of local Environment Agency planning is to conserve and enhance the environment through effective land and resource management. While the Agency is well placed to influence some of the factors which impact on the environment, through its regulatory powers, it has little control over the mechanisms which determine land use change. This is largely the responsibility of the local planning authorities (LPAs) through Town and Country Planning Legislation.

The Agency is a statutory consultee on development plans for categories of development specified in Article 10 of the Town and Country Planning (General Development Procedure) Order 1995 and under Regulation 8(6) of the Town and Country Planning (Assessment of Environmental Effects) Regulations 1988 for planning applications relating to specific types of project. LPAs also consult the Agency 'informally' on other development applications which have the potential to have an adverse impact on the environment.

The Agency participates in the planning process to protect the public and the environment, within its sphere of responsibility, from any adverse effects associated with development and will oppose any specific development which conflicts with this purpose. Furthermore, it will encourage LPA's to adopt policies for protecting both the public and the environment. The final decision on planning matters rests with the LPA. (See *Section 3.2*)

Local Perspective

Almost one and a half million people live in the LEAP area, concentrated in the urban areas of Barnsley, Doncaster, Chesterfield, Sheffield and Rotherham. In addition, there is a long history of industrial and commercial activity, especially in metal manufacture, the production of metal goods and engineering.

The Agency has a full and active dialogue with all the local planning authorities, within the LEAP area, at all levels of development control. This extends from making comments on individual applications to providing policy inputs to structure and local plans.

Table 6: Current status of development plans in the LEAP area (June 1997).

Area : Local Authority, Title of Plan	Recent Progress
Selby Selby District Council Area Wide Local Plan.	Estimated Adoption date - Dec 1997.
Kirklees	The Public Inquiry for the Unitary Development Plan closed in Sep 1996. The Inspector's Report is due by Sep 1997.
Barnsley Barnsley Urban Area Local Plan - Adopted May 1996. Dearne Towns District Plan - Adopted June 1992. Penistone District Plan - Adopted July 1992. Wombwell Town Centre Local Plan - Adopted May 1994. Darton Local Plan - Adopted Feb 1986. Dodworth Local Plan - Adopted Nov 1985. South Yorkshire County Structure Plan - Adopted 1980.	The Public Inquiry for the deposit draft of the Unitary Development Plan ended Feb 1997. Inspector's Report will be received September 1997.
Wakefield Wakefield Unitary Development Plan - Adopted Dec 1994.	To be reviewed although timetable to be established. Consultation draft available in 1998.
Doncaster Mexborough, Conisborough District Plan - Adopted 1982. Armthorpe, Edenthorpe, Kirk Sandall, Barnby Dun and adjoining areas District Plan - Adopted 1987. Thorne, Stainforth, Hatfield District Plan - Adopted 1984. Adwick, Bentley, Sprotborough Local Plan - Adopted 1989. Balby, Hexthorpe Local Plan - Adopted 1989. South Yorkshire County Structure Plan - Adopted 1980.	The Public Inquiry for the Unitary Development Plan ended Feb 1996. The Inspector's Report has been received and modifications will go on deposit in June 1997.
Peak District Peak District National Park Plan - Adopted 1989. National Park Structure Plan, First Review - Adopted 1994.	A park-wide local plan went on deposit in March 1997, with the Public Inquiry expected in Jan/Feb 1998.

SOURCE : BDS Marketing Research.

Area : Local Authority, Title of Plan	Recent progress
Rotherham Swinton, Wath upon Dearne, Brampton Bierlow District Plan - Adopted 1984.* Green Belt Local Plan - Adopted 1990. Rotherham County Borough Development Plan - Adopted 1955. Rotherham County Borough Development Plan : Town Map Amendment No. 1 - Adopted 1969. West Riding County Development Plan : - Adopted 1973. • Don & Dearne Valleys Town Map (First Review), • Rotherham Rural District Town Map No. 15 (First Review).	Part I of the Unitary Development Plan has been out for consultation. A Public Inquiry for the whole UDP officially in May 1997. The Inspector's Report is currently being awaited. *Parts of this plan have now been superseded by the Swinton Plan.
Chesterfield Chesterfield Borough Local Plan - Adopted Feb 1996.	
Bolsover Northern Parish Local Plan - Adopted March 1990 Old Bolsover/Hillstown Local Plan - Adopted July 1993.	The consultation period for the deposit draft of the district wide Local Plan ended in May 1996. A deposit draft will be available in Autumn 1997.
North East Derbyshire Clay Cross and North Wingfield Local Plan - Adopted Dec 1990. Wingerworth Local Plan - Adopted April 1986. South Eastern Parishes Local Plan - Adopted June 1987.	The Southern Area Local Plan will now be incorporated into the district wide plan. The draft district wide Local Plan was on deposit until Nov 1997. The Inspector's Report is expected in August 1997.
Sheffield City Green Belt Local Plan - Adopted Dec 1983. Stocksbridge District Plan - Adopted May 1984. Darnall District Plan - Adopted Sep 1984. Central Area District Plan - Adopted Oct 1988.	The Public Inquiry for the UDP ended in March 1996. The Inspector's Report has been received and will go on deposit in Autumn 1997.
Derbyshire Dales Wirksworth Local Plan	A draft District wide Local Plan went to a Public Inquiry which ended in Sep 1996. The Inspector's Report has been received and modifications will go on deposit in June 1997.

SOURCE : BDS Marketing Research.

Significant planning applications in the area include development of contaminated land and siting of landfill sites. There is pressure to build on green sites.

PPG 12 "Development Plans and Regional Planning Guidance" states that particular attention should be paid to the protection of groundwater resources as, once contaminated, it is difficult to rehabilitate the resource. This is an issue with some planning applications in the Doncaster area.

Significant areas for commercial development are the Wath Regeneration Scheme in the Dearne Valley and the regeneration of the main industrial area of Sheffield. There are Enterprise Zones in the Barnsley, Doncaster and Rotherham MBC areas. These sites for commercial development and landscaping have already been granted planning permission and the Agency has requested and obtained conditions to be attached to protect the environment.

Industrial developments can result in contaminated surface water runoff, which may find its way to local watercourses. The main sources of contamination are:

- spillages of oils and chemicals;
- oil and petrol from hard standings and storage areas; and
- water used for vehicle washing.

The Agency will advise/request planning conditions, where necessary, to ensure that hard standings and parking areas are properly drained with oil interceptors or trapped gullies as appropriate. Oil and chemical storage facilities must be adequately bunded. Firewater containment must be provided for particularly hazardous sites.

PPG 23 "Planning and Pollution Control" states that sewage disposal is capable of being a material consideration in the determination of a planning application. The Agency will advise LPA's where existing facilities are considered inadequate and encourage development to be phased in line with improved infrastructure provision.

Control of development in flood plains and other flood risk locations is an essential Agency activity. Under DoE circular 30/92 'Development and Flood Risk' Planning Authorities are required to seek the advice of the Agency with regard to flood risk as part of the planning process. This covers enquiries about flooding records at a site, and also the issue of flood risk from increased surface runoff as may be caused by large areas of roofing or car parks. To publicise and explain the Agency's flood defence policies relating to development in flood plains, a new document was been produced earlier this year (1997) titled 'Policy and Practice for the Protection of Floodplains'.

5.2 TRANSPORT

Background

The Environment Agency has no direct control over transport policy and the resulting emissions. However, traffic emissions form a very significant part of overall contributions to pollution levels and any measurement or assessment of overall levels and trends must recognise the contribution of the transport sector. The European Commission have published a Green Paper 'Impact of Transport on the Environment' which outlines an EEC strategy for sustainable mobility and highlights the expected growths in all forms of transport with consequential increased pollution levels.

Table 7: The Contribution of Road Traffic to Pollution Emissions in 1993 and 1994

Pollutant	Percentage of total pollution emissions 1993	Percentage of total pollution emissions 1994
Hydrocarbons	38%	29%
Nitrogen Oxide	49%	49%
Carbon monoxide	91%	88%
Carbon dioxide	20%	20%

(Source: DoE Digest of Environmental Protection and Water Statistics numbers 17 and 18 - 1995/6)

On this substantial pollution load is superimposed that from domestic housing with the balance made up from power generation and other industrial sources. National Planning Policy Guidance relating to this is set out primarily in PPG 12 and PPG 13. It recognises the need to reduce the amount of transport and encourage the use of acceptable alternatives to the private car.

Local Perspective

Parts of the LEAP part are fairly heavily industrialised and the problems of transport are significant contributors to pollution particularly in the vicinity of major transport arteries. The area is crossed by the M1, A1, M18 and M62 motorways.

Road schemes can provide large areas of impermeable surface draining to a single point, discharging into either a watercourse or to soakaways and may pose increased flood and pollution risks. Pollution can occur as a result of accidental spillage or as a result of the cumulative effects of tyre and brake wear, vehicular emissions and the use of de-icing materials. (See *Issue 5*)

Local data collection for local air quality plans to be submitted by local authorities and on a wider area scale information submitted for the local area Environment Agency Plan have both to take into account the big contribution of transport to the overall pollution level. (See *Issue 7*)

5.3 INDUSTRIAL PROCESSES

Background

Emission controls on major industrial processes as are prescribed under the Environmental Protection Act for integrated pollution control ensure compliance with current best technology and practice. Contributions to emissions from the much greater number of smaller unregulated processes and from commercial and domestic sources and transport now outweigh the contributions of the emissions from a small number of very large industrial processes in most areas. Because of the scale of the operation power generation and other larger combustion processes should probably be treated as an exception to this rule.

Local perspective

The area has traditionally been the home of large scale mining and metallurgical industries - principally steel making. Industrial change has much reduced the predominance of these traditional industries in the area but many resulting problems remain to be solved such as those of contaminated land and mine water. The mining industry continues on a much smaller scale, with only one deep mine left, and open casting operations now cause more disturbance than deep mining.

The use of coal as a fuel has fallen in power generation and other heavy industrial sectors as industries turn to cleaner fuels and updated production methods though electrical power generation from solid fuel sources continues on a very large scale. The area is influenced by a number of very large coal fired power stations to the south of the area along the Trent Valley and also to the north of the area between Leeds and the Humber. The stations currently operating in these areas continue to be major emitters but all have programmes to reduce emission levels over the next few years.

Other industry in the LEAP area is generally on a smaller scale and uses technology which is capable of good control of emissions in most cases. The majority of industry is now reaching a point where difficulties are being encountered in accurately measuring many of the low emission levels now encountered. Local problems, particularly of dust and odour, continue to be associated with some of the more traditional processes.

The major concern is that industrial processes should continuously operate the best abatement equipment. Major emissions are usually associated with malfunctions or accidents, the frequency of which can be minimised but never completely eliminated. Certain climatic conditions can give rise to temporary local problems and exceedances, now usually pollution from traffic or in certain cases domestic coal burning. (See *Issue 14*)

In addition to the mining and metallurgical industries the area has a wide mix of industrial processes in all industrial sectors including carbonisation and associated processes, non-ferrous metals, minerals and refractories, glass manufacture (regulated under Air Pollution Control by local authorities) and a variety of chemical plants, the

Wansley Beck
West Beck
R. West
The Shell
La Beck
Cawthorne Dike
R. DEARNE
Cudworth Dike
BARNSLEY
R. Dove
DONCASTER
R. DON
R. DEARNE
Little Don
STOCKSBRIDGE
Dodon Beck
R. DON
Blackburn Brook
ROTHERHAM
R. Loxley
R. Rivelin
SHEFFIELD
Shire Brook
Pigeon Bridge Brook
R. Sheaf
The Moss
R. ROTHER
R. Drone
Barlow Brook
Holme Brook
CHESTERFIELD
Poole Brook
R. Hipper
Trickett Brook
R. ROTHER
R. Doe Lea
0 2 4 6 8 10km
Scale

SOUTH YORKSHIRE AND NORTH EAST DERBYSHIRE AREA

LICENSED IPC SITES

KEY

- CATCHMENT BOUNDARY
- RIVER
- TIDAL LIMIT
- FUEL COMBUSTION OR PRODUCTION
- METAL PRODUCTION AND PROCESSING
- MINERAL INDUSTRIES
- CHEMICAL INDUSTRIES
- WASTE DISPOSAL AND RECYCLING
- OTHER INDUSTRIES

Figure 7

largest of which are located in the south of the area. The area has some modern examples of incineration equipment used for incineration of sewage sludge, municipal waste and clinical waste. The use of incineration rather than landfill for disposal of waste is an ongoing debate where local concerns, needs and availabilities are an important part of the equation governing future development of such facilities. (See *Figure 7; & Issue 13*).

5.4 POWER GENERATION

Background

Power generation from fossil fuels contributes to the problems of atmospheric pollution and impacts on local air quality by releasing sulphur dioxide and oxides of nitrogen. The Environment Agency directly regulates only those installations of more than 50 megawatt thermal input. Local authorities regulate installations of between 20 and 50 mega watts thermal input as Part B processes under the Environmental Protection Act. Thus currently many substantial installations (below 20 megawatts) are not similarly regulated on emission standards.

Local Perspective

Major thermal power stations are located outside the area to the north, at Ferrybridge, Eggborough, and Drax, and in the Trent Valley to the south causing possible pollution in the LEAP area. Improvement of efficiency and optimisation of emissions from all sizes of unit, including those below the limit currently regulated by local authorities, would reduce pollution. Domestic solid fuel burning is decreasing but still represents a significant contribution to levels of sulphur dioxide and particulate pollution levels.

5.5 STORAGE AND USE OF RADIOACTIVE MATERIALS

Background

Radioactive materials are used in many aspects of modern medicine and industry. The Radioactive Substances Act 1993 provides for controls to be exercised over the use and keeping of radioactive materials and the accumulation and disposal of radioactive waste. The Agency is responsible for administration and enforcement of the Act in England and Wales: this takes the form of registrations for keeping and using radioactive materials and authorisations for accumulating and disposal of such material.

Local Perspective

There are no major nuclear installations in the area but there are a number of medical and industrial uses, of which industrial radiography as a service primarily to the metal industry is the most predominant. Because of the geology of the LEAP area the background radiation from the earth and cosmic sources is not high: this and the lack of major nuclear sites in the area means that radioactivity is not a matter of major concern in the LEAP area.

5.6 MINERAL EXTRACTION, MINING AND ASSOCIATED ACTIVITIES

Background

Mining and quarrying can affect the water environment as a result of the physical presence of a mine or quarry, dewatering, or discharges from a site. Quarries can intercept runoff from surrounding areas thereby depriving surface water features of water, or intercept groundwater flow which may feed springs or provide groundwater supplies through borehole abstractions. Dewatering at mines and quarries can affect groundwater flow which can then affect groundwater abstraction, springs and surface water features by reducing inflow and lowering the water table. Discharges can have an impact on receiving waters. For example, the presence of elevated levels of suspended solids can clog the bed of a stream creating a poor environment for flora and fauna.

Mining subsidence can also affect flood defences and the level of protection provided. Where major coalfields are involved many of the older mines also had associated coking plants which caused significant contamination of the sites, groundwaters and surface water. Spoil heaps containing metal oxides such as iron can pollute the water environment.

Open casting operations and washing of old colliery spoil heaps to reclaim coal create similar problems. Conversely these methods can be used as part of comprehensive reclamation methods for regenerating sites contaminated by previous mining operations.

County Councils attempt to control the extraction of clay, limestone, sand and gravel so as to ensure an adequate and steady supply for industry. Mineral working has the potential to affect the LEAP area both as a direct result of the extraction works themselves and through discharges of effluent. After-use of the sites can have consequences on groundwater levels and groundwater movement, and on watercourses and water level dependent habitats.

Mineral extraction can also affect flooding: raised banks around gravel pits can obstruct flood flows; pits worked 'dry' can lower local water tables; restoration of pits can change the pattern of underground water flows. These issues should be addressed at the planning stage.

When properly managed and planned, mineral workings are not necessarily incompatible with environmental protection. Some habitats are irreplaceable, but others can be mitigated for or improved upon by imaginative restoration. Such restoration can provide recreational opportunities or can be designed to create diverse wetland habitats which may add significantly to the nature conservation resource and help replace certain types of habitats lost from floodplains.

Local Perspective

The area has only one remaining active coal mine, at Hayroyd near Scissett. Active pumping and treatment of minewaters still continues, particularly at the former Woolley Mine, near Barnsley operated by the Coal Authority to prevent flooding of the Caphouse

mining museum near Wakefield and polluting discharges to the River Calder. Monitoring of the minewater rebound in the Barnsley area continues with close liaison on potential problems. In addition minewaters continue to be pumped by RJB Mining to the Don at Carr House, Rotherham; to protect the mines at Maltby and Rossington; and to the Rother at Williamthorpe, Hartington, Blax and Cresswell to protect several active mines to the south. Pumping arrangement are continually under review to balance environmental and operational requirements. (See *Issue 2*)

Opencasting and washing of colliery spoil occur throughout the area and new proposals continue to be received. The largest site, of some 1200 hectares at Arkwright, involved moving the whole village to avoid methane problems resulting from previous mineworkings. Certain major sites such as Orgreave, near Sheffield, involve not only the open casting of the site but also provision of a landfill site cell constructed to safely dispose of the contaminated material.

English Partnerships, a government body whose responsibilities include regeneration of industrial sites, has taken over the former British Coal Property portfolio of sites. In this area there are twenty-four sites varying in size from a few hectares to several hundred hectares. The programme of regeneration will take between eight and ten years and a close collaboration with the Agency has been established to determine how maximum environmental benefit can be achieved. Many of the sites will involve recovery of the underlying coal.

A number of other quarries for clay, limestone and aggregates, sand and gravel have comparatively little impact on the environment.

5.7 WASTE MANAGEMENT

Background

Waste poses a threat to the environment and to human health if it is not managed properly and recovered or disposed of safely. It is essential, therefore, that everyone in the waste disposal chain from production and transport, through to final disposal or recovery, manages waste in a safe and proper manner. Legislation places a 'duty of care' on everyone who must, by law, take all reasonable steps to look after any waste they have and also prevent its illegal disposal by others. This duty includes the requirement to store waste in a safe and secure manner.

Any site where waste is disposed of, recycled or recovered can have an adverse effect on the environment if it is not properly managed. Some of these impacts can be long term and may have serious consequences. For example, the landfilling of biodegradable materials gives rise to the production of landfill gas which contains methane. The uncontrolled release of gas from landfill sites could give rise to an explosion hazard.

SOUTH YORKSHIRE AND NORTH EAST DERBYSHIRE AREA MAJOR WASTE MANAGEMENT FACILITIES

KEY

- CATCHMENT BOUNDARY
- ADMINISTRATIVE BOUNDARY
- MAIN ROAD
- TREATMENT PLANT
- LANDFILL
- SCRAPYARD
- TRANSFER STATION

Figure 8

Similarly, many materials which are landfilled give rise to a potentially polluting leachate, the uncontrolled seepage of which from a landfill site has the potential to pollute groundwater and surface water. Problems of this nature can be very difficult to remedy after the event. The release of both landfill gas and leachate continues for many years, often decades after the landfill operation has ceased. There are a number of sites in the area which were not subject to the more stringent controls which exist today and which, therefore, may still have the potential to cause problems.

Other impacts of waste management facilities such as litter, vermin and dust, can be quickly and easily remedied.

A control system of licensing and inspections for waste sites is implemented and enforced by the Agency: it aims to ensure that waste activities do not cause pollution or harm to human health. Illegal disposal of waste, often by burning or dumping, can cause a serious public nuisance and on some occasions be dangerous.

Failure to adequately handle and dispose of wastes classified as special wastes carries the greatest potential risk. The Agency enforces special waste legislation which tracks the movement of these wastes from the points of production to their final disposal or recovery.

It is generally recommended that waste is disposed of as close as possible to its source: this is referred to as the 'proximity principle'. It is sometimes necessary to move some waste over great distances, across international boundaries, because it requires specialist treatment. The Agency implements regulations to control these trans-frontier movements of waste.

By reducing the amount of waste we produce, and increasing re-use, recovery and recycling of waste, we can reduce the pressure on the environment. Recent legislation places responsibility upon the producer of waste and is intended to increase the recovery and recycling of various waste streams. The first scheme was introduced in early 1997 and relates to packaging and packaging waste. Further regulations are likely to follow for other waste streams such as tyres and scrapped cars.

Local Perspective

The major waste management facilities in the LEAP area are shown in *Figure 8*.

The figures quoted in the text below are for the four local authorities in South Yorkshire - i.e. Barnsley, Doncaster, Sheffield and Rotherham.

Disposal of controlled waste

The LEAP area is heavily populated and industrialised. It is estimated that about 2.6 million tonnes of controlled waste is disposed of in the area each year. Cross-boundary movement of wastes for vary enormously from year to year and are difficult to monitor, but overall the area is a net importer, imports accounting for approximately 340,000 tonnes.

Landfill is the main disposal method used in the area and there are 306 licensed landfill sites. Several of these are engineered to minimise the risks to groundwater from waste which have the potential to pollute. There are other smaller sites which take only inert wastes. A number of sites have gas management systems in place and two extract the gas for use as an auxiliary fuel in brick manufacture. In addition to landfilling, substantial quantities of household and commercial waste from the Sheffield area are disposed of at the Bernard Road plant where waste is incinerated and energy recovered to produce heat.

A substantial proportion of waste passes through intermediate waste handling or treatment facilities before being finally disposed of. There are ninety-two licensed transfer stations, one hundred scrapyards and vehicle dismantlers, twenty-one civic amenity sites and seven chemical treatment plants. The total throughput of all licensed sites is about 4.52 million tonnes of waste per year.

In addition to the above, significant quantities of waste are disposed of at 576 registered non-licensed sites. Some industrial effluent and solid wastes such as food wastes, abattoir waste, paper pulp sludge wastes and biological treatment effluent are applied to land for beneficial purposes. It is estimated that 170,000 tonnes per annum of waste is applied to land in this way. In addition approximately 160,000 tonnes per annum of inert wastes is disposed of at exempt sites, where it is used primarily for site reclamation and improvement purposes.

Approximately 51,000 tonnes of special waste was produced in the area in 1995/6. The major categories of special waste were acids, alkalis, asbestos and chlorinated and non-chlorinated solvents. Most special waste produced in the area, is disposed of at local landfill sites. In addition the area is a net importer of special waste and approximately 46,000 tonnes of special waste was imported during 1995/6.

Approximately 1.28 million tonnes of waste from the construction and demolition industry was disposed of in 1996/7, of which about 25% was from contaminated site clearance.

Recovery and Recycling of Controlled Waste

Significant quantities of waste of all types are recycled: household, commercial, industrial and construction/demolition materials. Because most of the reprocessing takes place at unlicensed facilities it is difficult to estimate the precise quantities involved.

In the LEAP area the scrap metal recycling industry has a well established infrastructure of collectors and reprocessors. There are currently over one hundred authorised scrapyards and vehicle dismantlers: these sites handle in excess of 600,000 tonnes of scrap metal each year, most being used as raw material in the steel making industry. (See *Issue 13*)

5.8 EFFLUENT DISPOSAL

The disposal of effluents from industry, sewage treatment works, sewerage systems and agriculture can have a significant impact on the quality of receiving waters particularly when treatment is inadequate or dilution is low. (See *Issue 4*)

The Environment Agency is responsible for the protection from pollution of rivers, canals, estuaries, coastal waters and groundwater, known as 'controlled waters'.

Effluent discharges are controlled by consents and authorisations which impose conditions to regulate the quality and quantity of the discharge. Conditions are set taking account of upstream water quality, the dilution available and the quality required downstream to achieve the desired Water Quality Objective.

The Agency uses two principal schemes for the reporting and management of river water quality: the General Quality Assessment (GQA) scheme and the Water Quality Objectives (WQOs) scheme - soon to be made statutory. Both are described in greater detail in *Appendix D*. The Agency is continually reviewing discharge consent conditions to ensure that objectives will be met. The review may result in variation of a consent or authorisation. When setting new conditions the Agency needs to specify a reasonable and practical timescale for the discharger to carry out the required improvements.

The Agency monitors water quality using a network of sampling points which are targeted to provide an accurate water quality classification. Similarly, effluent discharges are monitored to ensure that discharges comply with the conditions set in their consents or authorisations.

Yorkshire Water Services supplies drinking water, disposes of sewage, operates sewerage systems and maintains public registers of drinking water quality within the LEAP area.

The Office of Water Services (OFWAT) is the regulator of the water industry ensuring that customer interests are represented in terms of quality and efficiency of service and price paid.

Local Perspective

Trade discharges and abandoned minewaters, and sewage treatment works are shown in *Figures 9 and 10*.

Upper Don

Headwater reservoirs can greatly reduce the flow on certain lengths of river, increasing the effects of relatively minor discharges which can have significant localised impact due to lack of dilution. In addition, discharges of ochrous, rust coloured, water from abandoned coal mines, such as Bullhouse and Sheephouse Wood have a major impact on water quality and the ecology of the river.

