EA MIDLANDS LEAPS - BOX 5

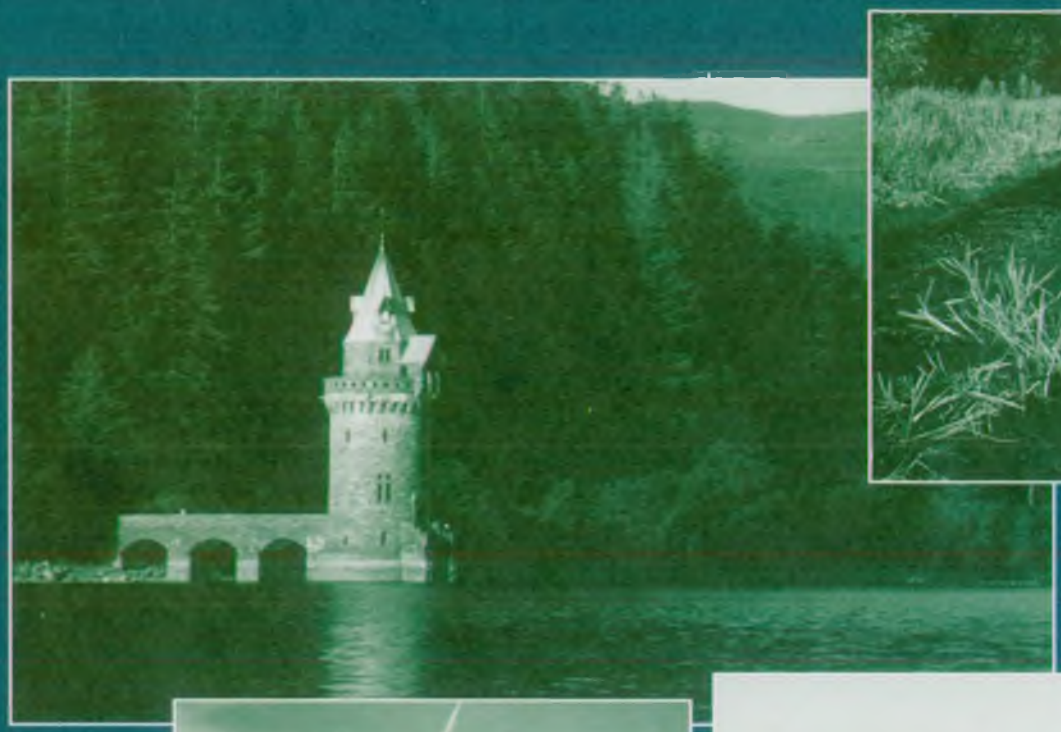
local environment agency plan

SEVERN UPLANDS

CONSULTATION REPORT

DECEMBER 1998

ASIANTAETH YR AMGYLCHEDD
ENVIRONMENT AGENCY



YOUR VIEWS~

This Consultation Report is about the Severn Uplands area. It is the Environment Agency's analysis of the environment in this area and the issues that the Agency believes need to be addressed.

The Agency wants to hear your views:

- ***Have all the important environmental issues been identified?***
- ***What do you think should be done about them?***
- ***Do you have any other information or ideas that need to be considered?***
- ***We would appreciate your views, which will help us finalise the Action Plan.***

The consultation period is from December 1998 to March 1999 to. Please send your comments in writing to:

Dee Murray or Jo Langfield,
The Environment Agency
Hafren House
Welshpool Road
SHREWSBURY
Shropshire
SY3 8BB

Telephone: (01743) 272828
Fax: (01743) 272138
e-mail: dee.murray@environment-agency.gov.uk