West Beck
Wombwell Beck
The Skell
Ea Beck
Cawthorne Dike
R. DEARNE
BARNSLEY
Dearne Drike
R. Dove
R. DEARNE
DONCASTER
R. DON
Little Don
R. DON
STOCKSBRIDGE
Ewden Beck
R. DON
Blackburn Brook
ROTHERHAM
R. Loxley
R. Rivelin
SHEFFIELD
Shire Brook
Pigeon Bridge Brook
R. Sheaf
The Moss
R. Drone
R. DRONE
Barlow Brook
Holme Brook
CHESTERFIELD
Poole Brook
R. Hipper
Trickett Brook
R. DRONE
R. Doe Lea
0 2 4 6 8 10km
Scale

SOUTH YORKSHIRE AND NORTH EAST DERBYSHIRE AREA

TRADE DISCHARGES & ABANDONED MINEWATERS

KEY

- CATCHMENT BOUNDARY
- RIVER
- TIDAL LIMIT
- TRADE DISCHARGES
- ABANDONED MINEWATER DISCHARGES

TRADE DISCHARGES

1. Hepworth Building Products
2. J. Flack & Sons
3. Shuttle Eye Colliery Tip
4. Stocksbridge Steel Works
5. Jamont (British Tissue)
6. Wooley Colliery
7. Dodworth Tip Leachate
8. Carlton Ind. Estate
9. Sheepbridge Ind. Estate
10. Hickleton Tip Leachate
11. Monkton Coking Works
12. Cudworth North Tip
13. Boulder Bridge Scrap Yard
14. BC Sharlston
15. Croda
16. Tinsley Wire
17. Brinsworth Steel Works
18. VHE Cortonwood Redevelop
19. Laporte Flourides
20. Rhone Poulenc
21. Holmewood Ind. Estate
22. Coalite Chemicals
23. Coalite Fuels
24. Coal Products, Wingerworth
25. Langwaithe Grange Ind Estate
26. BC Frickley
27. BC Brodsworth
28. BC Askern
29. John Carr
30. BC Bentley
31. Prosper de Mulder
32. Dupont
33. Case International
34. Pilkingtons
35. Sandall Ind Estate
36. Long Sandall Ind Estate
37. Thorpe Marsh Power Station
38. M62 Trading Estate

ABANDONED MINEWATER DISCHARGES

1. Bull House Minewater
2. Alexandra Drift Minewater
3. Sheephouse Wood
4. Benny Lane Adit
5. Silkstone
6. Marshall
7. Deepcar
8. Wharncliffe Side
9. Claywheels Lane
10. Loxley Bottom
11. Myers Grove
12. Fender Shaft
13. Robinsons Borehole
14. Forge Dam Adit
15. Summerley No 1
16. Unstone Minewater
17. Dock Walk
18. Mary Anne Shaft

Figure 9

BARNSLEY
DONCASTER
STOCKSBRIDGE
ROTHERHAM
SHEFFIELD
CHESTERFIELD
R. DON
R. DEARNE
R. Dove
Little Don
Ewden Beck
Blackburn Brook
R. Loxley
R. Rivelin
R. Sheaf
Shire Brook
Pigeon Bridge Brook
The Moss
R. ROTHER
R. Rippon
Barlow Brook
Holme Brook
R. Hipper
Tricker Brook
Poole Brook
R. Doe Lea
Cawthorne Dike
Dearne Dike
West Beck
Wombwell Beck
The Skell
Ea Beck
0 2 4 6 8 10km
Scale

SOUTH YORKSHIRE AND NORTH EAST DERBYSHIRE AREA

SEWAGE TREATMENT WORKS

KEY

CATCHMENT BOUNDARY

RIVER

TIDAL LIMIT

SEWAGE TREATMENT WORKS

1. Crow Edge
2. Ingbirchworth
3. Hoylandswaine
4. Clayton West
5. Cheesebottom
6. Cawthorne
7. Stocksbridge
8. West Bretton
9. Silkstone
10. Wharncliffe Side
11. Cranemoor
12. Hood Green
13. Darton
14. Dodworth
15. Holmesfield
16. Tankersley
17. Shortwood
18. Dronfield
19. Worsbrough
20. Unstone
21. Monkton Colliery
22. Wentworth
23. Old Whittington
24. Lundwood
25. Elsecar
26. Cudworth
27. Lundhill
28. Blackburn Meadows
29. Grimethorpe
30. Danesmoor
31. Wombwell
32. Wragby
33. Fitzwilliam
34. Darfield
35. Woodhouse Mill
36. Middlecliffe
37. Stavely
38. Great Houghton
39. Wath-on-Dearne
40. Aldwarke
41. Stockley
42. Bolsover
43. Bolton
44. Carleton
45. Ackworth
46. Swinton
47. Shuttleworth
48. Hooton Roberts
49. South Elmsall
50. Denaby
51. Mexborough
52. Wrang Brook
53. Mexborough
54. Stapleton Park
55. Burcroft
56. Clifton
57. Cridling Stubbs
58. Kirksmeaton
59. Adwick/Carcroft
60. Askern/Norton
61. Bentley Toll Bar
62. Bentley Arskey Lane
63. Sandall
64. Thorne
65. Rawcliffe

Figure 10

The river also receives discharges from combined sewer overflows and sewage treatment works at many locations with Cheese Bottom, Stocksbridge, Blackburn Meadows (Sheffield) and Aldwark (Rotherham) being the most significant. It is critical to the quality of the river and its uses that these discharges are operated effectively at all times. The combined actions of Yorkshire Water and the major industrial dischargers, which range from quarrying, through paper manufacture to steel works discharges, have resulted in significant improvements in river quality over the past six years in particular.

River Rother

The Rother has in the past been described as the dirtiest river in Europe. Water quality improvements have been dramatic over the past six years as a result particularly of improvements in sewerage, sewage treatment and industrial discharges. The habitat, and hence the biology, has not improved and this must be addressed if the full potential is to be realised. There are still thirty sewage discharges, the most significant being at Bolsover, Danesmoor (Clay Cross), Old Whittington (Chesterfield), Staveley, Woodhouse Mill and Dronfield.

Industry has played its part in the improvements, partly due to the decline in the coal mining and coking industries and partly due to improvements at the remaining sites, including other chemical industry works which are authorised by the Agency. The river also receives discharges from contaminated land and run-off from industrial sites and landfill sites. These are not subject to consent by the Agency and can be dealt with only by preventing the pollution in the first place: this will involve changing practices at many smaller sites where activities that might have gone unnoticed six years ago can now be perceived as significant pollution.

The river also continues to receive minewater from pumping stations operated to protect active coal mines outside the catchment. These discharges replace those at Markham and Bolsover Collieries and the water provides dilution for other discharges.

River Dearne

The headwaters of the Dearne are of good quality in the main but can suffer from farm pollution incidents. Mine waters also impact on the quality in a number of ways. The cessation of pumping at certain mines has reduced dilution for sewage effluents. This applies at Dodworth which has changed the options for the long-term plans. Outbreaks of new ochrous minewaters such as at Silkstone have conversely caused a direct deterioration in water quality. At Woolley rationalisation of the pumping arrangements and treatment of the pumped water have resulted in additional water being available tn the river to dilute effluents and improve quality. The Dearne also has the only active coal mine in the Don catchment near Scisset which also raises and treats minewater.

The major sewage works and sewerage systems in the catchment have adversely affected water quality and the improvement programme by Yorkshire Water is not yet completed. This work, which covers Clayton West, Lundwood (Barnsley), Dodsworth, Worsbrough, Wath and Wombwell in particular will result in significant benefits to the river.

Lower Don

Water quality in the Lower Don has improved as a consequence of improvements on the tributaries. One result is that the impacts of local discharges at Sandall (Doncaster), Thorne and Goole are now more noticeable: work to improve their quality can now be justified.

There are also several major industrial discharges on the lower Don from chemical, glass and animal byproducts manufacturers. The legacy of colliery spoil heaps and contaminated land associated with pitheads and coking operations which are causing pollution at a number of sites is being addressed.

5.9 SURFACE WATER ABSTRACTION

Background

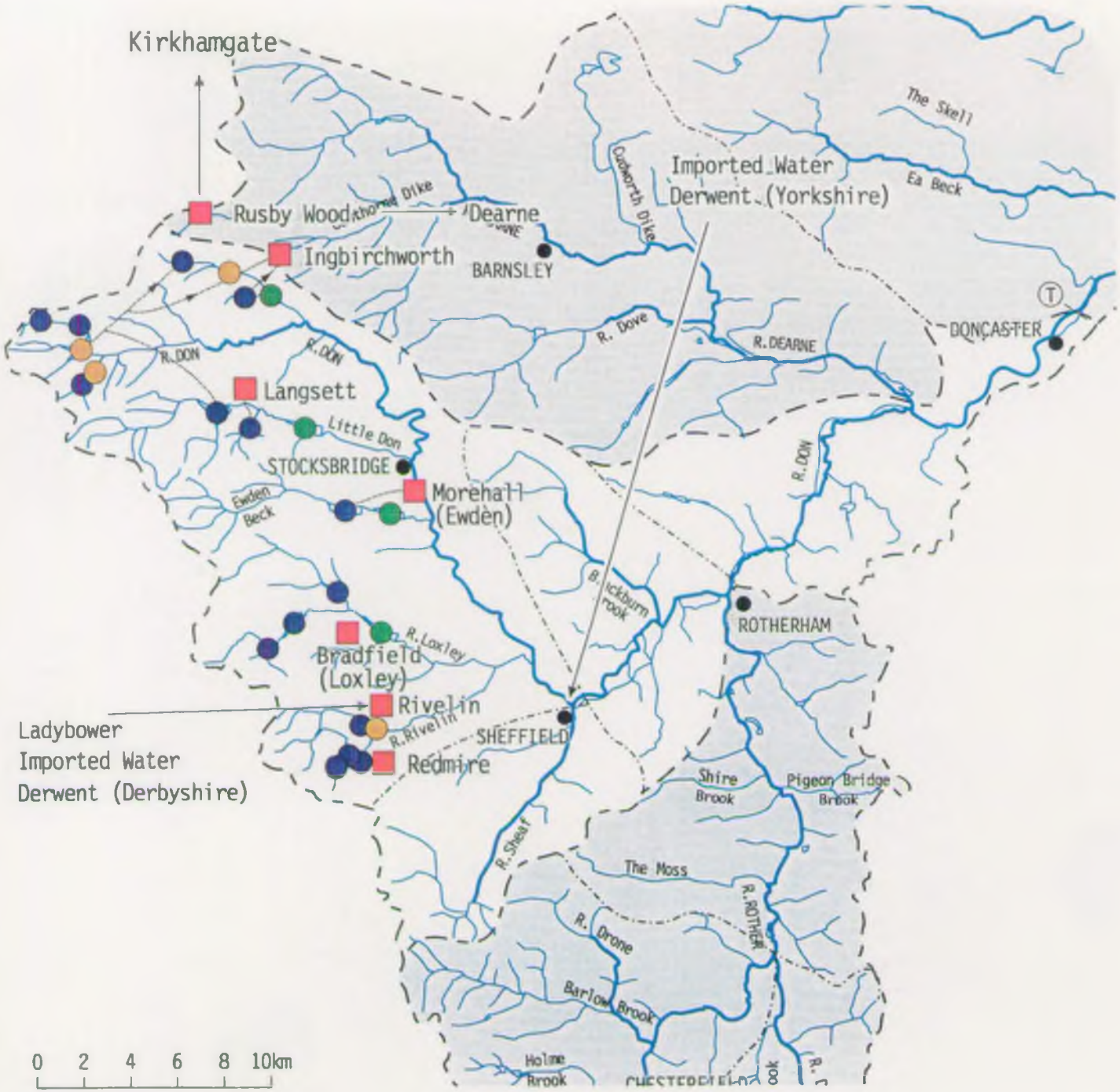
Abstraction of water for potable, industrial or irrigation purposes is an important use of the surface water resource. Abstraction affects the watercourse immediately downstream by reducing the volume of water. In order to fulfil its duty to ensure that the water resource is managed effectively, the Agency operates a system of abstraction licensing. Almost anyone who wants to abstract from a surface water source must first obtain an abstraction licence which specifies the total authorised hourly, daily and annual quantities which can be abstracted. (See *Issue 11*)

Conditions may also be imposed on the licence, where appropriate, in order to protect downstream abstractions, other users, and the quality of the water environment.

Local Perspective

The upper reaches of the LEAP area are extensively impounded with nineteen reservoirs used for the supply of drinking water. There are also six compensation reservoirs which are used to supplement flows in the rivers. Significant amounts of water are imported into the area for public water supply purposes, the main imports being from Ladybower Reservoir on the Derbyshire River Derwent to the west, the Yorkshire River Derwent to the north and boreholes to the north of the area which abstract groundwater from the Sherwood Sandstone aquifer. (See *Figure 11.*)

There are a large number of industrial abstractors within the area which, as a result of needing water for purposes such as cooling and manufacturing have tended to be located close to rivers. Much of the traditional heavy industry has declined over time, but



SOUTH YORKSHIRE AND NORTH EAST DERBYSHIRE AREA UPPER DON CATCHMENT

YORKSHIRE WATER SERVICES WATER TREATMENT WORKS

KEY

- CATCHMENT BOUNDARY
- SUB-CATCHMENT BOUNDARY
- RIVER
- WATER TREATMENT WORKS
- SUPPLY RESERVOIRS
- COMPENSATION RESERVOIRS
- SUPPLY & COMPENSATION RESERVOIRS
- WATER TRANSFER

Figure 11

SOUTH YORKSHIRE AND NORTH EAST DERBYSHIRE AREA

LICENSED SURFACE WATER ABSTRACTION

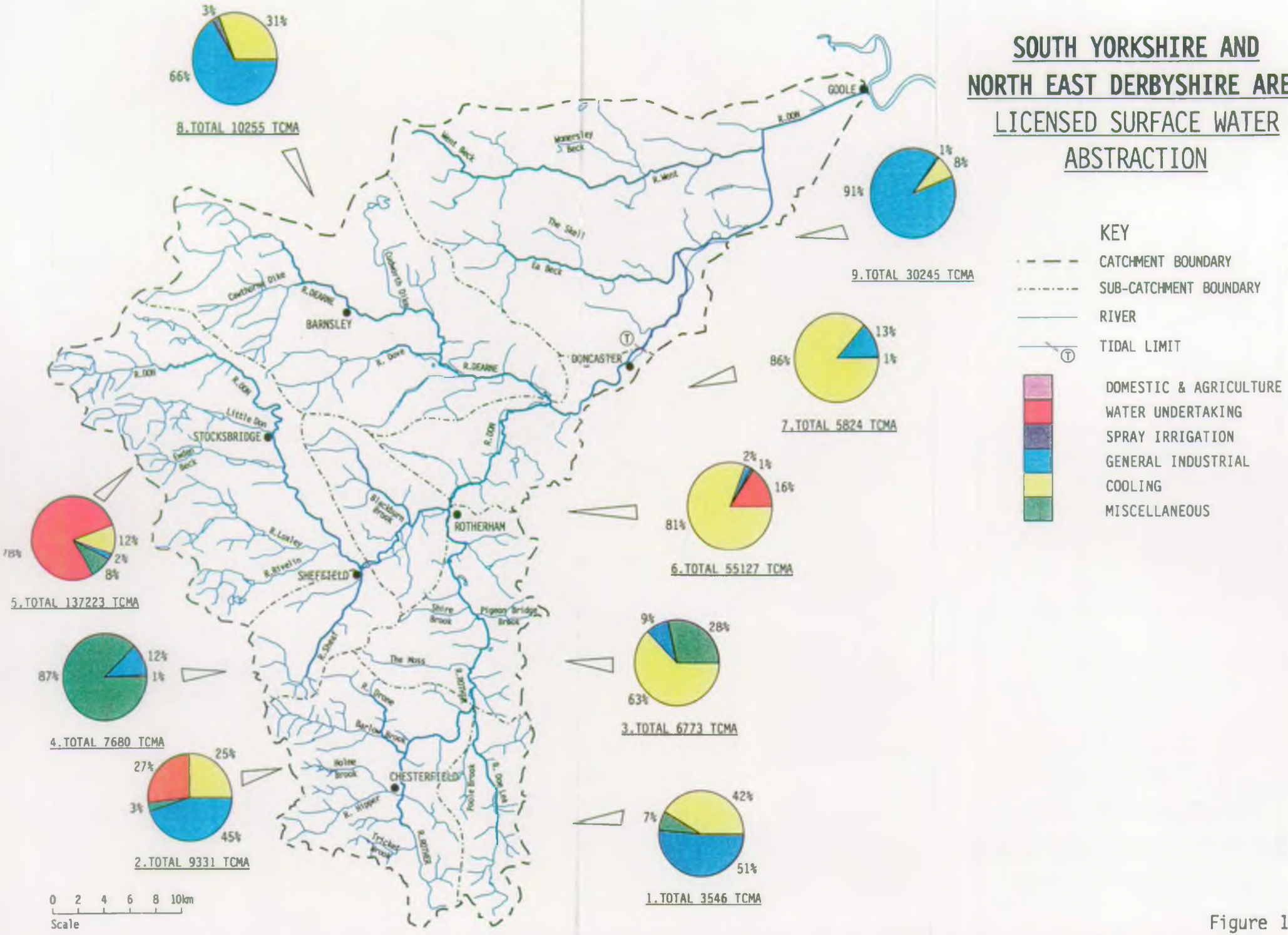


Figure 12

industry is still a significant user of water. Within the area as a whole there are 125 licensed abstractions for industrial and manufacturing purposes.

Agriculture is another important user of water, either for spray irrigation or domestic and agricultural purposes. There are currently sixty licences for spray irrigation within the area of which fifteen are subject to a condition requiring cessation of abstraction when river flows are equal to or less than the specified flow. Such conditions are used to ensure that the environmental needs of the river will be protected, as well as existing protected rights (licensed and exempt abstractions), downstream quality requirements and minimum flows.

Figure 12 shows licensed surface water abstractions.

5.10 GROUNDWATER ABSTRACTION

Background

Groundwater abstraction relates to the use of water from underground saturated rocks known as aquifers which may provide storage for considerable volumes of good quality water which often requires little treatment prior to use. Consequently, one of its most important uses is for public and private drinking water supplies. In addition to potable supply, it is also used for a number of other purposes including cooling, industrial processing, bottling and spray irrigation.

The management of groundwater resources is achieved through the licensing of abstractions under the Water Resouces Act 1991, in a similar manner to surface water abstractions. The quantities of water which may be abstracted are specified as part of the licence, which may also include conditions requiring monitoring of groundwater levels. The Region has guidelines for the technical determination of groundwater abstraction licences. In addition to checking availability of sufficient resource to support a new abstraction, or a proposed increase in abstraction, an assessment is made of the potential impact of the abstraction on rivers and other water-dependent features. Some small abstractions are exempt from these licensing requirements. (See *Issue 12*)

Local Perspective

In the lowest part of the catchment the Sherwood Sandstone is an important source for public water supply, and both the Sherwood Sandstone and Magnesian Limestone aquifers are extensively used for agricultural purposes, notably spray irrigation. Large quantities are also used by industry, particularly in the Doncaster area, and there are some small abstractions for domestic purposes. Groundwater abstraction from both the Sherwood Sandstone and Magnesian Limestone aquifers is carefully controlled through licensing to protect the long term sustainablity of these important groundwater resources.

The Coal Measures cannot supply the same yields as the Sherwood Sandstone and Magnesian Limestone and therefore are of limited use as a source for public water supply. Furthermore, in some areas, the quality has been adversely affected by past

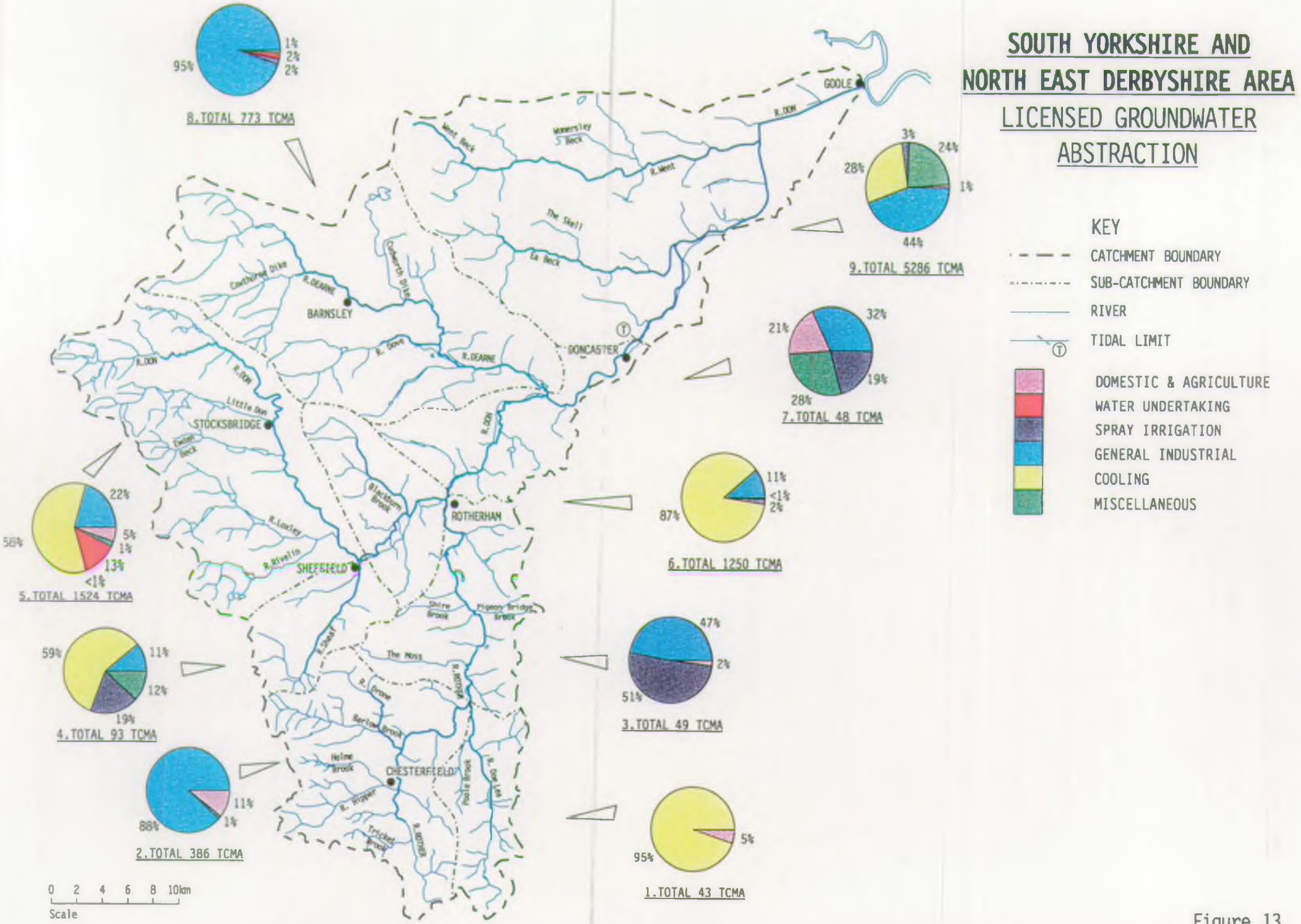

SOUTH YORKSHIRE AND
NORTH EAST DERBYSHIRE AREA
LICENSED GROUNDWATER
ABSTRACTION
KEY
CATCHMENT BOUNDARY
SUB-CATCHMENT BOUNDARY
RIVER
TIDAL LIMIT
DOMESTIC & AGRICULTURE
WATER UNDERTAKING
SPRAY IRRIGATION
GENERAL INDUSTRIAL
COOLING
MISCELLANEOUS
8.TOTAL 773 TCMA
95%
1%
2%
2%
9.TOTAL 5286 TCMA
3%
24%
28%
1%
44%
7.TOTAL 48 TCMA
21%
32%
19%
28%
6.TOTAL 1250 TCMA
11%
<1%
2%
87%
5.TOTAL 1524 TCMA
22%
5%
1%
13%
<1%
56%
4.TOTAL 93 TCMA
59%
11%
12%
19%
3.TOTAL 49 TCMA
47%
2%
51%
2.TOTAL 386 TCMA
11%
1%
88%
1.TOTAL 43 TCMA
5%
95%
GOOLE
BARNSLEY
DONCASTER
STOCKSBRIDGE
ROTHERHAM
SHEFFIELD
CHESTERFIELD
R.DON
R.DEARNE
R.Dove
R.Loxley
R.Rivelin
R.Sheaf
R.Rother
R.Moss
R.West
R.Ryton
R.Derwent
Cawthorne Dike
Little Don
Dalton Beck
Blackburn Brook
Shire Brook
Pigeon Bridge Brook
The Moss
Barlow Brook
Holme Brook
Poole Brook
Tricket Brook
Wombwell Beck
Wombwell Beck
West Beck
The Skell
La Beck
0 2 4 6 8 10km
Scale

Figure 13

industrial activities, particularly mining. However the Coal Measures can often provide water of sufficient quality and quantity for agricultural purposes, golf course irrigation and for many industrial uses.

The Millstone Grit Series of the Pennine uplands tends to yield groundwater superior in both quality and yield to the Coal Measures. However, as the area is predominantly rural, groundwater abstraction is dominated by agricultural and domestic use, with limited supply for industry.

Licenced groundwater abstractions are shown on *Figure 13.*

5.11 FLOOD STORAGE AND FLOOD DEFENCE

Background

The Agency aims to provide effective protection for people and property against flooding from rivers and the sea and to provide adequate arrangements for flood forecasting and warning. (See *Issues 8 to 10*)

When a watercourse floods, the excess water flows into the floodplain. These natural flood plains provide extra flow capacity and storage capacity for the rivers. This capacity is reduced if significant areas of the floodplain have been raised in level, embanked, or built upon, and can result in higher flood levels elsewhere on the river. There is significant pressure to develop floodplains, particularly in urban areas where large areas of level land in the centre of a city are at a premium. (*Issue 9*)

The Agency may build new flood defences if flooding is a serious problem in a particular area. The highest priority is for new defences to protect built-up areas from flooding. All schemes must be technically, economically and environmentally sound. (*Issue 8*)

Flood defences must be maintained in good order. Earth banks have to be inspected for subsidence, holes, vermin infestation, and erosion; grass has to be cut; trees on banks have to be pollarded and managed to prevent them blowing over and leaving holes in banks, and to prevent them from collapsing into the river and causing blockages. Flood walls must be inspected for leakage, cracks, and movement. The river bed must be dredged to maintain an adequate flow area. River banks often require protection against erosion. (*Issue 10*)

For locations where there remains a significant flood risk a flood warning system has been developed. Wannings are issued when remote river level gauges, or a forecasting computer model of the rivers system shows that flooding is likely.