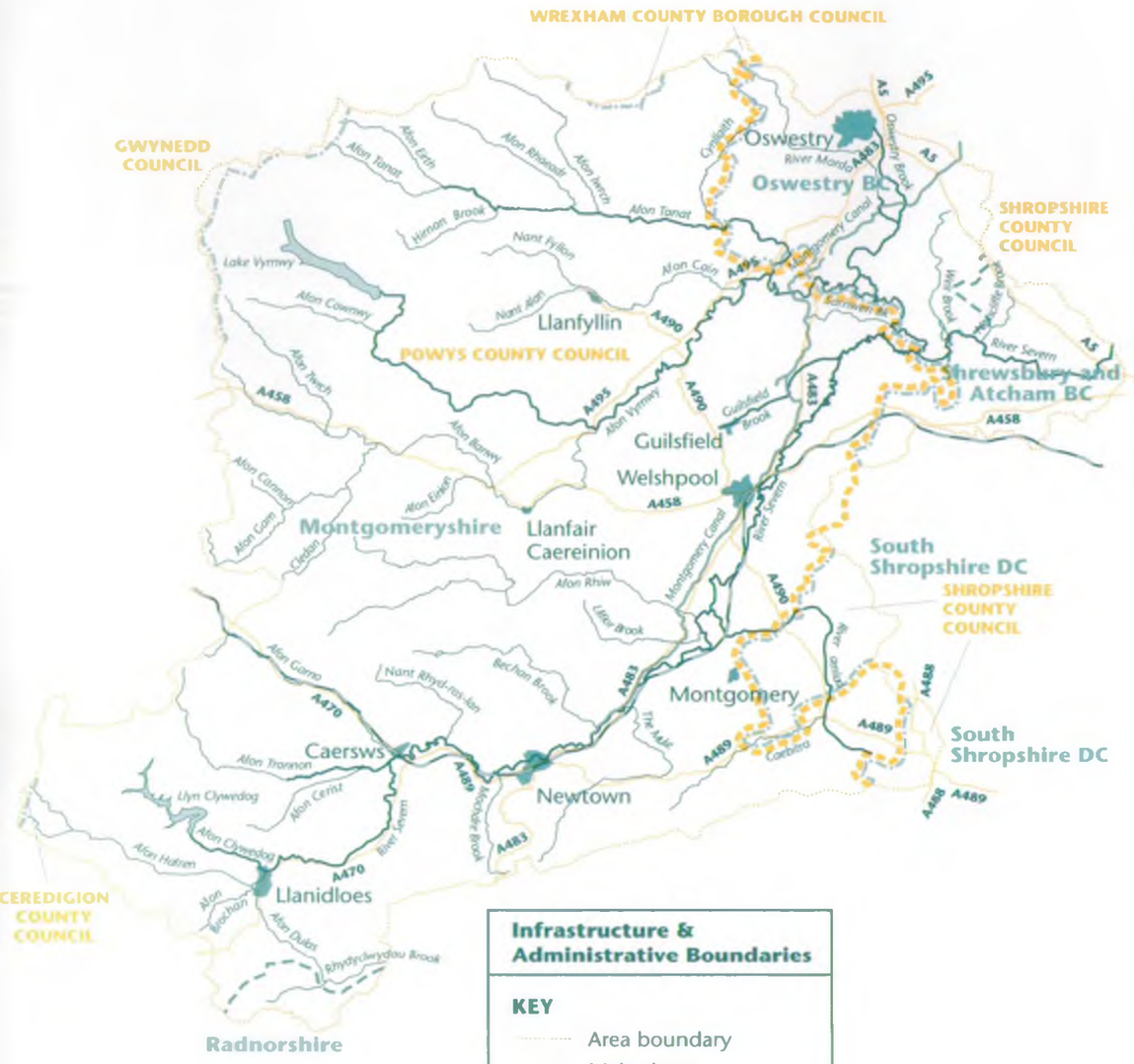
Please return your comments to us by 12 March 1999

Further copies of this Report are available at the above address.

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

Photographs: Clockwise from centre: Lake Vyrnwy; Montgomery Canal (Courtesy of John Tucker, SWT); Slurry Spreading; Otters

Severn Uplands Key Details



Infrastructure & Administrative Boundaries

KEY

- Area boundary
- Main river
- Ordinary watercourse
- Canal
- Built up areas
- National boundary
- County boundary
- District boundary
- A road
- Railway

N

0 10km

General

Area	2,065 km2	
Topography	Source of Severn	613m (AOD)
	Highest point	827m (AOD) (top of Moel Sych)
	Lowest point	55m (AOD) (Perry confluence)

Population	Year	Population
(estimated from 1991 Census)	1991	74,800
	2001 (predicted)	83,000

National Parks:	Snowdonia National Park
Water Companies:	Severn Trent Water Ltd North West Water Ltd Dwr Cymru/Welsh Water
Internal Drainage Boards:	Melverley IDB Powysland IDB
Navigation Authorities:	British Waterways - Montgomery Canal

Local Authorities in the plan area

Unitary Councils	*% of plan area*	*County Councils*	*% of plan area*	*District/Borough Councils*	*% of plan area*
Powys County Council	**85**	**Shropshire**	**14.5**	Oswestry BC	7.5
-Montgomeryshire Area	84	**County**		Shrewsbury &	
-Radnorshire Area	1	**Council**		Atcham BC	4
Wrexham County Borough Council				South Shropshire DC	3
Gwynedd Council	0.5				
Ceredigion Council					

Main Towns and Populations

Towns	Population (1991)
Oswestry	14,300
Newtown	10,100
Welshpool	5,800
Llanidloes	2,700
Llanfair Caereinion	1,300
Caersws	1,200
Montgomery	1,100
Llanfyllin	1,100
Guilsfield	1,000

Conservation

Special Area of Conservation	2 (1 with wetland interest)
Sites of Special Scientific Interest	77 (49 with wetland interest)
Special Wildlife Sites	112 (42 with wetland interest)
Scheduled Ancient Monuments	263 (48 associated with water)
Areas of Outstanding Natural Beauty (AONB)	Shropshire Hills AONB
English Nature Natural Areas	Oswestry Uplands
	Mosses and Meres
	Shropshire Hills
	Clun and NW Herefordshire Hills

Fisheries

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

Salmonid	351.1 km
Cyprinid - rivers	0
Cyprinid - canals	40.5 km

Water Resources and Flood Defence

Average annual rainfall (1961-1990)	1,266 mm
Mean daily flow of River Severn at Montford	3651 Megalitres per day
Maximum mean flow (1953-1996)	37188 Megalitres per day
Total licensed abstraction:	114,000 Megalitres per year
Surface water	104,000 Megalitres per year
Groundwater	10 Megalitres per year
Number of licensed abstractions: Total	348
Groundwater	240
Surface water	108
Storage capacity Llyn Clywedog	49,924 Megalitres
Storage capacity Lake Vyrnwy	59,666 Megalitres
Length of Main River	289.5 km
Length of Main River within IDB area	64 km
Length of flood banks and floodwalls maintained by the Agency	79 km
No. of flood alleviation schemes	4
Length of navigable canal (administered by British Waterways)	26 km

Environment Planning and Protection:

Water Quality

Length of river and canal (km) in each grade of the General Quality Assessment (GQA)

General Description	Grade	Chemistry 1997	Biology 1995 (see Appendix 1)
GOOD	A	207.2 237.3	174.2 259.9
	B		
FAIR	C	39.8 10	50.2 10.0
	D		
POOR	E	0	0
BAD	F	0	0

Total number of consented discharges:	213
Water company sewage discharges and storm overflows	95
Private sewage treatments plants	109
Industrial	9

Waste Management Sites

Landfill sites (inert)	2
Landfill sites (biodegradable)	1
Former landfill sites	46
Waste treatment plants	1
Incinerators	0
Household waste reclamation sites	1

Integrated Pollution Control (IPC)

IPC authorisations	0
Radioactive substances authorisations	0
Radioactive substances registrations	2
Metal recycling sites	6
Transfer stations	7

FOREWORD

I am delighted to introduce the Local Environment Agency Plan (LEAP) consultation report for the Severn Uplands area encompassing the upper reaches of the Severn catchment. The majority of which is in Wales and lies mostly within the counties of Powys and Shropshire. Our aim is to protect and enhance the whole environment through the promotion of sustainable development. One way of achieving this aim is through local environment planning and collaborative action, with both the local community and other organisations.

We have identified key environmental issues affecting the Severn Uplands area in consultation with various groups and organisations. We need to confirm that we have identified all the current issues and options to resolve them, and that we achieve a balance between the conflicting demands placed upon our natural environment. The LEAP process will provide a framework for protecting and improving our local environment, in partnership with others.

The publication of this report marks the start of a three-month period of consultation. It will be core reading for everyone concerned with the future of the plan area. Following the consultation period we will produce a five-year Action Plan. This will set out a costed programme of work by the Agency, and by agreement, other organisations, to protect and improve the environment of the Severn Uplands area.

Your views are very important and will help us produce the Action Plan. I look forward to hearing from you.

Steve Morley
Upper Severn Area Manager
Environment Agency

Acknowledgements

The Environment Agency has compiled this report with contributions from key organisations operating in the area. The Agency is particularly grateful to the County, District and Borough Councils for the information provided; to the Farming and Rural Conservation Agency (FRCA), an executive agency of the Ministry of Agriculture, Fisheries and Food (MAFF) and the Welsh Office, for the provision of information on agriculture; and to the Soil Survey and Land Research Centre for information on soils. Thanks must also go to the Severn Uplands project group members, the AEG sub-group, respondents to the informal issues consultation and to all those who have helped with the production of this document.

Vision for the Severn Uplands Area

The Severn Uplands area is predominantly rural in character, and is known for its attractive upland landscape and great natural beauty. The rivers in the catchment of the upper reaches of the Severn support high class fisheries and provide a diversity of habitats for a wide range of flora and fauna.

The area is home to around 75,000 people, who depend on their local environment in many ways and value it for the amenities and enjoyment it provides for their local communities. The picturesque and unspoilt countryside within the Severn Uplands area is also increasingly seen as a tourist attraction.