Local perspective

The altitude of the headwaters of the Don river system results in the highest parts of the catchment often having a deep covering of snow in the winter. A rapid thaw can cause severe flooding problems in the lower parts of the catchment, especially if accompanied by heavy and sustained rainfall. Rainfall runs quickly off the surrounding hills giving a

very quick response time to rainfall events. These upper reaches of the rivers are especially prone to flooding during summer months when high intensity but localised storms are more frequent. Dronfield is a good example of this.

From Sheffield and Barnsley the catchment becomes much flatter, the valleys open out and gradients and velocities decrease. It is between here and Doncaster that most of the flood storage areas, or washlands, are located. Doncaster suffered its most severe flooding in 1947 when snow-melt coincided with widespread heavy rainfall and high tides. The river banks were overtopped and large areas of Doncaster and Bentley were flooded. In response to this a system of washlands was developed with control gates to store flood water upstream of Doncaster.

From Doncaster to its confluence with the Humber the Don is tidal. This surrounding area is very flat with large areas several metres below the highest recorded tide levels. The area is most at risk when there are moderate to high flows in the Don, Ea Beck, or the Went, combined with a high tide. Under these conditions flood waters back up in the channel. If there is a high storm surge or series of high tides, the banks could overtop.

The extent of tidal flooding is shown on *Figure 14.*

Coal mining continues in this area. The subsidence caused by mining can be over one metre at the surface: to maintain the effectiveness of flood defences within the subsidence area they must be raised to compensate for the subsidence. Many of the flood banks on the Ea Beck have been raised for this reason.

The tidal defences at Goole are at present being strengthened and raised to allow for the anticipated rise in sea level resulting from global warming.

The Agency is involved with the preparation of Water Level Management Plans (WLMP) for Sites of Special Scientific Interest (SSSI). Where the Agency is the operating authority for the site its staff liaise with English Nature and other interested parties to ensure that the water level requirements for a range of activities can be balanced and integrated. A WLMP has already been completed and agreed for Denaby Ings near Doncaster, and an Interim Management Statement has been produced for Sprotborough Flash: the Final WLMP will be produced in 1998.

West Beck
Monkersley Beck
R. West
The Shell
Ea Beck
Cawthorne Dike
R. DEARNE
Cubbert's Dike
BARNSLEY
R. Dove
R. DEARNE
DONCASTER
R. DON
R. DON
Little Don
STOCKSBRIDGE
Ewden Beck
R. DON
Blackburn Brook
ROTHERHAM
R. Loxley
R. Rivelin
SHEFFIELD
Shire Brook
Pigeon Bridge Brook
R. Sheaf
The Moss
R. ROTHER
R. Drone
Barlow Brook
Holme Brook
CHESTERFIELD
Poole Brook
R. Doe Lea
R. Rippon
Trickett Brook
R. ROTHER
0 2 4 6 8 10km
Scale

SOUTH YORKSHIRE AND NORTH EAST DERBYSHIRE AREA

EXTENT OF TIDAL FLOODING

KEY

CATCHMENT BOUNDARY

RIVER

TIDAL LIMIT

EXTENT OF TIDAL FLOODING

Figure 14

5.12 LAND USE, AGRICULTURE AND FORESTRY

Background

The landscape of an area reflects the complex interplay between the natural environment and human activity. Geology, geomorphology, topography and drainage provide the basic elements of the landscape and, together with associated vegetation and settlement patterns, determine the essential landscape character of an area.

The ways in which land is utilised have an impact on the Agency's areas of responsibility. Forestry, agriculture, urban and industrial development will affect not only adjacent watercourses, but may also have considerable impact downstream on groundwater, surface water and the atmosphere.

Sustainable development is seen as the cornerstone of Government land use policy.

The Agency seeks to influence land use policy and practice through a number of routes:-

- the Town and Country Planning process;
- the process of issuing authorisations and consents;
- liaison with local planing authorities, other government agencies, industry, landowners and individuals.

The Agency has little control over the mechanisms which determine land use change, which is largely the responsibility of LPAs through Town and Country Planing legislation. (See *Section 5.1*)

The agency has a duty to promote access to water whereas the conservation of landscape and the promotion of access to the countryside in England is the responsibility of the Countryside Commission. The Commission is empowered to designate, for confirmation by the Secretary of state for the Environment, National Parks and AONBs. In March 1996, the Commission launched its strategy for the next ten years, 'A Living Countryside' endorsing its commitment to a number of ongoing and new initiatives. These include the 'Countryside Character Programme' which defines landscape areas of the English Countryside (with English Nature and English Heritage); the Rural Action Programme (run jointly with English Nature and the Rural Development Commission); support for local authorities in protecting AONBs: the Community Forests Programme; continuing advice on national planning policy issues and regional guidance. A significant part of the Countryside Commission's new strategy is its support for the government's target of doubling the Government's woodland areas.

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

Forestry in Britain is controlled by the Forestry Commission which has recently been split into The Forest Enterprise and The Forestry Authority. Forest Enterprise runs the land and forestry holdings of the Commission as a commercial enterprise whilst the Forestry Authority sets standards for the forestry industry, runs grant schemes to assist private woodland owners, and ensures that regulations for plant health and tree felling are complied with. In recognition of the potentially harmful impact of poorly managed forest development, the Forestry Authority has published The Forests and Water Guidelines, against which all forest operations are assessed. It has also produced The UK Forestry Standard which is a benchmark for the sustainable management of forests.

European Community Directive No 85/337 on environmental impact assessment states that projects which may have significant effects on the environment, for example because of their size or nature, must have an assessment of those effects. The Directive specifically includes initial afforestation where this may lead to ecological changes.

MAFF uses a system of land classification based upon the extent to which physical characteristics of land impose long term limitations on land use. The grades range from Grade 1 which is excellent land with virtually no limitations on agricultural use to Grade 5 which is very poor quality land with severe limitations.

Local Perspective

Farming

Agricultural census data covers the period 1985-1995 and shows the following trends:-

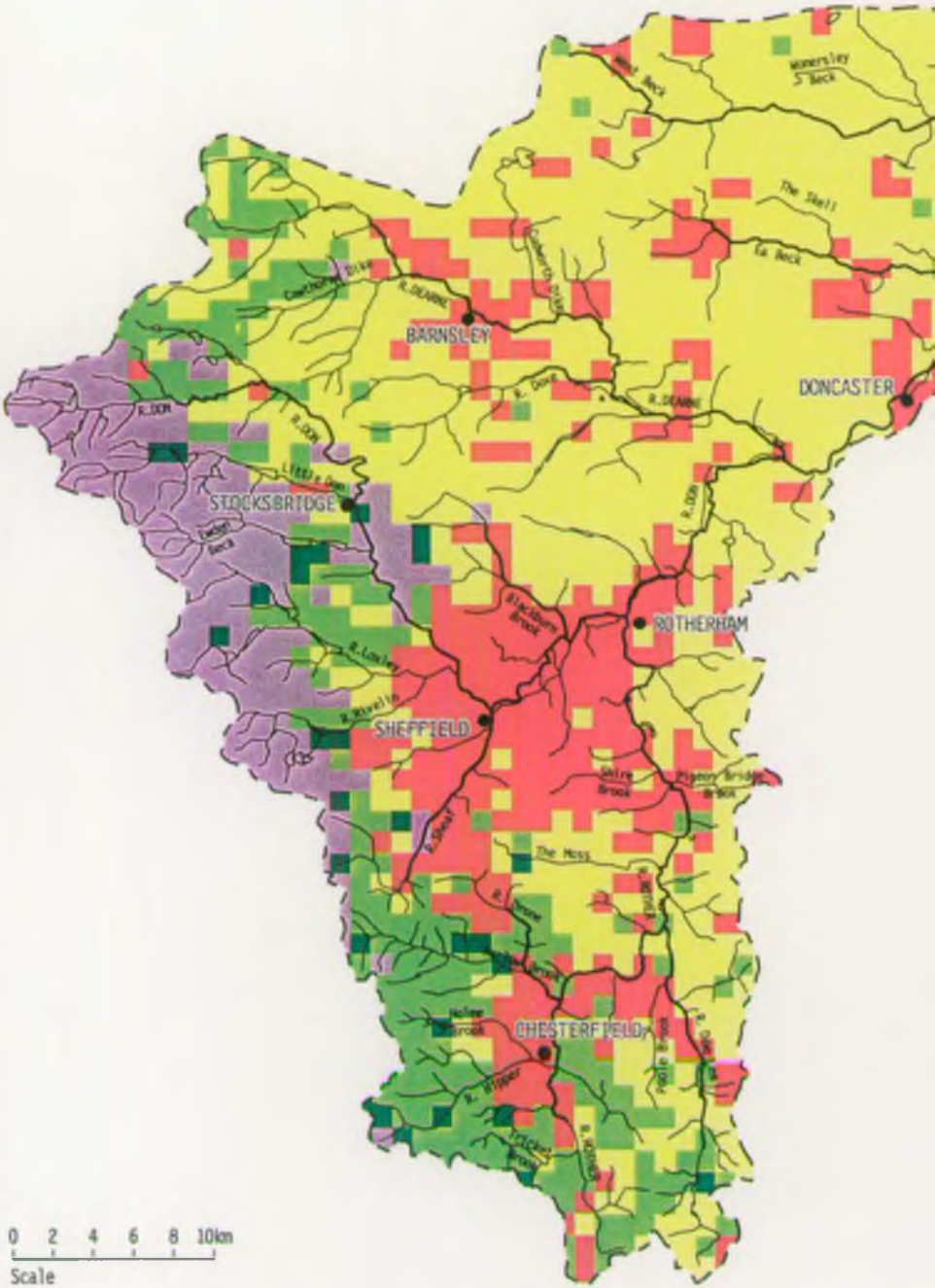
- In the livestock sector there has been a decline in the number of dairy cattle which is more than counterbalanced by increases in beef cattle and sheep numbers.
- There has been a small decline in the number of pigs and a 9% drop in the number of fowls.
- The total area of agricultural land has increased slightly but there has been a reduction in the land used for crops, especially cereals and horticulture.
- Six percent of the agricultural land has been taken out of agricultural use and 'set-aside'
- The LEAP area has a lower proportion of good quality agricultural land and a higher proportion of urban areas than the average for England.

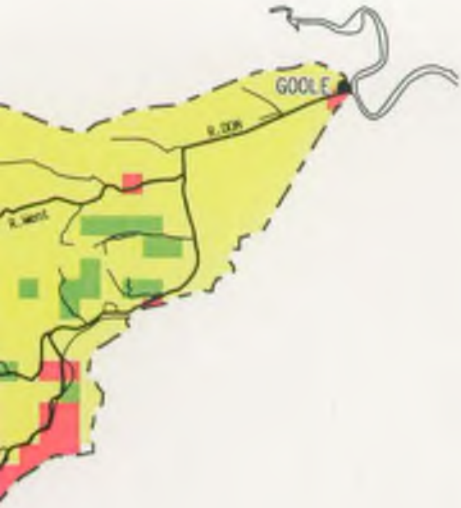
South Yorkshire Forest

The South Yorkshire Forest is one of twelve Government-approved Community Forests in England. The South Yorkshire Forest Plan expresses an agreed forty year vision and presents a framework for addressing conservation, recreation, and access issues, landscape management and ensuring that environmental improvements make a contribution to the economic regeneration of the region. The Forest, which is much more than just about trees, covers 153 square miles, mainly at the centre of the LEAP area. Seven million tress will be planted but the Forest also includes farmland, housing, wildlife areas and industry.

The core partners - Barnsley, Rotherham, and Sheffield councils, the Countryside Commission and the Forestry Commission - have all committed themselves to the Forest's long term interests. These and many other organisations are undertaking a programme of work to sustain an improved environment.

Dominant land use of the LEAP area is shown on *Figure 15.*


BARNSLEY
DONCASTER
STOCKSBRIDGE
ROTHERHAM
SHEFFIELD
CHESTERFIELD
R. DON
R. DEARNE
R. Loxley
R. Rivelin
R. Sheaf
R. Rother
R. Stour
R. Doe Lea
Rivelin Dam
Ladybower Res.
Derwent Res.
Howden Res.
Carsington Res.
Ashopton
Hathersage
Bamford
Dronfield
Eckington
Killamarsh
Mexborough
Conisbrough
Adwick le Street
Bentley
Barnsley
Wombwell
Darfield
Hoyland
Cawthorne
Penistone
Thurlstone
Dunford Bridge
Langsett
Underbank
Bullhouse
Ingbirchworth
Dodworth
Worsbrough
Wharncliffe Woods
Ecclesfield
Chapeltown
Thorncliffe
Grenoside
Ughill
Bradfield
Stocksbridge
Deepcar
Oughtibridge
Wadsley Bridge
Malin Bridge
Hillsborough
Ecclesall
Dronfield
Unstone
Brimington
Tapton
Chesterfield
Whittington
Staveley
Killamarsh
Rotherham
Kimberworth
Wath
Swinton
Mexborough
Conisbrough
Adwick le Street
Bentley
Barnsley
Wombwell
Darfield
Hoyland
Cawthorne
Penistone
Thurlstone
Dunford Bridge
Langsett
Underbank
Bullhouse
Ingbirchworth
Dodworth
Worsbrough
Wharncliffe Woods
Ecclesfield
Chapeltown
Thorncliffe
Grenoside
Ughill
Bradfield
Stocksbridge
Deepcar
Oughtibridge
Wadsley Bridge
Malin Bridge
Hillsborough
Ecclesall
Dronfield
Unstone
Brimington
Tapton
Chesterfield
Whittington
Staveley
Killamarsh
Rotherham
Kimberworth
Wath
Swinton
0 2 4 6 8 10km
Scale



SOUTH YORKSHIRE AND NORTH EAST DERBYSHIRE AREA

DOMINANT LAND COVER BY 1km SQUARE

Data supplied by MAFF, ITE Data Source supplemented by additional information around large urban areas

KEY

- GRASSLAND
- MOORLAND / HEATH
- ARABLE
- URBAN / BARE GROUND
- WOODLAND
- OPEN WATER

Figure 15

5.13 FLORA AND FAUNA

Background

The conservation duties of the Agency are contained in the Environment Act 1995 which places a duty on the Agency to promote the conservation of flora and fauna which are dependent on an aquatic environment. Duties are imposed on all the Agency's functions with respect to the conservation and enhancement of natural beauty and the conservation of flora, fauna, geological and physiographical features of special interest. Under this section the Pollution Prevention and Control functions are required *to have regard to* conservation, and the Water Management functions have a duty *to further* conservation. The Agency is required to consult English Nature and the National Parks Authorities before carrying out or authorising activities which may damage the special interests of notified areas. The Act includes also a Code of Practice on Conservation, Access and Recreation.

English Nature is the statutory adviser to the Government on nature conservation in England, with responsibility for promoting the conservation of England's wildlife and natural features. Its work includes the selection, establishment and management of National Reserves; the identification and notification of Sites of Special Scientific Interest (SSSI); and the provision of advice about nature conservation. SSSIs are designated because of their ecological, physiographical or geological characteristics and are protected by the Wildlife and Countryside Act 1981. Those which meet the criteria as set out in the Habitats Directive may be designated Special Areas of Conservation - see below. English Nature has recently produced a 'Natural Areas' programme, which classifies areas by their wildlife and natural features, and provides long-term objectives to guide action plans and strategies.

The European Habitats Directive is implemented in the UK through the Conservation Regulations 1994, and introduces special conservation measures for habitats of certain types and for those supporting certain rare species. These sites are to be designated as Special Areas of Conservation. The directive also sets out a more general requirement to maintain rare species and protect threatened habitats. These requirements include the assessment of the impacts of plans or projects on protected areas, and there are significant implications in this for the Agency as a competent authority. This requirement also applies to sites designated as Special Protection Areas (SPAs) under the European Birds Directive.

There are a number of other international agreements and conventions to which the UK Government is a signatory. These include the Ramsar Convention (1971) on the Conservation of Wetlands of International Importance; the World Heritage Convention (1975) on the Protection of Natural and Cultural Areas of Outstanding Universal Value; and the Bonn Convention (1983) on the Conservation of Migratory Species of Wild Animals. One of the most recent and important is the Rio Convention on Biological Diversity (1992) signed by the UK Government at the Rio Summit. This has resulted in the production of the UK's Biodiversity Action Plan with targeted Species and Habitat Action Plans, many of which require action and input from the Environment Agency.

There are many non-statutory bodies playing a significant role in nature conservation. County Wildlife Trusts operate on local basis, managing nature reserves, promoting conservation, and helping to identify and protect sites of conservation value at a county level. The Royal Society for the Protection of Birds (RSPB) plays an important role in wildlife conservation, establishing and managing reserves, conducting research, campaigning on issues of national significance, and advising on many elements of land management for birds and other wildlife. The Farming and Wildlife Advisory Group (FWAG), a non-statutory body with partial funding from the Ministry of Agriculture, Fisheries and Food (MAFF) and the Department of the Environment, provides guidance to farmers and landowners on the integration of wildlife conservation with farming practices.

Environmentally Sensitive Areas (ESA) are designated by MAFF. The areas designated as ESAs are landscapes of distinct topographical and/or land-use types which hold much ecological interest but which may come under threat from more intensive agricultural practices. Farmers within ESAs are eligible for payments to enable them to conserve or restore the desired habitats and land-use practices in order to maintain and improve the conservation value of the targeted areas. MAFF also funds a range of other 'agri-environment' schemes and has recently taken over the funding of the Countryside Stewardship scheme. The Stewardship Scheme has broadly similar aims to the ESA scheme but is not restricted to designated areas: instead it is targeted at a range of valued habitat and landscape types in the wider countryside, including a category of Waterside Landscapes. (See *Issues 11 & 19*)

Local Perspective

The LEAP area contains a varied and valuable range of habitats and species which reflect the differing land uses across the area. Although typically thought of as urban and industrial, the area includes internationally important wildlife sites such as the South Pennine Moors SPA. The industrial heritage of the area has also helped to create valuable sites such as Denaby Ings SSSI where mining subsidence has resulted in permanent flooding of the site. The following sections concentrate on the river environment, since this is where the main conservation responsibilities of the Agency lie, and *Figure 16* shows the Nature Conservation Sites.

Headwaters

The rivers of the area rise in the high moors of the Peak District National Park, and flow through the South Pennine Moors SPA, the North Peak ESA, and the Dark Peak Natural Area. The area is typified by vast areas of blanket bog, with gritstone tors and edges, of considerable value to breeding birds such as golden plover, curlew, merlin and peregrine. The boulder-strewn slopes and valley sides are valuable for breeding ring ouzel and wheatear, although bracken growth is perceived as a problem, and is controlled by spraying in some areas.

BARNSLEY
DONCASTER
STOCKSBRIDGE
ROTHERHAM
SHEFFIELD
CHESTERFIELD
R. DEARNE
R. DON
R. Dove
Little Don
Carthorpe Dike
Cudworth Dike
Blackburn Brook
R. Loxley
R. Rivelin
R. Sheaf
R. Rother
R. Drone
Shire Brook
Pigeon Bridge Brook
Barlow Brook
Holme Brook
R. Hipper
Trickett Brook
Poole Brook
Ea Beck
The Skell
Vomersley Beck
Hunt Beck
R. Ouse
PEAK DISTRICT NATIONAL PARK
0 2 4 6 8 10km
Scale

SOUTH YORKSHIRE AND NORTH EAST DERBYSHIRE AREA

NATURE CONSERVATION

KEY

- CATCHMENT BOUNDARY
- RIVER
- NATIONAL PARK
- SITE OF SPECIAL SCIENTIFIC INTEREST

1. Thorne Crowle & Goole Moors
2. West Ings Meadows
3. Forlorn Hope Meadow
4. Shirley Pool
5. Owston Hay Meadows
6. Brockdale
7. Wentbridge Ings
8. Nostell Brickyard Quarry
9. South Elmsall Quarry
10. Carlton Main Brickworks
11. Bilham Sand Pits
12. Denaby Ings
13. Cadeby Quarry
14. New Edlington Brick Pit
15. Bradgate Brickworks
16. Pye Flatts Meadows
17. Wharncliffe Craggs
18. Little Don Stream Section
19. Canyard Hills
20. Wadsley Fossil Forest
21. Neepsend Railway Cutting
22. Stannington Ruffs
23. Neepsend Brickworks
24. Hallam Moors
25. Houndkirk Moor
26. Totley Wood
27. Eastern Moors
28. Moss Valley Meadows
29. Moss Valley
30. Moss Valley Woods
31. Harewood Grange Stream Section
32. Duckmanton Railway Cutting
33. Doe Lea Stream Section
34. Dovedale Wood
35. South Pennine Moors

Figure 16

The watercourses maintain a high conservation value due to their very natural character, and generally unpolluted state, with fast flow through steep sided valleys, semi-natural woodland, plantations, and permanent pasture.

Many of these areas are designated as Sites of Scientific Interest (SSI), or Sites of Importance for Nature Conservation (SINC) by the local authority. The streams support breeding dipper, grey wagtail and common sandpiper. The reservoirs and mill goits in this area add to the diversity of habitats, but can be damaging to the aquatic biology on certain river lengths where the natural river flow is reduced by the impoundment at the reservoirs. Generally this is an area of high conservation value, requiring a high degree of protection from the pressures of development, water abstraction, and maintenance of good chemical and biological quality.

River Don

The River Don flows through the Yorkshire Southern Pennine Fringe Natural Area, which is typified by hills, ridges, and broad valleys, with extensive urban and industrial areas along the western districts of Sheffield. The River and its tributaries the Rivelin and Loxley maintain some natural character, with wooded valley slopes such as Wharncliffe Wood, of local nature conservation importance, and permanent pasture which attracts breeding birds such as lapwing, skylarks, and barn owls.

Ochreous mine water and other discharges occur in this area, resulting in a poor biological quality on some stretches of river. As the rivers enter the urban fringe, development presses up to the water's edge, restricting both the natural river corridor and the physical habitats within the channel. Despite this urbanisation, the rivers do hold many features of wildlife interest, for example, weir pools with fringing reed-beds, goits, islands, and gravel shoals, fig trees, and other diverse flora that has colonised the old retaining walls. The river also provides feeding grounds for numerous bird species including wagtails and kingfishers.

As the River Don flows into Sheffield, it enters a different Natural Area, the Nottinghamshire, Derbyshire and Yorkshire Coalfields. The industrial centres of Sheffield and Rotherham dominate the area, although the wider landscape is more rural, with arable farming and scattered woodlands. This industrial heritage has limited the nature conservation value of the river, with channel modification and poor water quality decreasing the diversity of aquatic flora and fauna. Introduced species, in particular the invasive Japanese Knotweed and Himalayan Balsam, dominate the river banks in many locations. However, the river still maintains much bankside vegetation and tree cover, forming important wildlife corridors into the city centres. In places industry has resulted in creation of sites of conservation importance, such as at Blackburn Meadows and Old Denaby Ings.

Downstream of Rotherham, the Don flows through Sprotbrough Gorge SSSI which is characteristic of the Southern Magnesian Limestone Natural Area. Along with Nearcliffe Woods, Hexthorpe Flats and the Don Navigation, the site provides a mosaic of ancient woodland, marshland, limestone grassland and open water habitats for the plants, insects, mammals and birds associated with the river corridor.

As the river flows through Doncaster, it enters the Humberhead Levels Natural Area, a typically flat open landscape, dominated by agriculture, extensive pumped drainage systems, and re-aligned, flood embanked river systems. The biological quality of the river remains poor, reflecting the extent of channel modification, and the long term effects of both organic and chemical pollution. Although much of the original marshland has been drained, remnants of wetlands remain in the network of washlands, and are of value to wintering and migrating birds. Historic re-alignment of the river has left many oxbow lakes, such as Thorne Waterside SSI, which are now of considerable conservation value. The east of the area includes part of Thorne Moor proposed SAC, a raised mire of international ecological importance.

Despite intensive management, and poor biological quality resulting from organic enrichment, the main tributaries of the lower Don - the River Went and Ea Beck - have significant conservation value. The flood embankments on Ea Beck are botanically diverse, with a variety of habitats from grassland to scrub which support a range of invertebrate and bird life. The surrounding borrow pits are also rich in wildlife, with habitats ranging from open water to willow carr.

The Went catchment includes Went Ings Meadows SSSI and the Lower Went Valley SSI, a series of wet meadows which form part of a smaller-scale, pastoral landscape around the Fishlake and Sykehouse area. These meadows are valuable for wintering wildfowl such as Bewick's swans and wigeon. The middle reaches of the Went are of less value to wildlife, having been extensively straightened in the past, and with predominantly arable land-use adjacent. More upstream sections of the River Went flow through the Southern Magnesian Limestone Natural Area, where the river has cut a gorge through the limestone. Much of the steep-sided valley supports ancient woodland and limestone grassland, and is designated as Brockadale SSSI.

River Rother

After rising in the Peak District, the River Rother and its tributaries flow almost entirely through the Nottingham, Derbyshire and Yorkshire Coalfields Natural Area. This area is characterised by urban and industrial centres, as well as substantial areas of pastoral and arable agricultural land.

Although many of the tributaries of the Rother are polluted in their lower reaches, the upper sections are cleaner and support a variety of aquatic life. The Hipper and the Holme Brook remain natural in character for much of their length, flowing through deciduous woodland and pasture land. The lower reaches through Chesterfield have more limited conservation interest because of man-made alterations.

The River Drone, despite its short length, passes through a wide variety of habitats and varies from a swift flowing, meandering, course to a more enclosed channel. Its upper reaches through Dronfield consist of extensive culverts and walled channels although areas of local interest still remain. The middle reaches flowing through greenbelt are of increased conservation quality as the channel tightly meanders through adjacent narrow wooded valleys, carr woodland, standing pools and small reedbeds with herb-rich banks.

The conservation quality of the river diminishes again in the lower reaches as it is contained by flood banks and river revetment constructed of stone-filled wire baskets.

A tributary of the River Rother with national conservation value is the Moss, much of which is designated SSSI. It retains a highly natural character in its channel and adjacent semi-natural habitats including extensive areas of woodland. The Moss supports valuable populations of the native white-clawed crayfish. The River Doe Lea has a very poor biological quality reflecting the history of pollution in the area.

Throughout most of its length, the habitat diversity of the Rother is severely degraded and in need of restoration, following a long history of channel modification, land drainage, mineral extraction and general industrial development. Although improvements in water quality have been achieved recently, the main River Rother remains generally of poor biological quality. Despite this legacy, areas of conservation value do exist in the form of features such as oxbow lakes, flashes created through subsidence from mining operations, restored opencast sites and washland Ings. These have been identified in the River Rother Wildlife Strategy prepared by local authorities and other organisations interested in the catchment.

River Dearne

Rising in the Dark Peak Natural Area, the Dearne flows through the Yorkshire Southern Pennine Fringe Natural Area. The river remains relatively natural here, many lengths with their original meandering course with associated pool and riffle sequences, exposed rocks, shoals and earth cliffs utilised by nesting kingfishers and sandmartins. The river valleys include broadleaved woodlands of local nature conservation value, many of which extend to the water side, with good cover of semi-mature and mature trees continuing along the river to form a valuable wildlife corridor. The biological quality however is limited by poor water quality and heavy iron deposits from minewater discharges.

As the river flows into Barnsley, it enters the Nottinghamshire, Derbyshire and Yorkshire Coalfields Natural Area. Development, mineral extraction and industrial pressure has resulted in a much-altered river channel, with very straight embanked stretches that offer little habitat diversity. Enhancement projects are currently being undertaken by the Environment Agency to improve the value of these stretches for wildlife.

Despite this generally poor river environment, the wider river corridor includes a number of wetland sites of considerable importance, including Denaby Ings SSSI, Wath Ings and Broomhill Ings. Otters have been sighted recently in this area, and consideration should now be given to creating habitats which will support otter populations. This need could conflict with the current pressure for riverside footpaths such as The Dearne Way and the Transpennine Trail.

5.14 FISHERIES

Background

Fish populations are dependent upon water quality and quantity and on the physical habitat for their well being. Fish populations serve as excellent indicators of the quality of the water environment and generate financial benefits to local communities through exploitation by commercial and recreational fisheries.

In England and Wales the Agency has a specific duty under the Salmon & Freshwater Fisheries Act 1975 to maintain, improve and develop fisheries. This is additional to the more general powers for the enhancement and protection of wildlife under the Water Resources act 1991, the Wildlife and Countryside Act 1981 and the Control of Pollution Act 1974. The Agency has a duty to further the conservation of the fish communities in addition to its duty to maintain, improve and develop fisheries.

Local Perspective

Until the late 1980s most of the Don catchment remained fishless due primarily to its chemically degraded condition. Improvements to water quality over the last decade have led to a significant recovery of fish populations due to a combination of natural recolonisation and a series of restocking programmes. These programmes have been designed to restore the indigenous populations which were identified through a search of historical information. Today more than 80% of the main river length of the catchment contains a healthy fish population.

The upper reaches of the rivers in the LEAP area support brown trout populations some of which represent the last remnants of the Don's genetic stock. Below Hazelhead restoration of the grayling population took place in the early 1980's. Today this population extends throughout the upper river into the centre of Sheffield and has become well established. Below Wortley as a result of stocking carried out by local angling interests the river contains populations of a range of coarse fish including chub, barbel, dace, and roach.

The River Sheaf has an impact on water quality in the River Don where it enters the main river in the centre of Sheffield. Despite a slight down-grading the fishery still exists and progressively improves as the river flows to the lower outskirts of the city. Along this section coarse fish predominate; although occasional trout are found below the numerous weirs. Species such as barbel, chub, dace, roach and gudgeon are now well established mainly as a result of extensive restocking programmes carried out during the 1990's. Blackburn Meadows, the largest sewage treatment plant in the Don catchment, until recently exerted a significant deleterious effect on water quality where it entered the river just downstream of the Meadowhall Complex. Recent improvements to this plant particularly its ability to nitrify and reduce ammonia levels, has had major benefits to the fishery. Recolonisation of the section downstream of the works to the rivers confluence with the Rother has been rapid as stock from above have drifted downstream to take up residence.

The next input which affected the redevelopment of fish populations in the Don was that of the River Rother which until 1993 continued to downgrade water quality. Significant improvements to the chemical condition of the Rother in the early 1990's has gradually allowed fish stocks to become re-established. Downstream of the Rother confluence the Don now contains extensive populations of coarse fish. This improvement again has been brought about by natural recolonisation and extensive restocking programmes both on the Rother and the Don itself.

Ponding of much of the river between Rotherham and Doncaster as a result of its development as a navigation has had an effect on the fish which are now present. These conditions have favoured more sedentary species and populations principally consist of roach, bream, perch and gudgeon. Where the natural river still exists, separate from the navigation, faster flows and more natural conditions favour chub, barbel and dace, and in some sections particularly that which flows between the weir at Thrybergh and the village of Denaby extensive populations now thrive.

Below Doncaster the natural river splits away from the navigation and at this point becomes tidal. The upper section of the tidal river has developed into an exceptional fishery containing extensive populations of a range of coarse fish species including chub, roach, bream, barbel, dace, chub, gudgeon, eels, pike and perch.

Several of the tributaries of the River Rother avoided the worst excesses of industrial exploitation. Of particular significance were the River Hipper and Barlow Brook both of which contain remnants of the Don catchment's original genetic brown trout populations.

In its upper reaches above and around Chesterfield the Rother still suffers from poor water quality related principally to the effects of contaminated land. Fish are absent from this section of the river and do not appear until the river receives the flow from the River Whitting. Improvements to the effluent from Old Whittington Sewage Works which serves Chesterfield have allowed the recent re-establishment of fish. An introduction which took place in 1996 included dace and chub and evidence suggests that this population is now established. Earlier introductions which commenced in 1994 between Staveley and the river's confluence with the Don now provide good angling for local residents. Here, roach, dace, chub, barbel, gudgeon and perch make up the population which during the last two years has shown the first evidence of becoming self sustaining.

The River Dearne's uppermost reaches around Denby Dale suffered until the late 1980's from effects of woollen mills which had contaminated the land upon which they stood. The moth proofing agents which caused the contamination leached into the river making it intolerable to fish. During the last decade this contamination has reduced significantly allowing the re-establishment of brown trout which are now resident as a self-sustaining population.

Further downstream contamination from inadequately treated sewage and mining activity still exerts some influence although recent improvements to Darton Sewage Treatment Works have allowed the re-establishment of fish downstream through the centre of Barnsley. Below the town the effluent from Lundwood Sewage Treatment Works exerts

Went Beck
Wombwell Beck
R. Went
The Skell
Ea Beck
Cawthorpe Dike
Cudworth Dike
R. DEARNE
BARNSLEY
R. Dove
R. DEARNE
DONCASTER
R. DON
R. DON
Little Don
STOCKSBRIDGE
Loxley Beck
R. DON
Blackburn Brook
ROTHERHAM
R. Loxley
R. Rivelin
SHEFFIELD
Shire Brook
Pigeon Bridge Brook
R. Sheaf
The Moss
R. ROTHER
R. Drone
Barlow Brook
Holme Brook
CHESTERFIELD
R. Rippon
Poole Brook
R. Doe Lea
Tricker Brook
R. ROTHER
0 2 4 6 8 10km
Scale

SOUTH YORKSHIRE AND NORTH EAST DERBYSHIRE AREA

LOCATION OF FISH SPECIES AND APPROXIMATE EXTENT OF ANGLING

KEY

- CATCHMENT BOUNDARY
- TROUT (& OCCASIONAL GRAYLING)
- TROUT AND COARSE FISH PRESENT
- COARSE FISH ONLY
- FEW OR NO FISH PRESENT
- APPROXIMATE EXTENT OF ANGLING ARRANGEMENTS/ACTIVITY – WHERE KNOWN

Figure 17

a deleterious effect which almost entirely eliminates fish until the river reaches Darfield. Downstream from this point steady improvements occur in water quality which in turn allows fish populations once again to develop. Similar populations to those found in the River Don can be found in this section of the Dearne. Bream, roach, chub, dace, perch, gudgeon and pike predominate, particularly in the length immediately upstream of the rivers confluence with the Don.

Figure 17 shows the location of fish species in the LEAP area.

5.15 ANGLING

Background

Angling continues to be one of Britain's most popular participant recreational sports which is increasingly bringing economic benefits to the area.

Fishing rights in non-tidal waters belong to the riparian owners who may then lease the rights to angling clubs, syndicates or individuals. In tidal waters fishing rights are normally vested in the Crown who allow unrestricted angling but access over adjacent land to such rights may still be controlled by the riparian owner.

Under the Salmon & Freshwater Fisheries Act 1975, anyone aged twelve years or over who fishes for salmon, trout, freshwater fish or eels in England and Wales must have a valid Environment Agency Rod Licence which is enforced by Agency Bailiffs.

Commercial fishing for both eel and migratory salmonids is also controlled by the Agency through a system of licensing.

Local Perspective

Until recently fish populations in the Don catchment were restricted to sections of the headwaters where small populations of brown trout existed. Improving water quality throughout the system has allowed the redevelopment of the River Don and parts of the Rivers Dearne and Rother as fisheries which are becoming increasingly important for recreational angling.

Through a process of restocking and natural recolonisation populations of a range of coarse fish species are now established in the River Don. Grayling re-introduced in the early 1980's now extend from the headwaters above Penistone to the centre of Sheffield and recent experimental stocking with this species has also taken place on the rivers Rivelin and Loxley. The middle reaches of the river between Sheffield and Doncaster are extensively populated with roach, chub, dace, gudgeon, barbel, bream and perch which during the last three years have attracted an increasing amount of angling activity. Fishing rights have been leased to clubs by British Waterways on the navigable sections of the River Don between Rotherham and Doncaster and the Agency is developing angling agreements with interested parties for parts of the non-navigable reaches around Kilnhurst.

Elsewhere the ownership of fishing rights has proved difficult to establish, having been neglected due to the degraded condition of the river and the absence of fish over the last century.

Below Doncaster, the River Don becomes tidal and runs through a channel which has been heavily modified for the purposes of navigation, flood defence and land drainage. Despite the impacts of this work the upper tidal reaches have developed into an excellent coarse fishery with substantial stocks of chub, dace, roach, gudgeon, barbel and perch. This section, which because of its tidal status is a 'free' fishery now attracts increasing numbers of anglers who travel considerable distances to enjoy the sport it can provide.

At Doncaster the flow of the River Don is split. Part of the flow is diverted into the South Yorkshire Navigation which in turn forms the Stainforth Keadby and New Junctions Canals. These waterways have developed into exceptional coarse fisheries which have become increasingly important for competition angling. The match angling programme on these canals reflects their importance nationally as competition venues with regular national angling championships fished on them.

Of the two main tributaries of the River Don, the River Dearne is the most advanced in terms of its restoration as a fishery. The river has a brown trout population in its upper reaches around Denby Dale which has been re-established following improvements to discharges from traditional woollen milling operations, many of which have now closed.

Below Barnsley the effects of inadequately treated sewage discharges exert a deleterious effect on fish populations which begin to recover by the time the river reaches Darfield. Casual angling activity takes place along this section of the river and angling rights have been taken up on the section above Darfield Village. From this point down fish populations recover significantly, particularly in the section between Adwick and the rivers confluence with the River Don. Over the last three years this section of the river has become a popular and heavily used facility providing excellent catches of a variety of coarse fish species. The Agency owns stretches of fishing rights along the lower section of the River Dearne some of which are let to local angling interests.

In 1994 water quality improvements allowed the re-establishment of fish populations in the River Rother and this population seems to be becoming self sustaining. However, the lower section between Staveley and the confluence with the River Don has become increasingly used for recreational angling. The Agency owns fishing rights on several sections of the river. Formal angling arrangements have been agreed with local angling interests at Catcliffe and Killamarsh.

Figure 17 shows the approximate extent of angling in the LEAP area.

5.16 ARCHAEOLOGY & HERITAGE

Background

The landscape of Britain contains a rich heritage of historic and archaeological features. These can be vary from megalithic monuments to camp settlements, banks, ditches and mounds, Roman remains, castle and fortifications, deserted villages, ecclesiastical buildings, great halls and bridges. Many sites protected or managed for their historical interest are also valuable habitats for a range of wildlife. This is because they have often been undisturbed for long periods and are usually little affected by fertilisers and chemical sprays.

The principal legislation affecting ancient monuments in England is contained in the ancient Monuments and Archaeological Areas Act 1979 which was subsequently amended by the National Heritage Act of 1983. The Secretary of State is required to compile and maintain a schedule of monuments to which statutory protection is afforded.

Historic landscapes within the area are designated by English Heritage whilst Scheduled Ancient Monuments (SAM) are designated by the Department of National Heritage on advice from English Heritage. Other historical and archaeological sites may fall within areas designated as Environmentally Sensitive Areas by MAFF or be covered by the Countryside Stewardship Agreement with the Countryside Commission. Local planning authorities can also designate Conservation Areas which are of particular interest for special protection: these are included in the county Sites and Monuments Record (SMR).

Under the Environment Act 1995, the Agency has a duty to protect and conserve buildings, sites and other objects of archaeological, architectural or historic interest when undertaking its statutory duties. (See *Issue 18*)

Local Perspective

The Don, Dearne and Rother catchments have a rich and varied history with many sites of heritage interest.

The Roman occupation of the area has left many examples of their activity with the remains of forts situated at Doncaster, Burghwallis and Rossington. Associated with these military sites were a number of Romano-British settlements at places like Wortley, Wombwell, Cadby and Edlington.

Here the first evidence of exploitation of the area's rich mineral reserves can be found. Conisborough Castle, situated adjacent to the Don's confluence with the River Dearne, is a striking example of Norman architecture which provided the inspiration to Sir Walter Scott for his novel Ivanhoe. It was the Normans who first introduced the technology of water power from Europe, a development which was to radically change the face of the catchment. This early industrial activity was the forerunner of the eventual creation of one of the world's largest and most prosperous industrial centres. This prosperity was principally based on iron, steel and coal production. Examples of the infrastructure associated with this activity can be found all over the area with good examples at

West Beck
Wawerley Beck
R. West
The Skell
Ea Beck
Cudworth Drive
R. DEARNE
BARNSLEY
Cawthorne Dike
R. Dove
R. DEARNE
DONCASTER
R. DON
R. DON
Little Don
STOCKSBRIDGE
Ewden Beck
R. DON
Blackburn Brook
ROTHERHAM
R. Loxley
R. Rivelin
SHEFFIELD
Shire Brook
Pigeon Bridge Brook
Rivelin
The Moss
R. Drone
R. RYTON
Barlow Brook
Holme Brook
CHESTERFIELD
Poole Brook
R. Rother
Tricker Brook
R. ROTHER
Alum Wh
0 2 4 6 8 10km
Scale

SOUTH YORKSHIRE AND NORTH EAST DERBYSHIRE AREA

WATER ASSOCIATED AMENITY RECREATION AND HERITAGE

KEY

- CATCHMENT BOUNDARY
- RIVER
- TIDAL LIMIT
- FEATURE OF HERITAGE INTEREST
- AMENITY AND RECREATION
- CANOEING ACTIVITY DEVELOPING

① BRETTON HALL COUNTRY / SCULPTURE PARK
② CANON HALL COUNTRY PARK
③ MONK BRETTON PRIORY
④ WORSBOROUGH MILL & COUNTRY PARK
⑤ ELSECAR HERITAGE CENTRE
⑥ EARTH CENTRE
⑦ CONSIBROUGH CASTLE
⑧ KELHAM ISLAND INDUSTRIAL MUSEUM
⑨ ABBEYDALE INDUSTRIAL MUSEUM
⑩ BOLSOVER CASTLE
⑪ HARDWICK HALL

Figure 18

Rockley Blast Furnaces, Elsecarr, Newcommon Colliery Engine, Low Mills Furnaces and Top Forge at Wortley.

The introduction of water power resulted in the creation of dozens of mills which relied on the impounding effects of weirs which were built across the rivers. Many of these structures remain, some dating from the 12th Century: they form an important link with the area's industrial heritage. With improving water quality throughout the catchment these weirs once again form obstructions to the free passage of fish within the system. The Agency has a statutory responsibility set down in the 1975 Salmon & Freshwater Fisheries Act to exploit opportunities to provide ascent facilities over such structures. Achieving this without detriment to the architectural value of the sites will pose significant challenges.

All county councils in the area maintain detailed lists of known archaeological sites and monument records, and these are updated as fresh information is made available as a result of new excavation and survey work. The Agency recognises the county sites and monument records as the primary source of archaeological information and advice and consults them regarding such data. Any designations are notified to the Agency which ensures that accurate, up-to-date listings are maintained.

At present, legislation often protects only the monument itself or a specific building. In future, sites may include adjacent land in context with the scheduled monument. This will have implications for the Agency where the site is adjacent to or close to a watercourse.

Figure 18 includes sites of heritage interest.

5.17 NAVIGATION AND WATER-BASED ACTIVITY

Background

Use of the water environment for amenity and recreation is now recognised as vital to parts of the local economy. Passive recreational use of water includes viewing scenery, walking near water and enjoying the flora and fauna associated with the area. Active recreation can include rowing, sailing, canoeing and angling. There is an extensive network of footpaths and bridle ways which allow access to some parts of the river and its associated environs. Some are controlled by land owners, others by British Waterways and some, which are generally of a permissive nature, are owned by the Agency.

The Agency has a duty to take into account recreation in the performance of all its functions and to put its own property to the best use for such purposes. The Agency can draw up byelaws under the Water Resources Act 1991 for purposes connected with carrying out its functions. The Agency has also a vital role to play in liaising and advising other bodies to ensure that a co-ordinated approach has been taken to the strategic management and development of recreation. This allows the optimum potential of a water body to be realised. (See *Issue 18*)

Local Perspective

As the valleys of the Don, Dearne and Rother became increasingly industrialised, so their potential as a source of recreation began to diminish. In the major towns, the development of industry up to the water's edge hemmed in the river and eliminated traditional footpaths. The destruction of flora and fauna also led to a decline in the importance of the river to those with an interest in the natural world. The catchment remained in this degraded condition for well over a century and not until the mid 1980's did the rivers begin to be recognised as once again having potential. During the last decade improving water quality has increased both the active and passive use of the catchment for recreational purposes. Angling, boating, nature study and walking are all now popular activities throughout most of the catchment.

In the Pennine moorland attractive walks have been established around many of the reservoirs which were constructed in the last century. Trout angling on the upper Don recommenced in the late 1970's after more than a century of neglect and abuse. Downstream the work of the Five Weirs Walk Trust has restored access to the river along sections which were traditionally the most seriously damaged by industrial activity. The recovering ecology of this length of the Don is probably the most vivid demonstration of the improving condition of the catchment. The work of the trust has achieved the delicate balance between nature and the conservation of the industrial heritage of the area.

From the centre of Sheffield downstream the river is a navigation which contributed significantly to the industrial success of the area. Latterly its use for commercial navigation has significantly decreased but with improving physical and chemical conditions the river has become popular for pleasure navigation. Administration of the navigation is carried out by British Waterways who control, manage and licence all boating activity. The Sheffield Canal at the top of the system has recently been restored and now provides opportunities for craft to sail into the centre of the city where the restoration of the canal basin provides mooring and other facilities.

The mining industry in South Yorkshire resulted in massive environmental damage but through subsidence also created some of the most important wetland habitats in the catchment, such as Sprotborough Flash near Doncaster. Below Doncaster the navigation splits away from the natural course of the river eventually forming the Stainforth Keadby and the New Junction Canals. Excellent facilities for boating are provided here by British Waterways and the canals now represent one of the most important match angling venues in Britain.

The main tributaries of the Don, the Dearne and Rother are also beginning to reflect the increasing importance of the catchment for recreation purposes. Rother Valley Country Park near Staveley, which was formed as part of the restoration of industrial areas, now provides excellent facilities for water skiing, jet skiing, windsurfing, bird watching and other water based activities. On the lower Dearne improvements in water quality have been enhanced by physical restoration of the river channel which is designed to encourage an increase in the diversity and overall population levels of fish species. The improved aesthetic appeal of the river is attracting an ever increasing number of walkers and others who enjoy the natural environment.

SOUTH YORKSHIRE AND NORTH EAST DERBYSHIRE AREA

FOOTPATHS

KEY

- CATCHMENT BOUNDARY
- RIVER
- TIDAL LIMIT
- TRANS PENNINE TRAIL approx or proposed route
- DEARNE WAY
- FIVE WEIRS WALK
- SHEFFIELD FLOOD TRAIL
- CUCKOO WAY approx or proposed route
- ROTHERHAM ROUND WALK
- PENNINE WAY LDP
- PEAK DISTRICT NATIONAL PARK BOUNDARY

Figure 19

The Trans Pennine Trail, a major route for walkers, cyclists and horse riders coast to coast between Liverpool to Hull, runs alongside the lower River Dearne as well as the Don and Rother. The trail was afforded EEC status by its formal adoption as the western extremity of E8, the major through-route over continental Europe to Turkey. Millennium funds have been granted for its development and several sections of Environment Agency- owned river bank are being used.

Figure 18 shows sites of water associated amenity recreation and heritage; and *Figure 19* shows the major footpaths in the LEAP area.

5.18 TOURISM

Background

Tourism is of major importance to the economic and social life of the country and few individuals or localities do not benefit in some way from tourism spending. Thus tourism has emerged as a vital industry and it is important to encourage its continued growth and development.

Whilst the Environment Agency has no direct role in the management of tourism, we must recognise its value and also be aware of the ways in which it can impact on the environment. Strong safeguards may be necessary to ensure that development is acceptable in terms of the effects on the landscape, nature conservation, farmland and communities.

Local perspective

Visitors are drawn to the area by a range of varied attractions. On the one hand the area of the LEAP encompasses part of the Peak District National Park with its attractive moorland landscape and picturesque hamlets. Visitors use the area for walking, riding, scenic drives, angling, sailing and wildlife study. Sheffield is sometimes described as a city virtually within a national park and with its good hotel stock provides a good base for visitors to explore the park.

The Peak District National Park Authority has co-ordinated a number of joint projects to conserve and enhance the area's high landscape quality and ecological and historical value, and to improve recreational opportunities.

The local authorities in the area have also worked hard to enhance the image of the area and promote a number of measures to increase its attraction to visitors, including increased countryside access.

In addition to the area's natural assets, a range of superb man-made facilities draw visitors to the area for entertainment, business and educational events.

The area boasts one of the best arrays of sports facilities in Europe and has a resultant impressive programme of sport. There are also superb entertainment venues which

attract a massive influx of visitors. For example, Tina Turner performed to a total of 98,000 people in five nightly performances last year! The Meadowhall shopping and leisure complex attracts several million visitors per year from outside the area.

Also worthy of note is the Rother Valley Country Park with its watersports facilities, wildlife and other attractions. The park is being extended and Rotherham Council are placing particular emphasis on increasing its usage by long distance visitors.

Impressive future facilities are planned. The Earth Centre is a visionary project under development at Denaby Main. Its objective is to promote and demonstrate more sustainable use of our environment. In Sheffield, work is to begin shortly on the National Centre for Popular Music.

The Agency's approach must be to achieve a balance between maximising the economic and employment benefits offered by tourism, and the protection of the environment and the amenities of local people.

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6.0 CURRENT STATE OF THE LOCAL AREA

6.1 AIR QUALITY

Background

Air quality is one of the important factors governing quality of life within an area. Severe air pollution problems used to exist in heavily urbanised and industrialised areas. These severe problems have been energetically tackled by legislation starting with the early Alkali Acts of the nineteenth century through the Clean Air Acts of 1956 and 1968 to the Environment Act of 1995. There is still a need to reduce emissions from all sources and this is a major thrust of EU policy to improve air quality. Some local problems still require further attention but many of the remaining problems are on a global scale such as those of climate change and depletion of the ozone layer.

There is still considerable room for improvement in the monitoring of air quality as local variations and variation with climate conditions and times of day can still cause problems and unexplainable pollution episodes.

There is European legislation on air quality standards which applies in this country to a very limited number of pollutants (sulphur dioxide, smoke and nitrogen oxide and lead in air). This is now being extended to ozone implemented in the UK through the Ozone Monitoring and Information Regulations 1994. Benzene, an organic chemical emitted from vehicles and from industry, has also been added to the pollutants with air quality guidelines. Episodes when pollutants exceed the threshold values are now given out as public information and investigated. Cause and effect relationships for short term pollution episodes are not as yet well understood.

Current Air Quality Standards are listed on the following page but as can be seen from the relatively small values involved, sophisticated measuring equipment is required to give reliable data on which to make progress.

Considerable progress has been made in improving air quality over the last fifty years. Further progress will probably be at a slower rate, as the pollutant concentrations involved are much harder to measure and eliminate than in the past. There is an expert panel on air quality standards which continues to make recommendations for updating air quality standards.
(See *Issue 7*)

Table 8: National Air Quality Standards and Specific Objectives

Pollutant	Standard Concentration:	Measured as:	Specific Objective
Benzene	5 ppb	running annual mean	achieve by 2005
1.3 Butadiene	1 ppb	running annual mean	achieve by 2005
Carbon Monoxide	10 ppm	running 8 hour mean	achieve by 2005
Lead	0.5 $\mu g/m^3$	annual mean	achieve by 2005
Nitrogen dioxide	104.6 ppb	1 hour mean	99.9th percentile by 2005
Ozone	50 ppb	running 8-hour mean	97th percentile by 2005*
Particles PM_{10}	50 $\mu g/m^3$	running 24 hour mean	99th percentile by 2005*
Sulphur dioxide	100 ppb	15-minute mean	99.9th percentile by 2005*

* provisional objectives - all to be reviewed in 1999.

The implications of the percentiles:-

Nitrogen dioxide - 8 hours exceedance per year allowed; Ozone target to be achieved on all but 10 days per year; Particles target to be achieved on all but 4 days per year; Sulphur dioxide - 99.9% of measurements to be below 100 ppb.

Current

Air Quality

The paragraphs below describe the factors which are taken as indicative of air quality. Not all of these are currently monitored in the LEAP area. Some limited data on air quality has been assembled and presented for the LEAP area. Some examples are given in *Figures 21 to 23*. It is hoped that the uses, interpretation, data collection and development of this form of information will be examined and taken forward during and after the consultation period for this report. DETR Air Quality Monitoring Sites are shown in *Figure 20.*

Ozone

This gas is commonly known as the "sunshine pollutant" as it is formed as a result of the reaction between oxides of nitrogen (NOx), hydrocarbons and oxygen in sunlight. In the upper atmosphere ozone forms a barrier to harmful ultra-violet radiation. At ground level however, it is a poisonous gas and a photochemical pollutant, being particularly dangerous to anyone with breathing difficulties. As the most common photochemical oxidant, ozone is a good indicator of photochemical pollution in general.

West Beck
R.West
Ea Beck
R.DEARNE
BARNSLEY
R. Dove
R.DEARNE
DONCASTER
R.DON
STOCKSBRIDGE
Blackburn Brook
R.DON
ROTHERHAM
SHEFFIELD
R.Sheaf
R. Drone
R.RIVER
R. Doe Lea
CHESTERFIELD
0 2 4 6 8 10km
Scale

SOUTH YORKSHIRE AND NORTH EAST DERBYSHIRE AREA DETR AIR QUALITY MONITORING SITES

DATA SOURCE: DETR / NETCEN

KEY

- CATCHMENT BOUNDARY
- RIVER
- PRIMARY ROADS
- AUTOMATIC NETWORK SITE
- RURAL NO_2 OR SO_2 SITE
- NO_2 SURVEY SITE
- SMOKE AND SO_2 SURVEY SITE

Figure 20

Sulphur Dioxide (SO_2)

Sulphur dioxide gas (SO_2) is both naturally occurring and produced by human activity. It is an irritant to the eyes and throat and can cause serious harm to people with respiratory problems. About 20% of the world's atmospheric SO_2 is produced by volcanic eruption. Of the rest, the majority is derived from the combustion of fossil fuels with a high sulphur content - coal and heavy oil. Consequently coal and oil burning power stations are the major source of SO_2 along with vehicle emissions. However with less coal being burned as domestic fuel, the introduction of the Clean Air Act 1956 and improved technologies to reduce emissions, the release of SO_2 has declined dramatically in the last forty years. SO_2 contributes to acid rain in a similar way to nitrogen dioxide. (See *Figure 21*).

Oxides of nitrogen (NO_x)

Oxides of nitrogen (NOx) are formed by a reaction between nitrogen and oxygen during combustion processes. The main sources are vehicular emissions followed by industrial sources. The gas is usually released as nitric oxide (NO) which in the presence of sunlight and air can be converted to the more toxic nitrogen dioxide (NO_2) - an irritant which can cause breathing problems and increase susceptibility to viral infection. Oxides of nitrogen react with water in the atmosphere to form a weak acid - acid rain - which damages trees, crops and buildings. They also contribute to global warming as they are greenhouse gases.(See *Figure 22*)

Volatile Organic Compounds (VOC)

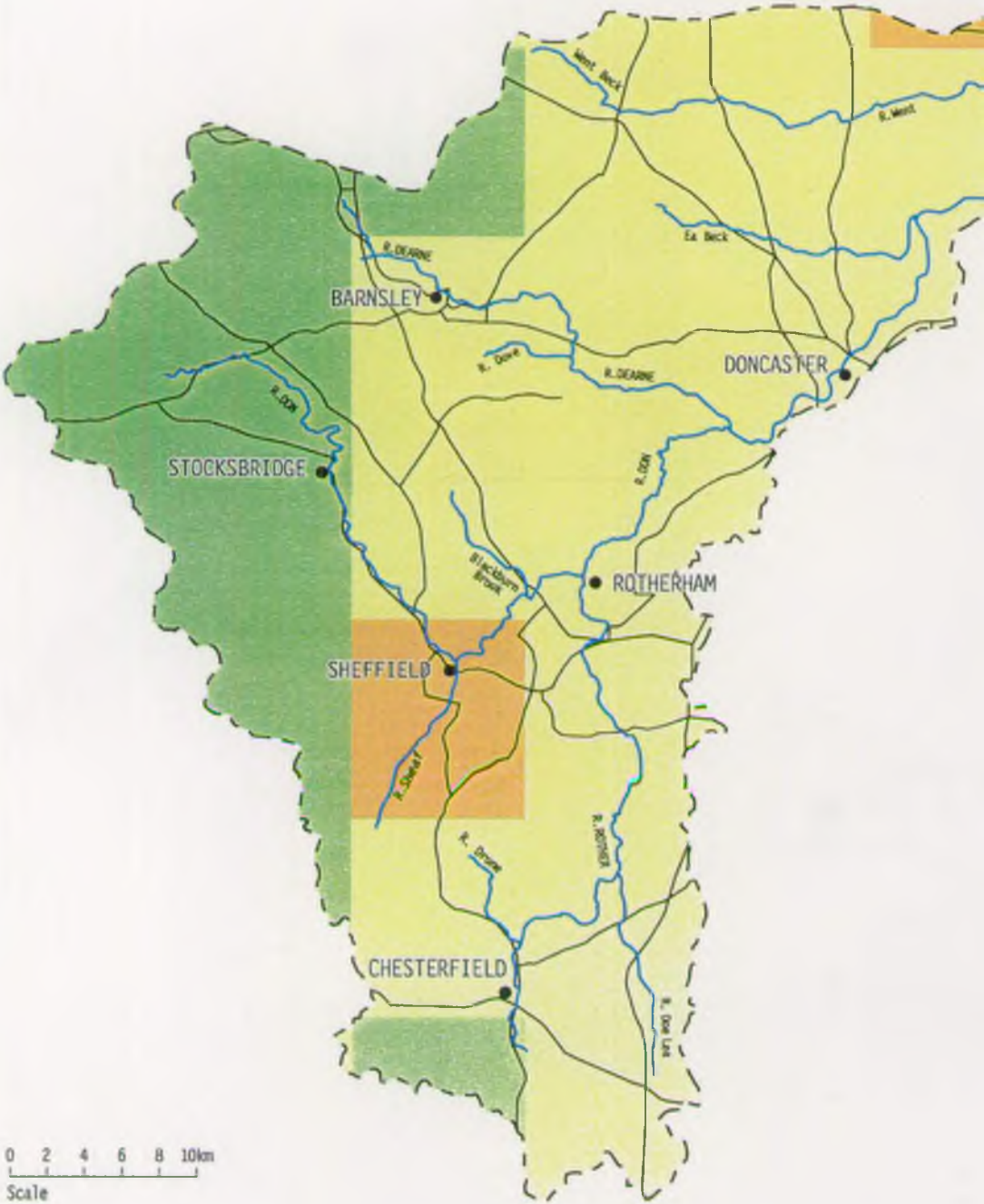
These gases include hydrocarbons, halogenated organics and benzene. They originate from oil, petrol, solvents and some industrial processes. These chemicals form tropospheric ozone and photochemical smogs in the presence of sunlight. Their health effects are varied with some being carcinogenic and some causing eye, throat and chest irritations.

Lead

Lead is released to the atmosphere during the combustion of leaded petrol. During the 1970s and early 1980s research showed that its presence in the air could result in retarded learning or even brain damage, especially among children. Consequently since the mid 1980s leaded petrol has steadily been withdrawn from sale and unleaded introduced with the increased use of catalytic converters. The use of unleaded petrol as an alternative has been encouraged by associated financial incentives and has resulted in a dramatic drop in atmospheric urban levels in the last ten years. This demonstrates the type of action that can be taken to reduce harmful atmospheric pollutants.

Particulates

Sources of particulate air pollution can be both human made or natural. Naturally occurring particulate matter can arise from wind erosion of rocks and soil, and plant matter such as pollen. The principal human source is emissions from the combustion of fossil fuels, particularly coal and diesel, and it is believed that the release of fine particulates particularly from diesel fuels can have an adverse effect on human respiration. (See *Figure 23*).


West Beck
R. West
Ea. Beck
R. DEARNE
BARNSLEY
R. Dove
R. DEARNE
DONCASTER
R. DON
STOCKSBRIDGE
R. DON
Blackburn Brook
ROTHERHAM
SHEFFIELD
R. Sheaf
R. Drone
R. RINGLEY
CHESTERFIELD
R. Doe Lea
0 2 4 6 8 10km
Scale

SOUTH YORKSHIRE AND NORTH EAST DERBYSHIRE AREA

AIR QUALITY

ANNUAL MEAN BACKGROUND SULPHER DIOXIDE CONCENTRATION

DATA SOURCE: DETR / NETCEN

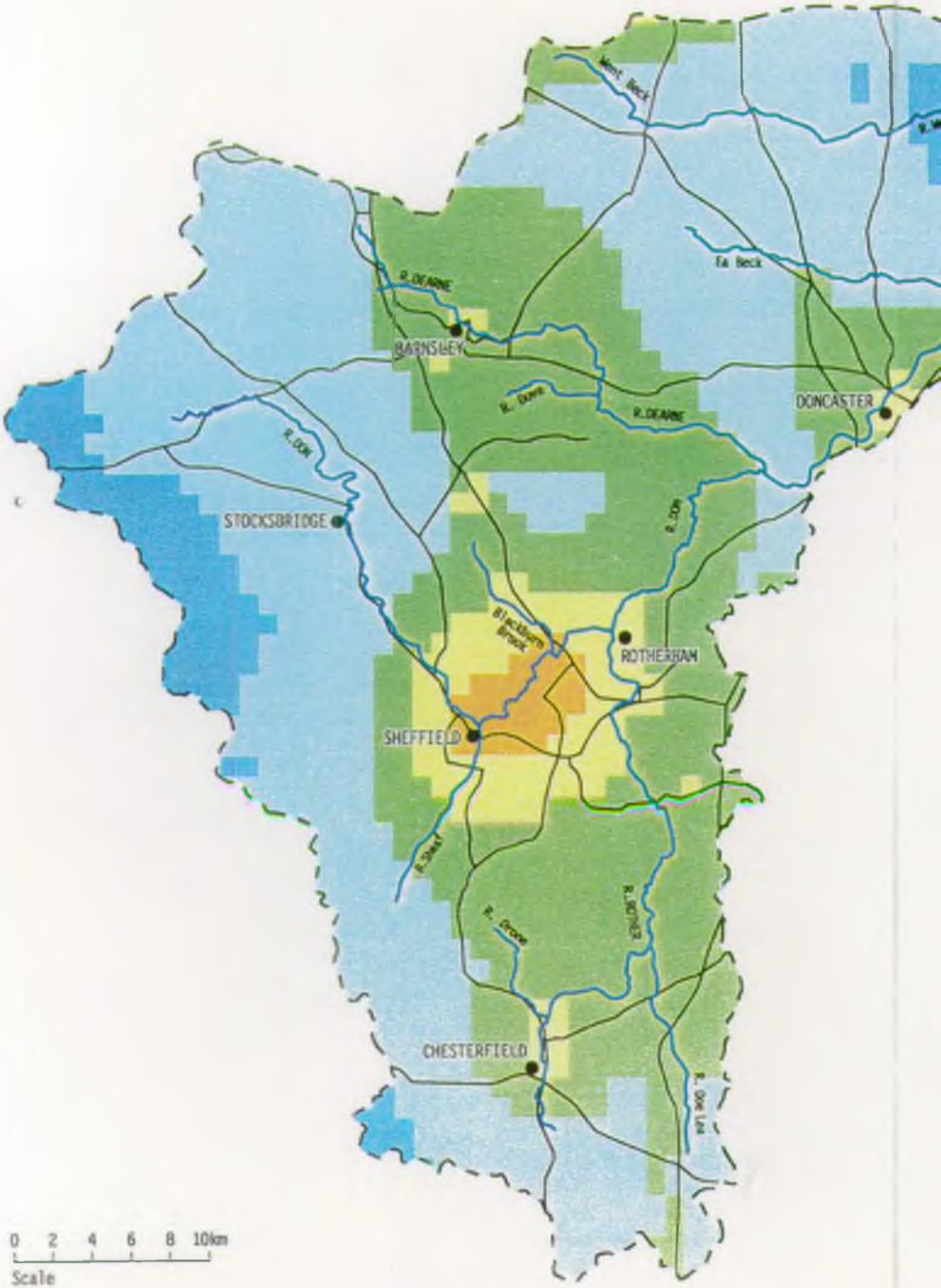
KEY

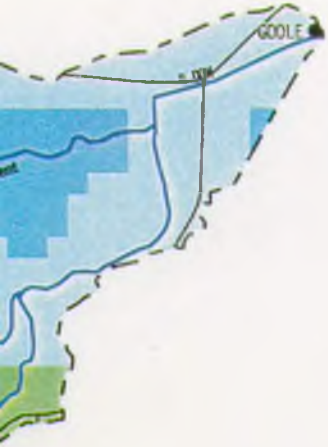
- CATCHMENT BOUNDARY
- RIVER
- PRIMARY ROADS

SULPHER DIOXIDE CONCENTRATION, ppb

- BELOW 1
- 1 – 2
- 2 – 4
- 4 – 6
- 6 – 8
- 8 – 10
- 10 – 12
- ABOVE 12

Figure 21


West Beck
R.DEARNE
BARNSLEY
R. Dove
R.DEARNE
Ea Beck
DONCASTER
R.DON
STOCKSBRIDGE
R.DON
Blackburn Brook
ROTHERHAM
SHEFFIELD
R.Sheaf
R. Drone
R.ROTHER
CHESTERFIELD
R.DOE LEA
0 2 4 6 8 10km
Scale



SOUTH YORKSHIRE AND NORTH EAST DERBYSHIRE AREA

AIR QUALITY

ANNUAL MEAN BACKGROUND NITROGEN DIOXIDE CONCENTRATION

DATA SOURCE: DETR / NETCEN

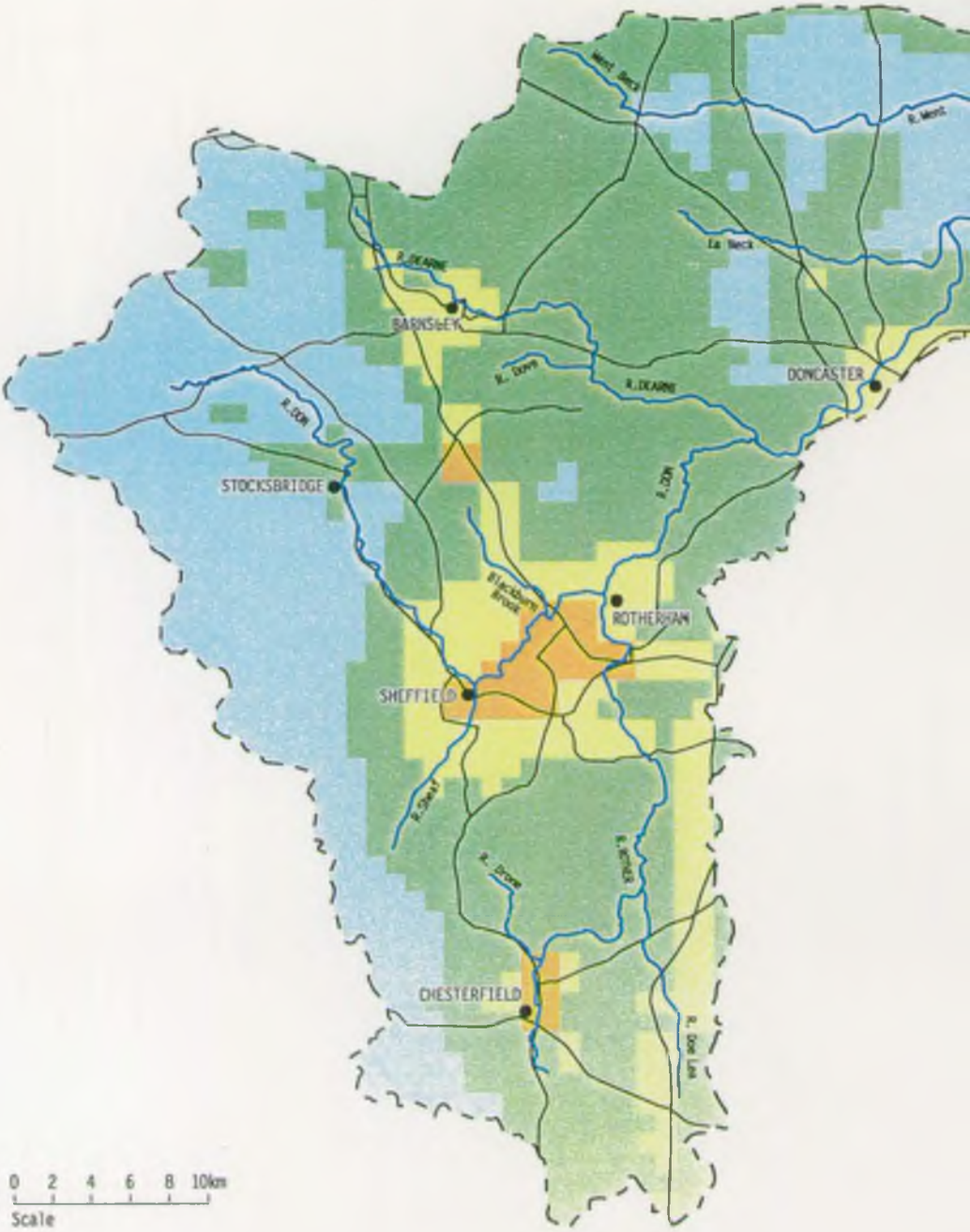
KEY

- CATCHMENT BOUNDARY
- RIVER
- PRIMARY ROADS

NITROGEN DIOXIDE CONCENTRATION, ppb

- BELOW 5
- 5 – 10
- 10 – 15
- 15 – 20
- 20 – 25
- 25 – 30
- 30 – 35
- ABOVE 35

Figure 22


R. Mersey
R. Mersey
Ea Beck
R. DEARNE
BARNSLEY
R. Dove
R. DEARNE
DONCASTER
R. DON
STOCKSBRIDGE
R. DON
Blackburn Brook
ROTHERHAM
SHEFFIELD
R. Sheaf
R. Drone
R. RIVER
CHESTERFIELD
R. Doe Lea
0 2 4 6 8 10km
Scale

SOUTH YORKSHIRE AND NORTH EAST DERBYSHIRE AREA

AIR QUALITY

ANNUAL MEAN BACKGROUND PARTICLE (PM10) CONCENTRATION

DATA SOURCE: DETR / NETCEN

KEY

- - — - CATCHMENT BOUNDARY
——— RIVER
——— PRIMARY ROADS

PARTICLE CONCENTRATION, $\mu g\ m^{-3}$

- BELOW 12.5
- 12.5 – 15
- 15 – 17.5
- 17.5 – 20
- 20 – 22.5
- 22.5 – 25
- 25 – 27.5
- ABOVE 27.5

Figure 23

Carbon monoxide(CO) and carbon dioxide(CO_2)
Carbon monoxide is a colourless and odourless gas which, if inhaled, enters the blood stream and disrupts the supply of oxygen to the body's tissues causing cardiovascular and respiratory problems. Its largest source is form petrol engine exhausts, particularly when vehicles are decelerating or stationary. Carbon dioxide is also released during fossil fuel combustion. Whilst it is not directly harmful to human health it is a major greenhouse gas. An average car emits approximately four tonnes of CO_2 over an average year's mileage of twelve thousand miles.

6.2 WASTE MANAGEMENT

Background

The Government has published a strategy for sustainable waste management entitled "Making Waste Work". This indicates that we must take more responsibility for the waste we produce, the way we manage it and its impact on the environment. The strategy has four main objectives as follows:-

- to reduce the amount of waste that society produces;
- to make the best use of the waste that society produces;
- to minimise the risks of immediate and future environmental pollution and harm to human health;
- to increase the proportion of waste managed by the options towards the top of the hierarchy (ie the preferable option is waste reduction, followed by re-use and recovery, and disposal should be used only as a last resort).

Within the Strategy there are several national targets as follows:-

- to reduce the proportion of controlled waste going to landfill from 70% to 60% by 2005;
- to recover value from 40% of municipal waste by 2005;
- to set a target for overall waste reduction by the end of 1998.

In addition, the strategy includes several secondary targets relating to different waste streams, such as construction and demolition wastes.

The targets in the Strategy are intended as a set of focused, quantifiable, indicative targets for more sustainable waste management. They are intended to send a strong message to those involved in waste management decision-making about the way in which the Government believes waste management practices should develop in the future. They are not legally binding at the present time, though there is a likelihood that they will have legal backing in the future.

There is new legislation relating to producer responsibility, however, which does provide legal underpinning for more recovery and recycling of waste. The new regulations introduced in March this year relate to packaging and require the UK to recover 52% of packaging and to recycle 16% of each packaging material by the year 2001. It is likely that more regulations will follow for other waste streams, such as electronic goods, end of life vehicles, tyres and batteries.

A further Government target is identified in the white paper "This Common Inheritance". This target recommends that 25% of household waste generated in the UK should be recycled by the year 2000.

As well as government targets, a number of industries have set their own voluntary targets, eg. a 90% recycling target for lead batteries, 65% recovery target for tyres and a 58% recycling rate for glass by the year 2000.

Outlined above are the key aspects of the national waste strategy and an indication of some of the targets which have been set for waste minimisation, recovery and re-use. Inevitably, we will still be left with some wastes which have to be disposed of and these must be dealt with in a way which minimises the risks of environmental pollution and harm to human health.

Whilst there have been very significant advances in the standards of site development and operation over the last two decades, further improvement can undoubtedly be achieved. The Government has produced guidance in waste management papers about how waste management sites should be engineered, operated and monitored, with particular emphasis on an holistic approach and the employment of sustainable landfill. Standards can not be changed overnight but the Agency is committed to achieving a steady improvement.

(See *Issues 13 & 14*)

Current status

It is estimated that around 435 million tonnes of waste are produced each year in the UK. About 245 million tonnes of this is 'controlled' (household, commercial and industrial) and the remaining 190 million tonnes is 'uncontrolled' (agricultural and mining and quarrying).

Uncontrolled wastes are often accommodated on the site of production, whereas controlled wastes usually, but not always, are removed off site for disposal or recovery.

Nationally, approximately 70% of controlled waste is disposed of to landfill. In promoting the concept of the waste management hierarchy, a target has been set in the national waste strategy to reduce the amount of waste going to landfill to 60%. It is hoped that this can be achieved by waste reduction and an increase in recovery and recycling.

Household waste

While household waste makes up only about 8% of total controlled waste nationally, it is potentially very polluting and gives rise to landfill gas. At the present time 90% is landfilled and only about 5% is recycled. Therefore much more work needs to be done to meet the target of 25%.

In addition, in order for the UK to meet the national targets for the recycling and recovery of packaging waste, significant quantities of packaging will have to be captured from the domestic waste stream and diverted to re-processing facilities.

The composition of household refuse varies both seasonally and geographically. It is important to have an accurate analysis in order to evaluate the potential for recycling and the impact of new initiatives. Work is being carried out to obtain better information about the composition of domestic waste locally.

Within the LEAP area the local authorities and voluntary organisations have made considerable efforts to reduce the quantity of waste requiring to be sent to landfill by providing recycling facilities for public use. Noteworthy recycling initiatives include the 'blue-box' scheme which provides kerbside collection of recyclables in parts of Sheffield. Doncaster and half of the Rotherham area have kerbside collection for paper, with more planned for this Summer. Barnsley Council is investigating the possibility of a waste recycling scheme for electronics waste.

The potential for composting the biodegradable fraction of domestic waste is recognised by each of the local authorities, and there are several targets in the national waste strategy specific to composting. A number of local authorities in the area now provide subsidised compost bins to householders to encourage home composting, and Sheffield Council is looking into setting up a central composting facility.

The overall recycling rate within the districts ranges from 2.4% to 11.4%. However, if the waste incinerated at Bernard Road 'heat to energy' plant is included, the recycling rate overall goes up, probably to an average of about 10% for the LEAP area.

These UK targets are an aggregated duty. While they do not specifically apply to each authority, each will have to make their contribution if the targets are to be achieved nationally.

Industrial and commercial waste

Industrial and commercial wastes make up the bulk of controlled waste. Like household waste, landfill is the most commonly used option with around three quarters going to landfill and the remainder going for incineration, recycling or other forms of treatment. Approximately one million tonnes of industrial and commercial waste is deposited each year at licensed sites in the area; most of it produced locally. This does not include the substantial tonnage of waste which is recycled and does not enter the disposal chain. Particularly worthy of note are very large tonnages of slag and scrap which are recycled within the metal manufacturing industry, and construction and demolition wastes which are recycled for use as secondary aggregate.

It is difficult to put an accurate figure on the types and quantities of industrial and commercial waste arising in the LEAP area. The Agency has identified an urgent need for better information which can be used as a basis for future decision-making and to assess performance against national targets. The Agency is therefore progressing a number of initiatives to improve data on waste arisings and disposal.

Construction and demolition wastes

Construction and demolition wastes make up just under a third of the controlled waste stream nationally. In the LEAP area there have been a number of major development projects in recent years resulting in a much higher percentage of this type of waste than the national norm.

The Government has set a specific target in the national waste strategy of fifty-five million tonnes per annum of waste to be recycled as secondary aggregate by the year 2006. Currently, around thirty million tonnes per annum are recycled in this way. Most of the material produced is consumed in low grade uses and only a small proportion is processed to meet the standards required for use in place of primary aggregates. There are about twenty-five authorised screens and crushers in this area producing secondary aggregate from waste. There is a need to divert more of this waste away from landfills to reprocessing facilities. This might be facilitated by the introduction of a tax on primary aggregates.

Special wastes

Special wastes account for a relatively small percentage of the total waste stream, but are potentially the most hazardous. In its widest context waste minimisation includes a reduction in the hazardous properties of waste as well as a reduction in quantity. A number of companies locally have made great strides in reducing the use of the most dangerous materials and substituting them with more environmentally friendly products. In addition, significant quantities of special waste, notably acids and solvents, are recycled. The Agency has a role play in promoting the use of less harmful substitutes and encouraging the recycling of special wastes.

6.3 WATER QUALITY

Background

Surface Water

Rivers and tributaries in the Don, Dearne and Rother catchment are of mixed quality with major improvements, especially over the past six years, leading to most stretches of the main rivers being capable of supporting good coarse fisheries. Much work remains to be done particularly on the tributaries and the impacts of sewage works, combined sewer overflows, contaminated land and the impact of the drought. A comprehensive water quality monitoring programme enables the Agency to assess whether or not the rivers meet their required quality standards.

Water quality is assessed against the following measures:-

- compliance with River Quality Objectives (RQOs);
- compliance with EC Directives;
- Biological Classes.

The Agency uses two principal schemes for the reporting and management of river water quality: - the general quality assessment (GQA) scheme; and the water quality objectives (WQOs) scheme. It is hoped that these will be made statutory in the near future.

The GQA scheme is used to make regular assessments of the quality of rivers to monitor trends over time and to compare rivers in different areas. Four components are being developed for the GQA assessment - general chemistry, nutrients, aesthetics and biology - each providing a discrete 'window' on the quality of the river stretches.

The general chemistry component of the GQA is now in use. It is made up of six grades (A to F) defined by standards monitoring levels of Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD) and Total Ammonia (see *Appendix D*). In the GQA chemical quality system A and B are classed as good quality, C and D are fair quality and E and F are poor quality. (See *Figure 24.)*

The GQA components for nutrients and aesthetics are under development and will be applied when available.

The Water Quality Objective (WQO) scheme, establishes quality targets based on the uses of the watercourse. The standards defining the five River Ecosystem (RE) Use Classes, addressing the chemical quality requirements of different types of aquatic ecosystems, were introduced by the Surface Waters Regulations 1994 under the River Ecosystem Classification. These uses are likely to include: River Ecosystem; Special Ecosystem; Abstraction for Potable Supply; Agricultural Abstraction; Watersports. For each stretch of river an RE class WQO's will be assigned including a date by which this level of water quality should be achieved. Until WQOs are formally established by legal notice served by the Secretary of State, and therefore have a statutory basis, they will be applied on a non-statutory basis with appropriate RE classes, and target dates when the objectives are to be achieved. Standards for further uses are still under development. One RE class relating to different types of fish population within a river has already been established.

Water quality targets are set for both long term and short term. Short term targets are realistic targets to be achieved by 2005, and long term targets are aspirational targets and may depend on AMP3 expenditure post 2005 to be achieved. Details of the water quality criteria for the River Ecosystem scheme are shown in *Appendix E*. Proposed long term River Quality Objectives are shown in *Figure 25*.

West Beck
Wombwell S Beck
R.Went
The Shell
Ea Beck
Cudworth Dike
R.DEARNE
BARNSLEY
R. Dove
R.DEARNE
DONCASTER
R.DON
R.DON
Little Don
STOCKSBRIDGE
Tinsley Beck
R.DON
Blackburn Brook
ROTHERHAM
R.Loxley
R.Rivelin
SHEFFIELD
Shire Brook
Pigeon Bridge Brook
R.Sheaf
The Moss
R.Drone
R.SHOGER
Barlow Brook
Holme Brook
CHESTERFIELD
Poole Brook
R. Doe Lea
R. Rother
Trickley Brook
R.WORKS
0 2 4 6 8 10km
Scale

SOUTH YORKSHIRE AND NORTH EAST DERBYSHIRE AREA

RIVER CHEMICAL QUALITY GQA GRADES 1996

KEY

- CATCHMENT BOUNDARY
- CLASS A
- CLASS B
- CLASS C
- CLASS D
- CLASS E
- CLASS F
- UNCLASSIFIED

Figure 24

BARNSLEY
DONCASTER
STOCKSBRIDGE
ROTHERHAM
SHEFFIELD
CHESTERFIELD
R. DEARNE
R. DON
R. Dove
R. Loxley
R. Rivelin
R. Sheaf
R. Rother
R. Drone
R. Moss
R. Doe Lea
R. Hipper
R. Erewash
Little Don
Cubert's Dike
Ea Beck
The Shell
Wensley Beck
West Beck
Blackburn Brook
Shire Brook
Pigeon Bridge Brook
The Moss
Barlow Brook
Holme Brook
Poolsbrook
Trickett Brook
RE1
RE2
RE3
RE4
0 2 4 6 8 10km
Scale

SOUTH YORKSHIRE AND NORTH EAST DERBYSHIRE AREA

PROPOSED LONG TERM RIVER QUALITY OBJECTIVES

KEY

CATCHMENT BOUNDARY

RIVER

TIDAL LIMIT

COMPLIANCE WITH RIVER ECOSYSTEM TARGETS (LONG TERM)

MEETS OBJECTIVE

MARGINALLY FAILS TO MEET OBJECTIVE

SIGNIFICANTLY FAILS TO MEETS OBJECTIVE

Figure 25

West Beck
Wawersley Beck
R. West
The Skell
Ea Beck
Cawthorne Dike
R. DEARNE
BARNSLEY
Cudworth Dike
R. Dove
R. DEARNE
DONCASTER
R. DON
R. DON
Little Don
STOCKSBRIDGE
Loxley Beck
R. DON
Blackburn Brook
ROTHERHAM
R. Loxley
R. Rivelin
SHEFFIELD
Shire Brook
Pigeon Bridge Brook
R. Sheaf
The Moss
R. Drone
R. DON
Barlow Brook
Holme Brook
CHESTERFIELD
R. Rother
Poolsbrook
R. DOE
Trickett Brook
R. ERIDGE
0 2 4 6 8 10km
Scale

SOUTH YORKSHIRE AND NORTH EAST DERBYSHIRE AREA

BIOLOGICAL WATER QUALITY

1995

KEY

- CATCHMENT BOUNDARY
- BIOLOGY GQA CLASS a
- BIOLOGY GQA CLASS b
- BIOLOGY GQA CLASS c
- BIOLOGY GQA CLASS d
- BIOLOGY GQA CLASS e
- BIOLOGY GQA CLASS f
- UNCLASSIFIED

Figure 26

The Agency is responsible for the protection of controlled waters from pollution. Effluent discharges are controlled by consents and authorisations which impose conditions to regulate the quality and quantity of the discharge. Conditions are set taking account of the upstream quality, the dilution available and the quality required downstream. The Agency is continually reviewing discharge consent conditions to ensure that the receiving watercourse achieves the necessary standards. Review may result in the variation of consent or an authorisation. When setting new consent standards, the Agency needs to identify a reasonable and practicable timescale for the discharger to carry out required improvements.

Biological criteria form an important component of water quality monitoring, as they provide an assessment of the impact of discharges on the aquatic environment. The biological classification used by the Agency is based largely on the presence and abundance of macro-invertebrate species. The status of invertebrate communities can be used to monitor the overall long term health of the river.

Biological water quality can be expressed in various ways, but the most convenient method is one which parallels the chemical water quality classification and has classes ranked 1A, 1B, 2, 3 and 4. The biology classes are prefixed with B and indicate 'very good', 'good', 'fair', 'poor' and 'bad' quality. These classes are derived from the interpretation of the types and numbers of the freshwater invertebrate animals present, and knowledge of their tolerance or sensitivity to (principally) organic pollution. More recently the biological GQA system has also introduced biological classes a-f, based on the match between target values for biotic scores and actual results. (*See Figure 26.*)

Groundwater

Water bearing rocks, known as aquifers, provide storage for considerable volumes of high quality water, which often requires little or no treatment before being put into supply. Groundwater also provides the baseflow of many river systems which may be used for drinking water, industrial and agricultural purposes as well as for fishing and other recreational activities. The quality of this baseflow is therefore important in maintaining surface water quality in these areas. Groundwater quality shows significant natural variation relating to type of aquifer rock, for example sandstone and limestone.

Once polluted, groundwater is difficult and often impossible, to rehabilitate and it is therefore vital that the quality of this resource is protected. The 'Policy and Practice for the Protection of Groundwater' (NRA, 1992) defines the responsibilities of the Agency regarding groundwater resources and quality protection.

The policy classifies rock types into major aquifers such as the Magnesian Limestone and Sherwood Sandstone; minor aquifers such as the Carboniferous Limestone and Coal Measures; non-aquifers such as the Mercia Mudstone. The vulnerability of the aquifer to pollution is assessed from the type and thickness of soil and drift cover. A series of protection zones will be delineated for the major groundwater sources where the water is used for drinking water supplies or other purposes such as food processing or water bottling. The above document sets out guidelines to be used as a framework for decision-making on groundwater issues and also contains a number of different policies which are aimed at protecting the groundwater resource. The policies, which are not statutory,

relate to potentially polluting activities such as landfill, contamination of land, use of soakaways (including road and rail drainage), effluent discharges and diffuse sources of pollution.

Under the Water Resources Act 1991, a framework was established for water quality objectives. The framework applies to both surface water and groundwater and includes a system for classifying water quality which would enable the Secretary of State to set WQOs. These would require that specific targets for water quality should be achieved and maintained.

At present, no WQOs have been set for groundwater. However, in order to set targets at some point in the future, and to comply with the Agency's general duty under the Water Resources Act to monitor controlled waters, it is important that baseline data is available on groundwater quality. The Agency has therefore established a groundwater quality monitoring network across both the Plan area and the Region as a whole. The network was established in 1995 and will be used both to assess current groundwater quality and to identify trends that may occur in the longer term. Data may also highlight areas where groundwater has become polluted and further investigation is required.

Current Status

Surface Water

Compliance with River Quality Targets for the whole of the area are shown in *Figures 24 and 25*. Water Quality in the catchment as a whole, has improved dramatically, over the past six years in particular. The details can be seen in *Tables 9 to 11* on the following pages.

The reduction of over 120 km of the most polluted class E & F stretches to class A(2.1km), B(24 km), C(53 km) & D(42 km) is even more exceptional when it is considered that the majority of the changes are to the main rivers themselves. In particular the improvements from class E & F on the main River Don (50 km), Rother (30 km) and Dearne (16 km). Improvements would have been even greater but for the impact of the drought during 1995 and 1996. This significantly affected the flows in many tributaries leaving a lack of dilution and dispersal for the effluents they receive. There is still a great deal of further improvement required with nearly a 175 km of poor quality (class E & F) remaining.

The reasons for these improvements and the remaining exceptions on meeting targets, concentrating on those with the major impacts, are summarised in the following paragraphs.

Table 9/Figure 27: Changes in water quality of the River Don from 1990 to 1996 showing movement between classes over the period

GQA Class	1990	A	B	C	D	E	F	1996
A	3.5	3.5	0	0	0	0	0	5.6
B	114.9	2.1	107.9	1.8	3.1	0	0	139.2
C	136.6	0	10.4	112.6	9.1	2.3	2.2	189.2
D	138.3	0	18	27.1	82	11.2	0	179.8
E	187.3	0	0	31.6	64.7	88.3	2.7	138.3
F	107.8	0	2.9	16.1	20.9	36.5	31.4	36.3
TOTAL	688.4	5.6	139.2	189.2	179.8	138.3	36.3	688.4

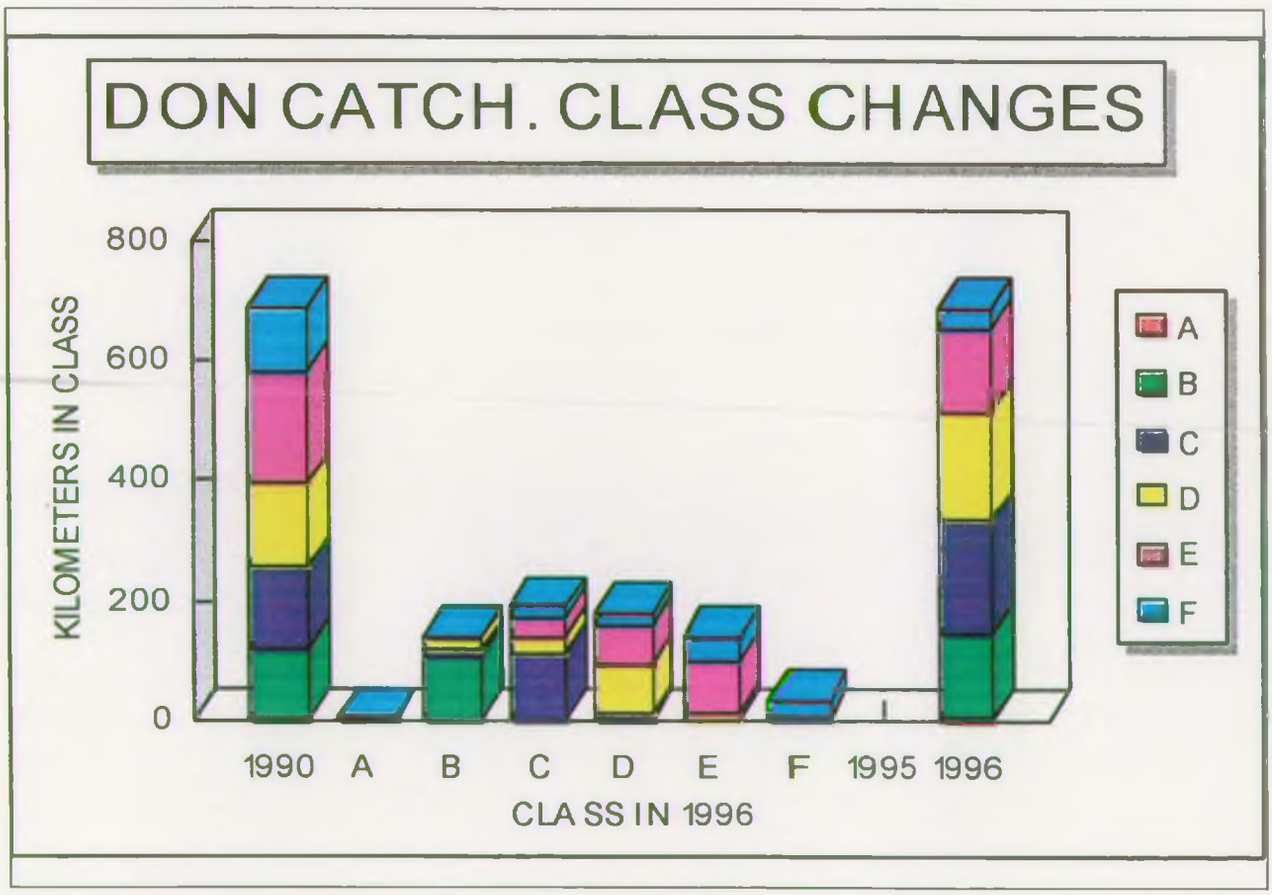


Table 10/Fig 28: Summary of changes in water quality of the River Don from 1990 to 1996

	1990 (KM)	1996 (KM)	CHANGE (KM)
A	3.5	5.6	2.1
B	114.9	139.2	24.3
C	136.6	189.2	52.6
D	138.3	179.8	41.5
E	187.3	138.3	-49.0
F	107.8	36.3	-71.5
TOTAL	688.4	688.4	0

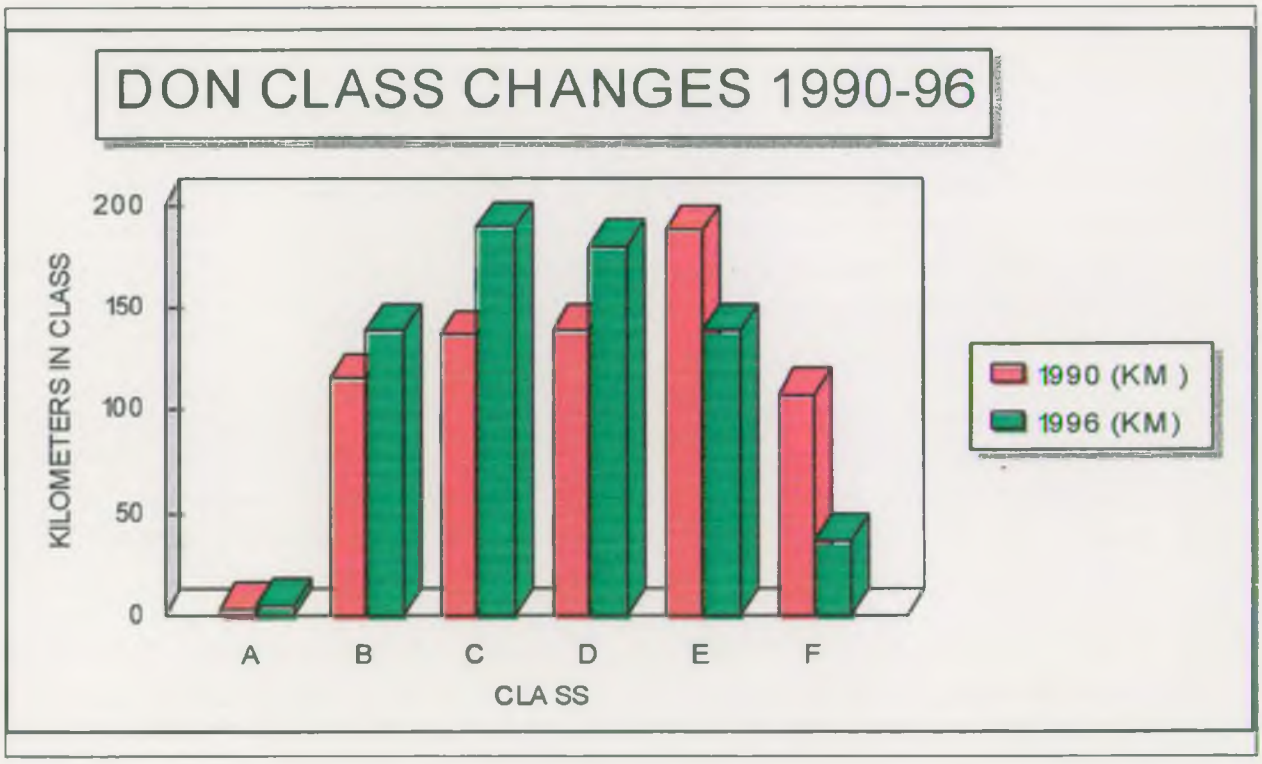


Table 11: Changes in water quality of the River Don from 1990 to 1996 showing the contributions from each catchment

	1990 (KM)	ROTHER	ROTHER TRIBS	DOE LEA & TRIBS	DEARNE	DEARNE TRIBS	DON	DON TRIBS	WENT & TRIBS	TOTAL	1996 (KM)
A	3.5	0	0	0	2.1	0	0	0	0	2.1	5.6
B	114.9	0	13.3	0	-2.1	1.3	11.9	1.7	-1.8	24	139.2
C	136.6	21.5	2.1	0	8.5	13.1	4.8	0.9	1.7	53	189.2
D	138.3	9.3	-2.1	2.8	7.2	-9	34.2	-7.7	6.8	42	179.8
E	187.3	-4	-6.8	-2.3	-15.7	11.3	-32.1	6.7	-6.1	-49	138.3
F	107.8	-26.8	-6.5	-0.5	0	16.7	-18.8	-1.6	-0.6	-72	36.3
TOTAL	688.4										688.4

Upper River Don

The past six years have seen the improvements in water quality of over 50 kilometres, or almost half the total length of the main river Don over from the most polluted grades, class E & F. This has been achieved primarily from improvements to sewerage and sewage treatment at Sheffield (Blackburn Meadows and the Don Valley Interceptor Sewer) and Chesterfield (Old Whittington, with the resultant improvements in the Rother). Quality targets have also been achieved, or are on course, due to improvements at many industrial sites including Hepworth's Quarry, Crow Edge; United Engineering Steels, Stocksbridge; JAMONT, Oughtibridge; and Laporte Fluoride, Rotherham.

The only stretch of the main River Don which failed to meet its target during 1994-96 was the stretch between the Blackwater Dyke and the Roundwood due to Aldwarke Sewage Treatment Works. The works could not achieve nitrification during part of the above period, it currently does and should achieve this consistently on completion of further improvements in April 1998.

The Don tributaries the Cubley Brook, Graves Park Beck, Porter Brook, Sheaf, Bagley Brook and Carr Brook continue to have sections which fail to meet targets due to intermittent discharges from combined sewer overflows. Improvement works are programmed by Yorkshire Water over the next 10 years.

Other tributaries have suffered because of the low flows experienced during the drought which were inadequate to deal with the normal effluent loads particularly on the River Little Don downstream of Langsett Sewage Treatment Works, and further downstream by copper levels from Stocksbridge Works (being addressed by a scheme scheduled for completion in 1997), Blackburn Brook, and Hooton Brook.

Sickley Brook is affected by leachate from a disused refuse site entering a culverted section. Greasbrough Dyke has an illegal trade effluent connected to a surface water sewer. Dalton Brook was affected by high ammonia levels in Silverwood Colliery minewater prior to its closure. Roundwood Brook still suffers the effects from anaerobic deposits although the sewage works has closed. These are all under investigation and improvements are anticipated.

River Rother

The main River Rother has improved water quality from Classes E & F for over 30 kilometres, equivalent to sixty percent of its total length, during the period 1990 to 1996. This has been achieved in the main through improvements to sewerage and sewage treatment at Chesterfield (Old Whittington) and Staveley (improved sewage treatment and improved CSOs at Stavely and Netherthorpe). Improvements have also been made to a number of industrial discharges, in particular involving Coalite Chemicals, Coalite Fuels, Beighton and Glapwell Landfill sites, Rhone Poulenc and reclamation of Orgreaves coking site. There have been changes in discharges due to colliery closures and minewater pumping has ceased at Markham and Bolsover improving the lower Doe Lea.

The main river still fails to meet its target for two stretches as a result of sewage effluents. The stretches are from Danesmoor STW (Clay Cross) to Wingerworth and from Woodhouse Mill STW to the confluence with the River Don at Rotherham. Major capital schemes are planned to allow the targets to be met by the year 2000.

Of the tributaries of the Rother, the River Doe Lea does not meet its target from Holmewood Brook to Stockley Brook as a result of severe drought effects, and from Bolsover STW to the Coalite complex as a result of sewage effluent and the effects of mining subsidence. These issues are being investigated.

Spital/ Muster Brook, Brookside Beck, The Moss, Handley Brook and Todwick Beck do not meet targets as a result of a number of intermittent discharges which are being investigated.

The River Drone does not meet its target over most of its length as a result of a combination of minewaters and effluent from Dronfield STW. These need to be addressed together if any real improvement is to be made.

The Shire Brook does not meet its target due to discharges from combined sewer overflows which should be resolved in 1997 by a major capital scheme. The brook is culverted under Beighton Landfill Site and leachate from the waste is entering the culvert and affecting water quality. The culvert is currently being relined to prevent ingress of leachate, and later this year treatment of the leachate on site will commence.

River Dearne

The main River Dearne now meets its targets for the majority of its length. There river has not been as badly affected by pollution as have the rivers Don and Rother but has still shown improvements of over 15 kilometres from Class E since 1990. These improvements have been realised from a number of schemes involving Yorkshire Water and industry, particularly Woolley Colliery minewater discharge, Hayroyd Colliery discharge, treatment at Dodworth Spoil heap drainage, and closure of Coalite, Grimethorpe.

Occasional failures to meet targets downstream of Clayton West STW should be resolved by a scheme that is to be carried out in 1997. The other main exception is the stretch downstream of Lundwood STW to Houghton weir which consistently fails to meet targets. A major capital investment scheme, involving the installation of high rate filters and sand filters, is being undertaken at Lundwood and is due for completion in early 1998.

Barnsley Canal, Tanyard Beck, Silkstone Beck, Cawthorne Dyke, Billingley Dyke, Rockley Dyke and House Carr Dyke have all been severely affected by low flows during the drought reducing the dilution afforded to normal effluents.

Cudworth Dyke did not achieve its target over the entire length in 1996. The upper reaches have been badly affected by ammonia pollution, which has now been rectified. Further downstream there has been severe pollution by organic discharges from a bakery and the company have carried out improvements on site to prevent a recurrence. Along the same stretch a discharge from a sewage pumping station turned the dyke septic during last summer. Improvements are under discussion as part of Yorkshire Water's investment programme. Discharges, especially of ammonia, from Carlton Industrial Estate have contributed to the shortfall and investigations continue. The lower end of the dyke is affected by the effluent from Cudworth STW.

Shafton Beck and Grimethorpe Dyke have been affected by the effluent from Grimethorpe STW entering drought affected watercourses. Other problems upstream of the works are also being investigated as is the contribution of combined sewer overflows to Ferrymoor dyke.

Problems on Dodworth Dyke resulted from a combination of overflows at Keresforth Road, which has now been uprated, and illegal discharges from Fall Bank Industrial Estate.

The River Dove failed to meet its target below Worsbrough Reservoir mainly as a result of the effect of ammonia levels in the effluent from Dodworth STW. The works has now been abandoned with flows being pumped to an extended works at Worsbrough. Wombwell STW effluent also affects water quality downstream and a capital scheme, involving the installation of new aeration lanes, is due to start in 1997.

Carr Dyke, Brook Dyke, and the lower part of Elsecar Canal have been badly affected by combined sewer overflows, other discharges, and the influence of the drought of 1995/6.

Lower River Don

Improvements in water quality in the Lower Don mainly results from the improvements upstream in the Rother, Upper Don and Dearne. This has been assisted by improvements to the discharges from Prosper De Mulder in Doncaster, Croda at Rawcliffe Bridge, and John Carr Joinery in Bentley.

The main River Don has not achieved its target in the stretch above Rawcliffe Bridge. This results from the effect of the tidal Ouse on the Don and from the discharges from Sandall STW and Thorne STW. Improvements are planned for Sandall STW by the year 2000. The major improvement scheme at Thorne STW, to provide full biological treatment, is already underway and is due for completion by the end of 1997.

Significant improvement work is planned for the Goole area. This will include large scale resewerage work and a completely new sewage treatment works to serve the town. These three major schemes should further improve the now well-established fishery in the Lower Don.

The main tributary of the lower Don, the River Went, has not changed significantly in water quality in the past six years. Efforts have been previously directed towards the Rother, Dearne and Don. There is now a need to look more closely at the Went as a focus for future action. Investigations into low flow issues and the abstraction pressures on the river have commenced. Part of the River Went is designated as an EC Fishery. The EC Fisheries water quality limits are not being met due to the effects of Ackworth STW and Carleton STW discharges.

Sewage effluents and low flows combine to affect many of the Lower Don tributaries including Goosepool Drain (Adwick STW), Ea Beck (South Elmsall STW), Dobeller Drain (Rawclifffe Goole STW) and the Little Went (Carleton STW). A scheme to improve South Elmsall STW has been agreed, and this will improve a significant length of Ea Beck.

Many other tributaries in the low-lying catchment have proved vulnerable to contaminated runoff from colliery spoil heaps and other land associated with coal mining. These issues are being addressed through the redevelopment of the land by English Partnerships, the local authorities, and developers.

Langthwaite Beck is affected by drainage from Langthwaite Grange Industrial Estate which, despite continuing pollution prevention visits, continues to cause problems.

Kearsley Brook is severely affected by combined sewer overflows which are being addressed under a major resewerage scheme which is due to start in 1997/1998.

6.4 WATER RESOURCES

Background

Under the Water Resources Act 1991, the Agency has a duty to conserve, redistribute, augment and ensure the proper use of water resources whilst at the same time conserving or enhancing the environment.

In 1994, following both a report by consultants 'Water Resources Development Options For Yorkshire' (Halcrow 1993), and public consultation, the Region published its Regional Water Resources Strategy. Within the Region, water is used for a variety of purposes in cooling, food processing, irrigation, farm fishing, bottling, and private

domestic supplies. However, the largest demand on the water resource is from the water companies who abstract water from reservoirs, rivers, springs and boreholes for public water supply to their customers. For this reason, the water companies are dealt with separately within the Regional Strategy.

Forecasting long term changes in demand is a difficult and uncertain process. A large number of assumptions need to be made in relation to what may or may not happen over the planning period, which is typically 25-30 years. These assumptions relate to factors such as expected population growth; changes in the volume of water consumed per head; levels of industry activity; the impact of technology changes in industry; the impact of domestic metering, if adopted; leakage control.

Since the publication of the strategy, the Region has experienced extreme variations in rainfall, including a very wet winter in 1994/1995 and the drought of 1995/96. As a result of the drought, additional resources identified in the strategy have been brought forward by Yorkshire Water. Particular emphasis has been placed on leakage control and demand management as a sustainable approach to water management, rather than relying totally on new resources.

Work has commenced on producing a new regional water resources strategy for publication in 1999. One of the issues that will need to be addressed is an increase in emphasis on water conservation and management, including the possibility of the artificial recharge of aquifers.
(See *Issues 11, 12 & 15*)

Current Status

Surface Water

The Agency manages a regional rainfall and river flow monitoring network which is described in *Section 2.5*.

Where applicable, a gauging station may be used to set a prescribed flow condition for surface water abstraction licences. Once the flow, as measured at the gauging station, is equal to or less than a specified figure, abstraction must either cease completely or be reduced to a lower volume. This condition applies to many existing abstraction licences and will be contained in all future licences that are granted by the Agency.

As a result of the drought of 1995/96, Yorkshire Water made many changes to the water supply grid and to their abstractions. This is dealt with on the following page.

Groundwater

Throughout the LEAP area, groundwater levels in the various aquifers are monitored on a routine basis. This is achieved by measuring the groundwater level in boreholes that are part of the Agency's groundwater level monitoring network. With the exception of drought periods, there are usually few problems with the availability of groundwater in those rocks which are classified as aquifers. Spring flows naturally decline during the summer.

Locally, however, there are areas where groundwater resources have been fully committed thought the Agency's groundwater abstraction licensing policy. One example of this is in the Doncaster area where, historically, there has been a lot of abstraction for industrial purposes and water supply.

The Drought of 1995/1996

The headwater catchments are moderate to steep, undeveloped moorlands which feed reservoirs used for public water supply to Barnsley and Sheffield. The reservoirs are arranged in six groups located on the Don and its five main tributaries in the upper catchment. Each reservoir group makes compensation releases to the river downstream.

Due to pressures on the water supply and exceptionally low levels in the reservoirs, YWS applied for Drought Orders in December 1995 for the Sheffield and Barnsley reservoirs. The Orders reduced the releases of compensation water to a third of their licensed statutory amounts. In March 1996, with the drought conditions continuing, and with stocks in Winscar Reservoir, which feeds the upper Don, down to less than 20% of capacity, a further Order was applied for on this group. The drought on water supply affected the Don catchment much later than some of the other river catchments, and water from Winscar reservoir had been used to augment supplies to the Calder conurbations. The Winscar drought order expired in November 1996 and the Sheffield source reservoirs (which had an extension) expired in January 1997.

The Environmental Statement accompanying the Drought Order applications concluded that the proposed reductions in compensation flows would have no acute impact on the quality and ecology of the Don and its tributaries. This was a reasonable assumption provided the major effluent treatment works were operated to their maximum potential and that the Order related to the winter period when the impacts could be expected to be less. Conditions were imposed on the Drought Orders covering the requirements for monitoring, mitigation and restoration of the rivers. The particular concerns for the Don related to the longer term impact of the reduced flows on the ecology of a river that was just starting to show signs of recovery from more than a century of industrial pollution. A Crayfish survey was undertaken by YWS as part of their monitoring work but no Crayfish were found.

In 1995 the Don catchment had only 633mm of rainfall, amounting to 80% of the Long Term Average (LTA) for that area. The following year rainfall was 643mm, or 82% of the LTA. Although there was rain in February and March, the lack of rainfall in April resulted in the Don starting to fall behind the other Pennine catchments.

The YWS Southern Division reservoirs at the beginning of 1996 were less than 30% full, but quickly rose to over 60% during February and March. A steady fall then took stocks down to 33%, with the low point occurring in mid-October, before they rose following heavy rainfall. The reservoir levels rose from 36% full to 91% full in four weeks - the fastest rise on record - and they were completely full by the end of the year.

The flows in the Don are measured at Hadfields (Meadowhall) and Doncaster. Several of the main tributaries are also monitored. The upper Don and its tributaries respond rapidly to rainfall while the response downstream is both later and lower. Flows were

still only just above the dry weather flow (DWF) by the end of 1995, so despite periods of higher flow during the winter, only the highest values for February were above the LTA; the other winter months remained entirely below average. The DWF in 1996 was reached around a month earlier than 1995 for the Don at Doncaster, and six weeks earlier for the Rother and the Dearne. The flows remained at or below the DWF from mid-June into November. The flows continued to rise slowly until just before Christmas, when there were very high flows following heavy rain. The Don flow on 20th December 1996 was the third highest ever recorded. The flows then fell steadily until the end of the year, when they were below half their average.

During this time, the Agency already had a comprehensive monitoring programme in place covering flow, quality, biology and fisheries interests. This work was enhanced as a condition of the Drought Orders with extra ecological work to be carried out by both YWS and the Agency in 1995 and throughout 1996. At the start of the drought, an action plan was devised to manage and measure its effects, and included an emergency fish rescue plan. Various monitoring programmes were set up to investigate the drought's impacts, supplementing an existing programme. In addition, as a condition of the drought orders, YWS were asked to review the operation of a number of their STWs to improve efficiency where possible.

Although, in terms of rainfall, the drought was less severe in 1996 than it had been in 1995, in terms of water quality, there was more of an impact on parts of the River Don catchment in 1996. This was because none of the compensation flows, which provide a very significant proportion of the base summer flows in the main River Don upstream of Blackburn Meadows Sewage Treatment Works, were reduced in 1995.

The impact of drought on water quality was not severe although significant deteriorations did take place in several stretches of the main River Don. On the main River Don deteriorations in water quality were found, downstream of the confluence with the Scout Dyke, downstream of Stocksbridge STW, and downstream of Jamont. Deteriorations were also found in the stretch between the confluence with the River Loxley and the confluence with the River Sheaf.

Downstream of Blackburn Meadows STW, water quality was generally better due to reduced ammonia levels in Blackburn Meadows effluent; in spite of the drought and the substantially reduced dilution for this effluent. In the River Don tributaries no significant class changes took place.

The drought has highlighted many anomalies in the compensation regimes operated by YWS. The quantities of some of the releases were set to meet past industrial demands and are inappropriate for satisfying the needs of the environment. In addition, some of the compensation agreements in practice result in higher levels of compensation water being released in the winter months, when it is least needed. A regime where higher compensation releases are discharged in the summer months, as is currently the case with Winscar, and where winter rainfall is conserved, would be more appropriate. Compensation releases are shortly to be reviewed jointly by YWS and the Agency.

Environmental monitoring was considered to be a long term issue, and the drought order conditions specified that fisheries and biological (aquatic macro-invertebrate) surveys should be carried out during, and for two years after the cessation of the drought. It is likely, therefore, that there will be at least three years of monitoring carried out. Invertebrate monitoring commenced in the spring of 1996: part of the work was undertaken by the Agency and part by YWS contractors. All monitoring will now be carried out by the Agency and full costs will be reimbursed by YWS. It is intended that a final report with a full analysis encompassing both Agency and YWS data will be produced when three years of monitoring has been completed.

The Institute of Freshwater Ecology (IFE) were commissioned by YWS to undertake the fish population surveys at eight sites affected by Drought Orders within the River Don catchment. Surveys were carried out in April and October 1996 and also in March 1997. There were found to be greater reductions in overall biomass and density for larger trout within the River Don catchment, and a total failure of recruitment was found at least two sites on the River Don. Full details can be found in the Drought Report for 1996/97 which will be available in October 1997.

6.5 FLOOD DEFENCE

Background

The decision as to whether or not flood defences will be provided or improved involves considerations of cost effectiveness, environmental acceptability and the wishes of the local population.

As an aid to decisions on priorities for works the Agency has determined standards of service for flood defence based on land usage within the floodplain. Five 'land use bands', have been established, based on the presence and concentration of certain features of land use such as housing, commercial property, agriculture and transport networks. (See *Table 12 and Figure 29.*)

The standard of service is an indication of the appropriate level of defence against flooding. Consequently for an urban area, a flood defence scheme would provide defence against a flood event occuring on average once every 50 or 100 years. For an area of farmland the scheme would offer protection against only perhaps, a 10 year event. This reflects the relative disruption and damage a flood would cause.

For capital flood alleviation schemes, a rigorous appraisal is carried out to identify the nature and extent of the flooding problem, to identify the important aspects of the existing environment, and consequently to identify all acceptable engineering options. A review of benefits and costs forms the economic assessment.

Maintenance activities are also prioritised on a benefit/cost basis, within the guidelines of the standard of service. A system has been developed that shows the cost of the required maintenance work against the damage that the works are averting. Maintenance work is coordinated with conservation bodies, IDBs, and farmers.
(See *Issues 8 to 10*)

Wawsley S Beck
R.West
The Skell
La Beck
Cudworth Dike
Cawthorne Dike
BARNSLEY
R. Dove
R.DEARNE
DONCASTER
R.DON
R.DON
Little Don
STOCKSBRIDGE
Loxley Beck
R.DON
Blackburn Brook
ROTHERHAM
R.Loxley
R.Rivelin
SHEFFIELD
Shire Brook
Pigeon Bridge Brook
R.Sheaf
The Moss
R.Rother
R.Drone
Barlow Brook
Holme Brook
CHESTERFIELD
Poole Brook
R.Rippon
Trickett Brook
R.ROTHER
0 2 4 6 8 10km
Scale

SOUTH YORKSHIRE AND NORTH EAST DERBYSHIRE AREA

FLOOD DEFENCE INDICATIVE STANDARDS

KEY

- CATCHMENT BOUNDARY
- MAIN RIVER
- RIVER
- TIDAL LIMIT

LAND USE		RETURN PERIOD (years) FLUVIAL	TIDAL
	A	50 - 100	100 - 200
	B	25 - 100	50 - 200
	C	5 - 50	10 - 100
	D	1.25 - 10	2.5 - 20
	E	< 2.5	< 5
	X	Insufficient Data	

Figure 29

Current Status

Capital expenditure is programmed under a 10 year long term plan. The total programmed expenditure over the next 5 years for capital flood alleviation schemes in the Don catchment is £4,500,000. The annual maintenance budget is £330,000.

Table 12: Flood Defence Standards of Service

Standards of service land use bands and targets			
Land use band	Description of typical land use	Target standard of protection (return period in years)	
		Fluvial (River)	Saline (Tidal)
A	Urban	1:50 - 1:100	1:100 - 1:200
B	Lower density urban	1:25 - 1:100	1:50 - 1:200
C	Isolated rural communities	1:5 - 1:50	1:10 - 1:100
D	Isolated properties/intensive farming	1:1.25 - 1:10	1:2.5 - 1:20
E	Low grade agricultural land	<1:2.5	<1:5

A comparison of the target and actual standards of service allows improvement and maintenance works to be prioritised.

6.6 BIODIVERSITY

Background

The UK Biodiversity Action Programme resulted from the Rio Earth Summit of 1992, the main aim being to maintain biological diversity in terms of species and wildlife habitats at a national level as the UK's contribution to global biodiversity conservation.

The primary goals of the programme are to:-

- develop costed targets for key species and habitats;
- improve the accessibility and coordination of information on biodiversity;
- increase public awareness and involvement in conserving biodiversity;
- ensure that commitments in the plan are properly carried out and monitored.

(See *Issue 19*)

Current Status

The Agency has taken special responsibility for one aquatic habitat (chalk streams) and twelve species (dependent upon an aquatic environment).

Of these species the following are known to be present in the LEAP area (Don, Dearne, Rother catchment):

Water vole (*Arvicola terrestris*)
Otter (*Lutra lutra*) (few sightings)
Native crayfish (*Austropotamobius pallipes*)

A number of other aquatic species listed in the action plan, but not a special responsibility of the Agency, are also known to be associated with these rivers or with their wetlands, for example the great crested newt (*Triturus cristatus*).

Certain of the above named species are totally protected under the Wildlife and Countryside Act 1981, and those currently unprotected are likely to receive such protection in future.

APPENDIX A: ORGANISATIONS RESPONDING TO PRELIMINARY CONSULTATION

A preliminary consultation document was sent to selected representative organisations for comment in April 1997. The purpose of this informal exercise was to seek views on the issues which we had identified in the LEAP area and on the background information we had provided. The following organisations responded and their comments have been taken into account in the preparation of this document:-

ADAS

Barnsley MBC

British Steel Engineering Steels

British Waterways - N E Region

Dibb Lupton Alsop/Sheffield Green Business Club

Doncaster MBC

Dun Drainage Commissioners

English Sports Council, Yorkshire

The Forestry Authority

Government Office

National Farmers Union - NE Region

Rotherham MBC

Sheffield City Council

Sheffield University, Dept Animal & Plant Sciences

Sheffield Wildlife Trust

South Yorkshire Forest Partnership

Yorkshire Water Services

APPENDIX B : ENVIRONMENT AGENCY AIMS AND STRATEGIES

Environment Agency

Guardians of the environment

Our vision is

A better environment in England and Wales for present and future generations.

Our aims

- To achieve major and continuous improvements in the quality of air, land and water.
- To encourage the conservation of natural resources, animals and plants.
- To make the most of pollution control and river-basin management.
- To provide effective defence and warning systems to protect people and property against flooding from rivers and the sea.
- To reduce the amount of waste by encouraging people to re-use and recycle their waste.
- To improve standards of waste disposal.
- To manage water resources to achieve the proper balance between the country's needs and the environment.
- To work with other organisations to reclaim contaminated land.
- To improve and develop salmon and freshwater fisheries.
- To conserve and improve river navigation.
- To tell people about environmental issues by educating and informing.
- To set priorities and work out solutions that society can afford.

We will do this by:

- being open and consulting others about our work;
- basing our decisions around sound science and research;
- valuing and developing our employees; and
- being efficient and businesslike in all we do.

Introduction

The Environment agency was established on 1 April 1996. The main aims and strategies of the Agency are detailed below with an introduction to each of our functions.

Water Resources

It is the Agency's responsibility to assess, plan and conserve water resources. The Environment Act 1995 describes the duty of the Agency to ensure that measures are taken towards the conservation, redistribution, augmentation and proper use of water resources. The Act requires the Agency to make arrangements with water and sewerage undertakers and statutory water companies to secure the proper management and operation of water resources and associated works. To effect these requirements the Agency controls abstractions by a licensing system and has the power, if necessary, to issue drought orders and designate water protection zones and nitrate sensitive areas. Under the Environment Act 1995 all abstractions require a licence except for those of less than 20 cubic metres a day for domestic or agricultural use from surface water, and those of less than 20 cubic metres per day for domestic use from groundwater. There are also other exceptions for small abstractions from boreholes and springs. Charges for abstraction licences are based upon quantity, source, season and loss.

To secure the proper management of water resources the Agency operates a hydrometric network of rainfall stations, groundwater observation boreholes and river flow gauging stations. These provide not only data for water resources assessment but also for flood prediction, impact of effluent discharges, fisheries management, conservation and recreational uses.

The Agency's strategic objectives regarding water resources are:

- to plan for the sustainable development of water resources, developing criteria to assess the reasonable needs of abstractors and of the environment;
- to collect, validate, store and provide hydrometric and water environment data in order to assess water resources;
- to apply a nationally consistent approach to abstraction licensing, including licence determination, charging, policy and enforcement;
- to implement a consistent approach to the resolution of inherited problems caused by authorised over-abstraction;
- to work with other functions and external bodies to protect the quality of our water resources.

Water Quality

The Agency aims to maintain and improve the quality of rivers, estuaries, coastal waters and groundwater through the control of water pollution. These aims are fulfilled via:

- water quality management;
- effluent quality regulation;
- pollution incident investigation; and

- pollution prevention.

Water quality management is based principally on monitoring of the environment to establish chemical, biological and microbiological quality. These data are used by the Agency to detect trends, plan improvements and execute its statutory duties regarding the setting of discharge parameters and compliance with EC directives.

The Agency controls inputs into the environment via the issue of consents. Discharges from industrial, agricultural, domestic and sewage related sources are regulated by specification of effluent quality limits and conditions which the discharger must achieve. Such discharges are monitored routinely and failure to satisfy consent conditions may lead to legal action being taken.

The Agency makes an immediate response to all reports of pollution. During a pollution incident investigative actions are taken to identify the source, stop the discharge, minimise its adverse effects and ensure that remedial work, where appropriate, is completed. Legal action is considered in cases of serious and/or repeated incidents.

Pollution prevention via development control and advice on best practice to industry, farmers, water supply and sewage companies is carried out in support of water quality management to prevent deterioration of the water environment.

The Agency's strategic objectives regarding water quality are:

- to maintain waters that are already of high quality;
- to improve waters of poorer quality;
- to ensure that all waters are of an appropriate quality for their agreed uses;
- to prosecute polluters and recover the costs of restoration from them;
- to devise charging regimes that allocate the costs of maintaining and improving water quality fairly and provide an incentive to reduce pollution.

Integrated Pollution Control

The Agency is responsible for regulating over two thousand of the most complex and potentially polluting types of process under the regime of Integrated Pollution Control. This is a preventative philosophy which requires operators to use the Best Available Techniques Not Entailing Excessive Cost to prevent and minimise or render harmless the release of harmful substances to the environment. In addition the Best Practicable Environmental Option should be used where the releases from the process are to more than one of the environmental media, namely air, land and water, to minimise the overall effect on the environment.

Industrial Monitoring by the Environment Agency.

The concept of Integrated Pollution Control (IPC) is one of self monitoring within the regulatory regime policed by the Agency. This means that the operator monitors the point source releases at an agreed frequency and using agreed methods of analysis. The results of the monitoring and an estimate of the annual releases are placed on numerous

public registers. Inspectors check the operators monitoring protocols, sampling and analytical systems during site inspections. The Agency also perform independent monitoring to confirm the point source releases from the IPC processes. The results of the Agency monitoring activities are also placed on public registers.

Complex interactions between weather conditions, chemical processes, distances that air pollution can travel, and the number of possible sources make understanding causes and effects and attributing responsibility difficult in cases of air pollution. Prevention therefore depends upon the establishment of air quality targets.

The Government intends to introduce, in due course, mandatory duties on local authorities to assess local air quality and, where it is shown to be necessary according to nationally agreed criteria, prepare local air quality management plans for operation in defined areas where targets are unlikely to be met. Specific levels for a pollutant or combination of pollutants would define the level at which there is a potential risk of immediate serious damage. If the level were reached or approached in a particular area, it should therefore trigger a mandatory obligation on the relevant pollution control authorities, including the Agency, to take remedial action. The limit values have been proposed in draft within the National Air Quality Strategy documentation.

An increase in the number of air quality monitoring sites would further assist in identifying local air pollution, and publication of data that does exist, should raise awareness of local air quality.

Integrated Pollution Prevention and Control

A European Directive on Integrated Pollution Prevention and Control (IPPC) has recently been passed. This will be brought into United Kingdom legislation. The IPPC Directive covers an industry base that is, in general, an extension to that covered by the Environmental Protection Act 1990.

Waste Management

The Agency is responsible for regulating the waste disposal industry through the Environmental Protection Act 1990 and other legislation. This includes controlling the storage, transport, reclamation or final disposal of all controlled waste in order to prevent pollution of the environment.

The main functions and activities of the Agency with regard to waste management are as follows:

- licensing waste management facilities
- regulation of IPC processes which involve waste
- subsequent supervision of licensed activities
- operation of enforcement procedures aimed at unauthorised activities
- technical administration to regulate and monitor the movement of special waste - including international movements
- registration of waste carriers and brokers and promotion of the Duty of Care

- registration of the activities exempt from licensing
- collection of information about waste arisings and the preparation of a waste management plan
- responding to planning consultations where issues concerning waste may be a relevant factor
- maintenance of a public register and the general provision of waste management information and advice.

There are a number of wastes which are **not** controlled by the Agency. These are;

- gaseous emissions (except gaseous emissions from waste disposal and recovery operations, such as landfill gas or those from IPC processes)
- waste from mining and quarrying operations
- decommissioned explosives
- agricultural waste.

Conservation

The purpose of the conservation activities of the Agency is to:

- conserve and enhance the wildlife, landscapes and archaeological features associated with inland and coastal waters; and,
- promote the conservation of aquatic flora and fauna.

The Agency's statutory duties under the Water Resources Act 1991 are to further the conservation and enhancement of natural beauty in respect of proposals relating to Agency functions, protect sites of conservation interest and take into account the effects that any proposed developments would have. This is achieved by regulating the work of others through the land use planning consultation process and the issuing of consents under the Land Drainage Act 1991 and Water Resources Act 1991 for works adjacent to rivers. The Agency also carries out a programme of conservation works using its own workforce, in addition to assessing the conservation implications of other functional activities.

The Agency's strategic objectives in relation to conservation are:

- to assess and monitor the conservation status of inland and coastal waters and associated lands;
- to ensure that the Agency's regulatory, operational and advisory activities take full account of the need to sustain and further conservation;
- to promote conservation to enhance the quality of the aquatic and related environments for the benefit of wildlife and people.

Recreation

The Environment Agency has statutory duties to:

- ensure that water and land under the Agency's control (ie. as landowner, etc.) are

made available for recreational purposes, and that the needs in this context of persons who are chronically sick or disabled are taken into account;

- promote the use of all inland and coastal waters and associated land for recreational purposes.

Recreation includes the provision of opportunities and facilities for sports associated with water and the surrounding land, passive activities around water including public access and rights of way and the general aesthetic quality of the water environment.

These duties are identified in the Water Resources Act 1991 and in a code of practice which gives guidance on the kinds of provision required and the need to consider collaborative management with other bodies.

In addition to these recreation and amenity considerations the Agency, where it is the authority, has responsibilities relating to the maintenance and improvement of waterways for navigation. The Agency has no active navigation responsibility in the North East Region.

The Agency's strategic objectives regarding recreation are:

- to maintain, develop and improve recreational use of Agency sites;
- to take account of recreation in proposals relating to any Agency function;
- to promote the use of water and associated land for recreational purposes.

Navigation

The Agency's future strategy for navigation is to take a lead in working with other navigation authorities to bring about a more consistent approach to the administration of navigation in inland waters than currently exists in England and Wales, to facilitate and regulate the use of those inland navigations for which the Agency is navigation authority or has powers, and to manage the inter-relationship of navigation with other core functions of the Agency.

Fisheries

The general fisheries duties of the Agency are set out in the Environment Act 1995. Under this Act the Agency is responsible for the regulation of fisheries through the application of orders, byelaws and licensing systems.

An essential feature of the 1991 Act is the statutory duty placed on the Agency to 'maintain, improve and develop fisheries'. The term 'fisheries' encompasses both the recreational fishery and the fishery as an environmental resource. However the Act extends further to cover effectively all inland waters which have the capacity to support fish, other than fish farms; the latter are regulated by the Ministry of Agriculture, Fisheries and Food. Recreational fisheries include waters such as rivers, streams, canals, lakes, ponds and reservoirs.

In order to discharge its statutory duties the Agency undertakes a wide range of fish

surveillance and monitoring activities. Fish populations are biological indicators of changes in river flow, quality and habitat. The regulation of fish introductions and fish capture are also important.

The costs of the fisheries service are met, in part, by funds raised from rod licence sales.

The strategic objectives of the Agency's fisheries function are:

- to protect and conserve salmon, trout, freshwater fish, eels and, where appropriate, coastal fisheries;
- to regulate fisheries through the enforcement of a consistent series of licences, orders, byelaws and consents;
- to monitor the fisheries status of rivers and inland estuaries and, where appropriate, coastal waters;
- to formulate policies to maintain, improve and develop fisheries, and to restore and rehabilitate damaged fisheries;
- to provide an efficient and effective fisheries service which is responsive to the needs of its customers and is based on a sound charging system.

Flood Defence

The Agency has powers to:

- protect people and property against flooding from rivers and the sea;
- provide a means for the drainage of land; and,
- provide adequate arrangements for flood forecasting and warning.

Certain water courses are designated as 'main river'. On main rivers the Agency has permissive powers to construct new defences, maintain defences, and control the actions of others so that the risk to existing and future uses (e.g. development) can be minimised. The Agency is the primary body involved in flood defence matters but on 'ordinary watercourses' district or borough councils are the first point of contact. For flooding from sewers responsibility rests with either the district, or borough council or, the water undertaker.

The standard of flood protection can be measured in terms of the frequency (eg. 1 in 50 years), on average, up to which it will prove effective. The standards considered appropriate vary according to the land use to be protected and the economics of providing the service.

These activities are undertaken under the Water Resources Act 1991 and are directed by the Regional Flood Defence Committee. In addition to works on statutory main river the Agency also has powers to control weirs and culverts on ordinary watercourses that would otherwise affect the flow.

The Agency's strategic objectives in relation to flood defence are:

- to develop and implement the flood defence strategy through a systematic

approach for assessing capital and maintenance requirements and develop medium and long-term plans for those defences owned and maintained by the Agency;

- to encourage the development of information technology and the extension of facilities which will further improve procedures for warning of, and responding to, emergencies;
- to support R & D which will assist in identifying future flood defence needs;
- to review best practices for all operational methods, and the identification and justification of work, thus increasing efficiency and enhancing value for money;
- to heighten general awareness of the need to control development on flood plains and contribute to the development of Local Environment Agency Plans;
- to identify opportunities for the enhancement of environmental, conservation, recreational and amenity facilities when undertaking flood defence works;
- to undertake river maintenance operations in accordance with conservation guidelines for good practice.

Further information on the Agency's Flood Defence activities is given in *Appendix F*.

Land Use Planning

The Agency is a statutory consultee of the land use planning system and seeks to ensure that local authorities take into account the needs of the water environment when preparing development plans and determining planning applications. Promotion of source control techniques by local authorities would assist in this process.

A close working relationship is required with county, district and borough councils on mineral workings, waste disposal issues, infrastructure works, works within river corridors or floodplains, and any activities likely to pollute surface waters or groundwaters, increase the demand for water resources or adversely affect the conservation and amenity value of the environment.

Guidance notes for local planning authorities on the methods of protecting the water environment through development plans have been produced (September 1993), and these are being promoted in conjunction with the initiative to prepare LEAPs.

Sustainable development

The Agency has a duty to work towards sustainable development, as established by the following objectives, set by Ministers.

- An integrated approach to environmental protection and enhancement, taking into consideration the impact of all activities on natural resources;
- Delivery of environmental goals without imposing disproportionate costs on industry or society as a whole;
- Clear and effective procedures for serving its customers, including the development of single points of contact within the Agency;
- High professional standards, using the best possible information and analytical methods;

- Organisation of its own activities to reflect good environmental and management practice, and value for money for those who pay its charges, as well as for taxpayers as a whole;
- Provision of clear and readily available advice and information on its work;
- Development of a close and responsive relationship with the public including local authorities, other representatives of local communities and regulated organisations

Summary

Further information on the work of the Agency can be found in a series of Agency strategy documents covering water quality, water resources, flood defence, fisheries, conservation, navigation, recreation and research and development. These documents are available from the Agency Corporate Planning Section at the Environment Agency head office in Bristol.

APPENDIX C: EUROPEAN DIRECTIVES

European Commission (EC) Directives

The introduction of the European Commission (EC) Directives from 1976 to protect the water environment has had a significant impact on water quality issues. The UK has adopted the appropriate directive requirements and is incorporating them into UK legislation to complement other Agency water quality improvement measures and monitoring schemes.

Annual reports are made by the Agency to the DoE for fresh and saline waters using results from a comprehensive sampling and analysis programme. Quality assessments are made using specific numerical standards which are currently the only statutory water quality requirements. Where waters do not comply with the standards, the Agency is required to develop improvements plans to ensure the situation is remedied with an identified timescale.

There are several European Community Directives which apply or will apply to this LEAP area:-

The Surface Water Abstraction Directive (75/440/EEC)

The Directive ensures that water abstracted from rivers or reservoirs for drinking purposes achieves standards prior to treatment and distribution to public supply. Formal arrangements are in place between the water companies and the Agency to address non-compliance and other issues.

Drinking Water Directive

Owing to the importance of the LEAP catchment as a source of drinking water considerable emphasis is placed on monitoring of pesticides concentrations within the catchment.

Dangerous Substances Directive (76/464/EEC)

The Directive sets numerical standards for identified substances, which are particularly harmful to the water environment, and these must be achieved in all waters. New substances are introduced by the EC at intervals as new environmental initiatives are taken. Compliance with Dangerous Substances Directive is assessed by monitoring for specific substances downstream of registered discharges, and at a reference site in the lower reaches of the catchment.

The Freshwater Fisheries Directive (78/659/EEC)

The Freshwater Fisheries Directive requires that, where rivers are designated and suitable for salmonid or cyprinid fish populations, the Directive's water quality standards must apply. New designations may be made by notifying the DETR and permanent deterioration of designated waters is not permitted.

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

The Directive will apply to discharges of domestic sewage and similar industrial discharges with population equivalents in excess of 2000, made to fresh and saline waters and will be implemented in the period up to 2005. Standards will be set for discharge quality levels of treatment being specified according to the receiving water quality and characteristics.

North Sea Reduction Programme

Since 1987 the UK has adopted national and international initiatives to reduce pollution in the North Sea. The Paris Commission programme and the UK Red List substance initiative have estimated pollutant loads from rivers and discharges as a first step towards the identification of improvement measures.

The Integrated Pollution Prevention and Control Directive

Integrated Pollution Control was introduced to the UK in 1991. Since then industrial processes with a significant potential to release substances to air, water and land have been authorised under this new integrated regime. the original regulations have been modified and refined to provide an effective and apt means of regulating a select group of complex industrial processes.

The EC introduced Directive 96/61/EC "Concerning Integrated Pollution Prevention and Control" in September 1996. The requirements of this directive are currently being implemented. The likely effect of the introduction of this Directive will be to:

i alter the definition details of processes currently authorised under IPC in order to standardise across the whole of the EC;
ii introduce new industries e.g. large landfill sites, intensive livestock production to the system of integrated pollution regulation;
iii introduce new or extend the scope of pollution control eg noise.

The Agency will implement any new, or changed, regulations relevant to it's remit, will willingly provide advice and guidance to other organisations, and will put its own expertise and experience in integrated environmental management at the disposal of the policy-makers.

The EC Habitats Directive

The EC Habitats Directive was adopted in May 1992, requiring Member States to endeavour, where they consider it necessary in their land use planning and development policies, and in particular, with a view to improving the ecological coherence of the Natura 2000 network, to encourage the management of features of the landscape which are of major importance for wild flora and fauna. Domestic legislation to implement this, in the form of Statutory Instrument No. 2716 The Conservation (Natural Habitats & c) Regulations 1994, became law on 30 October 1994.

The Regulations include:

i definitions including relevant and competent authorities;
ii provision for the selection and designation of European sites;
iii provision for the protection and management of sites;
iv provision for the protection of certain species;
v measures to adapt planning and certain other controls.

Linear and continuous features (such as rivers and their banks or the traditional systems for marking field boundaries) or those functioning as stepping stones for the migration, dispersal and genetic exchange of

wild species are noted as habitats to be particularly protected.

The EC Directive on the Conservation of Wild Birds (79/409)

The overall purpose of the Directive is to provide for the protection, management and control of all species of naturally occurring wild birds in the EC. The Directive places an emphasis on the need to conserve bird habitats as a means of maintaining populations.

In the UK the Directive is implemented through the Wildlife and Countryside Act 1981 (as amended). Special Protection Areas (SPA) can be designated for internationally important sites. Such sites will have been previously notified as Sites of Special Scientific Interest (SSSI) and the SPA designation places no additional responsibilities on the owners or occupiers of the site. The designation requires that appropriate steps should be taken to avoid damage to or deterioration of the SPA except in circumstances where there is an over-riding public interest.

APPENDIX D: GENERAL QUALITY ASSESSMENT CLASSIFICATION

The General Quality Assessment (GQA) scheme is used to make regular assessments of the quality of rivers to monitor trends over time and to compare rivers in different areas. Four components are being developed for the GQA assessment - general chemistry, nutrients, aesthetics and biology, each providing a discrete 'window' on the quality of the river stretches. The general chemistry and biology components of the GQA is now in use. It is made up of six grades (A to F) defined by standards for Dissolved Oxygen, BOD and Total Ammonia. In the GQA chemical quality system A and B are classed as good quality, C and D are fair quality and E and F are poor quality.

The remaining two GQA windows (nutrients and aesthetics) are still under development and will be applied when available.

Water quality	Grade	Dissolved Oxygen (% saturation) 10 percentile	Biochemical Oxygen Demand (ATU) (mg/l) 90 percentile	Ammonia (mgN/l) 90 percentile
GOOD	A	80	2.5	0.25
GOOD	B	70	4	0.6
FAIR	C	60	6	1.3
FAIR	D	50	8	2.5
POOR	E	20	15	9.0
POOR	F	-	-	-

APPENDIX E : CHEMICAL STANDARDS FOR RIVER ECOSYSTEM CLASSIFICATION

The Water Quality Objective (WQO) scheme established quality targets based on the uses of the watercourse, to provide a commonly agreed planning framework for regulatory bodies and dischargers. The proposed WQO scheme is based upon the recognised uses to which a river stretch may be put. These uses could eventually include: River Ecosystem; Special Ecosystem; Abstraction for Potable Supply; Agricultural Abstraction; and Watersports. The standards defining the five River Ecosystem (RE) use classes, which address the chemical quality requirements of different types of aquatic ecosystems, were introduced by the Surface Waters (River Ecosystem) (Classification) Regulations 1994. For each stretch of river, an RE class WQO will be assigned including a date by which this level of water quality should be achieved.

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

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

APPENDIX F: FLOOD DEFENCE SUPPLEMENTARY INFORMATION

Regulation

The Agency supervises all flood defence matters but has special powers to carry out or control work on main rivers and sea defences. All watercourses are classified as either 'main river' (which is defined on maps held by the Agency and MAFF) or 'ordinary watercourse' (sometimes referred to as 'non-main river').

Local authorities and in some areas internal drainage boards (IDBs in the LEAP area are listed at the end of this Appendix) are responsible for flood defence on ordinary watercourses. Local authorities are also responsible for protecting the coast from erosion by the sea.

The extent of the 'main river' is shown in figure

It is preferable to avoid increased risk from flooding through control of development than to carry out works to alleviate problems once they occur. The relevant authority for controlling development in the flood plain is the local planning authority.

Surface water runoff is likely to be increased to some degree as a result of development as more impermeable surfaces such as roofs and pavements are created. The impacts of such development, however small, add up and can lead to significant flood problems. Where appropriate the Agency requires measures to control surface water to be incorporated into the overall development. Local planning authorities and the Agency liaise closely on these matters. There is presently a five year programme of surveys to identify and assess problem areas for future development. This survey extends to cover all watercourses and is targetted by Local Authorities.

The Agency is involved with the preparation of Water Level Management Plans for Sites of Special Scientific Interest. Where the Agency is the operating authority, we will liaise with English Nature and other interested parties to ensure that the water level requirements for a range of activities can be balanced and integrated.

Operations and Maintenance

In order that flood defences perform as they were intended it is essential to maintain them in good order. Earth banks need to be inspected for subsidence, holes, vermin infestation, and erosion. This requires grass cutting. Trees on banks need to be pollarded and managed to prevent trees blowing over and leaving holes in banks, and to prevent them collapsing into the river and causing a blockage downstream. Flood walls need inspecting for leakage, cracks, or movement. The river bed needs dredging in some places to maintain an adequate flow area. River banks often require large lumps of rock to protect against erosion.

The Agency and predecessor organisations have constructed a significant number of gates, weirs, pumping stations and other such structures to complement river channel improvements. These all require routine maintenance.

Privately owned structures are common on watercourses, for a variety of water uses such as operation of mills, creation of navigation channels and fish farming and amenity as well as access bridges and culverts. By law these must be maintained and operated properly by their owners if they affect river levels and flows. The condition of privately owned structures can be of concern.

Improvements

The Agency can build new flood defences if flooding is a serious problem in a particular area. Nowadays the Agency usually only builds new defences to protect built up areas from flooding, such as the proposed new defences at Dronfield. All schemes must be technically, economically and environmentally sound. There is a ten year programme for flood defence capital projects.

A study of the ecology (animal and plant life) of the area is always conducted to help shape the scheme options by minimising adverse impacts and identifying enhancement and mitigation opportunities. Conservation bodies and the public are consulted from an early stage, and where possible their views are incorporated.

Some examples of recent changes to maintenance procedures which aim to benefit the environment, whilst still meeting the requirements of flood defence, are the change from poisoning to trapping vermin; change in timing and frequency of bank mowing; greater use of natural materials for erosion protection and use of waste materials for conservation projects.

Flood Warning and Emergency Response

The Agency is responsible for the issue of flood warnings, both to the public and also to the Local Authorities, utilities, and the emergency services.

The Agency operates a system of monitoring rainfall and river levels, and also forecasting flood levels at key locations. This is used to ensure that flood warnings are issued in good time. Flood warnings are issued in accordance with a national colour coded system, yellow, amber, and red.

In the event of the possible overtopping or breach of flood defences, public in the area at risk would be alerted by the use of loudspeaker systems. At times of flooding an information service is available where the public can phone in to get up to date flooding information. The Floodcall number is (0645) 881188

At times of high water levels, in addition to our flood warning role, the Agency patrols the defences, operates flood defence structures, removes blockages and carries out any emergency repairs needed.

Local Authorities have emergency plans for dealing with floods. The degree of assistance offered varies, but can include sand bagging, pumping, and evacuation. Local Authorities are responsible for flooding from highways and 'non main' (usually small) watercourses.

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

Internal Drainage Boards

Within the River Don catchment area there are 9 IDBs, taken from Goole upstream these are:

1. Dempster
2. Goole and Airmyn
3. Rawcliffe
4. Thorntree
5. Cowick
6. Black Drain
7. Went
8. Dun
9. Dearne and Dove

These were set up following the Land Drainage Act (LDA) 1930, to deal with specific drainage problems in relatively low-lying agricultural areas and still carry out this work today.

APPENDIX G: GLOSSARY OF TERMS

Abstraction	Removal of water from surface water or groundwater, usually by pumping.
Abstraction Licence	Licence issued by the Environment Agency under s.38 of the Water Resources Act 1991 to permit water to be abstracted.
AMP (Asset Management Plan)	For the purposes of this document Asset Management Plans can be considered as the means by which the water undertakers (e.g. Yorkshire Water Services Ltd) plan the work required and the capital expenditure necessary, for improvements and maintenance of the water supply, sewage treatment works and sewerage systems. These are drawn up through consultations with the Agency and other bodies to cover a five year period. The Asset Management Plans have to be agreed by the Department of the Environment and OFWAT.
AOD	Above Ordnance Datum. Equivalent to mean sea level.
Aquifer	A layer of underground porous rock which contains water and allows water to flow through it.
Area of Outstanding Natural Beauty (AONB)	Areas of Outstanding Natural Beauty are designated under the National Parks and Access to the Countryside Act 1949 by the Countryside Commission. Their primary purpose is to conserve the natural beauty of selected landscapes.
Bacteria	Single-cell micro-organisms which multiply by fission. Aerobic bacteria need oxygen for growth. Anaerobic bacteria grow in an oxygen deficient environment. Other bacteria are typified according to the predominant reaction involved, eg. acetogenic bacteria which break down organic matter to produce acetic acid, methanogenic bacteria form methane from the fatty acids produced by acetogenic and other bacteria.
Biochemical Oxygen Demand	A measure of the amount of oxygen in water during the breakdown of organic matter.

Catchment	The total area of land which contributes surface water to a specified watercourse or water body.
Combined Sewer Overflow (CSO)	An overflow structure which permits a discharge from the sewerage system during wet weather conditions.
Controlled Waste	Defined by the Water Resources Act 1991 Part III Section 104. They include household, industrial and commercial waste.
Dangerous Substances	Substances defined by the European Commission as in need of special control because of their toxicity, bioaccumulation and persistence.
Discharge Consent	A statutory document issued by the Agency under Schedule 10 of the Water Resources Act 1991 to indicate any limits and conditions on the discharge of an effluent to a controlled water.
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 water. It is used to classify waters.
Drift Deposits	Term used to include all unconsolidated superficial deposits (eg fluvial, glacial, alluvial, etc) overlying solid rock.
Fissure Flow	Groundwaters flow through an aquifer by a combination of fissure flow through the cracks in the rocks and intergranular flow through the pore spaces of the rock matrix.
Flood Plain	This includes all land adjacent to a watercourse over which water flows or would flow but for flood defences in times of flood.
Fly Tipping	The unregulated and hence illegal dumping of waste.
Groundwater	Water which is contained in saturated underground strata.
'Hands Off Flow'	Hands Off Flow (HOF): Also known as the prescribed flow, it represents the flow at which abstraction must cease. The HOF ensures that the environmental needs of the river will be protected,

	as will existing protected rights (licensed and exempt abstractions), downstream quality requirements and minimum flows.
Headwater	Streams close to their sources (in the context of the R&D project defined as being either first or second order, within 2.5 kilometres of the stream source or with a mean annual flow of no more than 0.31 cumecs).
House Equivalent	A measure used for assessing the value of property and land protected against flooding by flood defences.
Landfill	The deposit of waste onto and into land in such a way that pollution or harm to the environment is prevented and, through restoration, to provide land which may be used for another purpose.
Landfill Gas	A by-product from the digestion by anaerobic bacteria of putrescible matter present in waste deposited on landfill sites. The gas is predominantly methane (65%) together with carbon dioxide (35%) and trace concentrations of a range of vapours and gases.
Leachate	Liquid which seeps through a landfill, and by so doing extracts substances from the deposited waste. If allowed to leave the site can pollute groundwater.
Leaching	Removal of soluble substances by action of water percolating.
Main River	Some but not all, watercourses are designated as "main river". "Main river" status of a watercourse must first be approved by MAFF. Statutory (legally binding) maps showing The exact length of "main River" are held by MAFF in London and the Agency in Regional Offices. The Agency has the power to carry out works to improve drainage or protect land and property against flooding on watercourses designated as "Main River". The Agency does not have the legal power to spend public funds on drainage or flood protection works on water courses not designated as "Main River".

Methane	CH_4, a colourless, odourless, flammable gas, formed during the anaerobic decomposition of putrescible matter. It forms explosive mixture in the range 5-15% methane in air.
μg/l	Microgrammes per litre.
mg/l	Milligrams per litre.
National Nature Reserve	An area of land designated by English Nature under Section 35 of the Wildlife and Countryside Act 1981. They are managed by or on behalf of English Nature specifically for wildlife conservation purposes.
Potable Water	Water of suitable quality for drinking.
Prescribed Flow	A flow set to protect lawful downstream users and the aquatic environment.
Public Surface Water Sewer	Sewers which transmit surface water runoff to a watercourse. The water should be uncontaminated and is the responsibility of the sewerage undertaker (in this case Yorkshire Water Services Ltd) to maintain and control.
Regional Telemetry System (RTS)	The Regional Telemetry System allows up-to-the-minute information to be gathered by computers at an Agency office from outstations within the area. These outstations monitor river water level, flow and quality.
Return Period	Refers to the return period of a flood. Flood events are described in terms of the frequency at which, on average a certain severity of flood is exceeded. This frequency is usually expressed as a return period in years, e.g. 1 in 50 years.
Riparian Owner	A person/organisation with property rights on a river bank.
River Corridor	Land which has visual, physical or ecological links to a watercourse and which is dependent on the quality or level of the water within the channel.
River Quality Objective (RQO)	The level of water quality that a river should achieve in order to be suitable for its agreed uses.

Sewage Sludge	Sludge resulting from the treatment of raw sewage. It typically contains 70-90% water, prior to dewatering.
Silage	A winter feed for cattle. Silage is produced in the summer by bacterial action on freshly cut grass and is stored in a clamp or silo. Silage production results in the formation of a highly polluting effluent.
Site of Special Scientific Interest	A site designated under the Wildlife and Countryside Act 1981 by English Nature or the Countryside Council for Wales, being of national importance for its wildlife, geological or geomorphological features.
Slurry	Animal waste in liquid form. Slurry is usually collected and stored in tanks or lagoons and is spread on farm land at a later date.
Special Protection Areas (SPA)	Special Protection Areas are internationally important sites designated under the EEC Wild Birds Directive.
Springs	Natural emergence of groundwater at the surface.
Strata	Layers of rock, including unconsolidated materials such as sands and gravel.
Sustainable (development)	Capable of being maintained at a steady level without exhausting natural resources or causing ecological damage.
Trade Effluent	Effluent derived from a commercial process/premises.
Washlands	The area of the flood plain where water is stored in times of flood. Structures can be added to control the amount of water stored in the washland and time its release to alleviate peak flood flows in areas downstream.
Waste	'Waste' is defined in the Control of Pollution Act 1974 Section 30(1) to include: (a) any substance which constitutes a scrap material or an effluent or other unwanted surplus substance arising from the application of any

process; and

(b) any substance or article which requires to be disposed of as being broken, worn out, contaminated or otherwise spoiled,

but does not include a substance which is an explosive within the meaning of the Explosives Act 1875.

Wastes, Controlled	"Controlled Waste" is waste described as such in the Control of Pollution Act 1974 Part 1. Section 30(1) which defines 'controlled waste' as "household industrial, and commercial waste or any such waste".
Wastes, Hazardous	A waste that, by virtue of its composition, carries the risk of death, injury or impairment of health to humans or animals, the pollution of waters, or could have an unacceptable environmental impact (qv) if improperly handled, treated or disposed of. The term should not be used for waste that merely contains a hazardous material or materials. It should be used only to describe wastes that contain sufficient of these materials to render the waste as a whole hazardous within the definition given above.
Wastes, Household	'Household wastes' is defined in the Control of Pollution Act Section 30(3)(a) as consisting "of waste from any factory within the meaning of the Factories Act 1961 and any premises forming part of a university or school or other educational establishment or forming part of a hospital or nursing home".
Wastes, Industrial	'Industrial waste' is defined in the Control of Pollution Act 1974 Section 30(3)(b) as consisting "of waste from any factory within the meaning of the Factories Act 1961 and any premises occupied by a body corporate established by or under any enactment for the purpose of carrying on under national ownership any industry or part of an industry or any undertaking, excluding waste from any mine or quarry". Generally taken to include waste from any industrial undertaking or organisation.

Wastes, Municipal	Municipal waste is that waste that is collected and disposed of by or on behalf of a local authority. It will generally consist of household waste some commercial waste and waste taken to civic amenity waste collection/disposal sites by the general public. In addition, it may include road and pavement sweepings, gully emptying wastes, and some construction and demolition waste arising from local authority activities.
Wastes, Special	A particular class of hazardous wastes, so controlled by regulation that prenotification of their transport and deposit is required to be given to statutory authorities. The procedure to be followed is described in the Control of Pollution (Special Wastes) Regulations 1980, issued under Section 17 of the Control of Act pollution 1974.
Water Quality Objectives	Water Quality objectives set by the Secretary of State for the Environment in relation to controlled waters. It is anticipated that these objectives will become statutory objectives in the near future.

APPENDIX H: ABBREVIATIONS

ADAS	Agricultural Development & Advisory Service
AMP	Asset Management Plan
BASIS	British Agricultural Standards Inspection Scheme
BATNEEC	Best Available Techniques Not Entailing Excessive Cost
BOD	Biochemical Oxygen Demand
BWB	British Waterways
CSO	Combined Sewage Overflow
DETR	Department of the Environment, Transport and the Regions (successor to DoE)
DO	Dissolved Oxygen
DoE	Department of the Environment
3Es	Emissions, Economics & Efficiency
EA95	Environment Act 1995
EC	European Commission
EN	English Nature
EPA90	Environmental Protection Act 1990
EU	European Union
FWAG	Farming and Wildlife Advisory Group
GQA	General Quality Assessment
IDB	Internal Drainage Board
IPC	Integrated Pollution Control
IPPC	Integrated Pollution Prevention and Control
LA	Local Authority
LEAP	Local Environment Agency Plan
LPA	Local Planning Authority
LTA	Long Term Average
MAFF	Ministry of Agriculture Fisheries and Food
MBC	Metropolitan Borough Council
NETCEN	National Environmental Technology Centre
NFFO	Non Fossil Fuel Obligation
NSA	Nitrate Sensitive Area
NVZ	Nitrate Vulnerable Zone
OFWAT	Office of Water Services
ppb	Parts per Billion
PPG	Planning Policy Guidance
RE	River Ecosystem
RFFS	Regional Flow Forecasting System
RPG	Regional Planning Guidance
RTS	Regional Telemetry System
RSA93	Radioactive Substances Act 1993
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SAM	Scheduled Ancient Monument
SMR	Site and Monuments Record
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
STW	Sewage Treatment Works
SWALP	Surface Water Abstraction Licensing Policy
UK	United Kingdom
UWWTD	Urban Waste Water Treatment Directive
WHO	World Health Organisation
WLMP	Water Level Management Plan
WQO	Water Quality Objectives
YWS	Yorkshire Water Services

MANAGEMENT AND CONTACTS:

The Environment Agency delivers a service to its customers, with the emphasis on authority and accountability at the most local level possible. It aims to be cost-effective and efficient and to offer the best service and value for money.

Head Office is responsible for overall policy and relationships with national bodies including Government.

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The 24-hour emergency hotline number for reporting all environmental incidents relating to air, land and water.

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