The plan area has an important role far beyond its physical boundaries, and indirectly affects many people who live outside it. One reason is the plentiful high quality water in its rivers and lakes, which is used as a major source of water supply to surrounding areas. Also of note is the fact that within the area is the upper part of the longest river in Britain. What occurs in these sensitive upper reaches can have an impact downstream for a distance of up to 350 kilometres.

The Environment Agency's aim for the Severn Uplands area is to:

* Work towards a sustainable local environment in partnership with others.

* Safeguard existing high quality water and habitats, and where appropriate work towards enhancing the environment.

* Ensure that future demands on the water environment from both within and outside the catchment are planned and managed in a balanced and sustainable way for the benefit of all users.

* Work in an integrated manner towards resolving those issues and problems that have been identified in the plan.

Key objectives of this plan are to:

* Seek to ensure that development in the area is environmentally sustainable.
* Maintain the highest possible level of protection for the water environment, restore damaged habitats and protect rare and threatened species.
* Improve water quality (where achievable) to meet long term River Ecosystem objectives.
* Improve fisheries by making spawning areas in rivers more accessible to migratory fish.
* Ensure proper management of the catchment's valuable water resources.
* Promote waste minimisation and recycling and encourage better management of waste products.
* Improve recreational and amenity access to watercourses where environmentally appropriate.
* Educate and raise awareness of the local environment and environmental issues.

The realisation of the Agency's vision will be achieved through a balanced management approach to all activities in collaboration with all users of the plan area. It is our intention to work in partnership with all relevant agencies and representative organisations to promote and achieve an integrated approach to managing our local environment. The plan highlights how the required improvements can be carried out, and future demands catered for, in a sustainable manner.

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APPENDICES

MAPS

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PART I SEVERN UPLANDS DRAFT LEAP

Part I This part of the Consultation Report is the Environment Agency's draft LEAP for the area. It provides an introduction to the work and responsibilities of the Agency and the LEAP process. It then gives a brief introduction to the LEAP area, and details specific environmental issues in the area and options to resolve them.

The plan provides an opportunity for public involvement so we can all have a say in what happens to our local environment. Following consultation, the draft LEAP will be developed to be published as a five year Action Plan.

Part I

Section 1 Introduction

This section gives an introduction to the Environment Agency and describes the Local Environment Agency Planning process and the purpose of this draft LEAP. A short introduction to sustainable development and biodiversity is also given.

1.0 Introduction

This is the first Local Environment Agency Plan (LEAP) for the Severn Uplands area. It supersedes the River Severn Upper Reaches Catchment Management Plan (CMP) produced by the former National Rivers Authority and the subsequent Action Plan and Annual Reviews. CMPs were integrated local plans for the water environment, whereas LEAPs look at the physical environment of water, land and air and reflect a wider, more holistic view in keeping with the duties and responsibilities of the Environment Agency.

There are, however, a number of issues raised in the CMP that have been carried over into the LEAP (see Appendix 8, 162). These include issues relating to surface water quality and acidification, sewage disposal in rural areas, management of water resources, floodplain management, land use changes and various issues relating to conservation, fisheries and recreation. Several new issues have also been raised, some of which have resulted from the additional responsibilities of the Environment Agency. All the issues are detailed in Section 3.

The Environment Agency is committed to the delivery of environmental improvement at the local level and through this plan we will continue to work in collaboration and partnership with various organisations and individuals to achieve this aim.

1.1 The Environment Agency

1.1.1 The Agency's Role, Aims and Objectives

The Environment Agency of England and Wales were established on 1 April 1996 by the Environment Act 1995. It is an independent public body and has taken over the functions of three previously separate environmental regulators: the National Rivers Authority (NRA) who had responsibility for the water environment; Her Majesty's Inspectorate of Pollution (HMIP) who had responsibility for the largest and most complex industrial processes; and the Waste Regulation Authorities (WRA) of the County Councils who had responsibility for waste regulation.
The Environment Agency has a wide range of duties and powers relating to different aspects of environmental management. It is required and guided by Government to use these duties and powers in order to help achieve the objective of sustainable development.

The Agency's principal aim, set out under Section 4 of the 1995 Environment Act, is to protect and enhance the environment as a whole, thus contributing to the Government's commitment to sustainable development. The integrated management of land, air and water, through pollution prevention and control, education, and where necessary, enforcement, are key means in meeting this aim.

The Environment Agency publication *'An Environmental Strategy for the Millennium and Beyond'* sets out further aims in order to meet the Agency's vision of 'A better environment in England and Wales for present and future generations'. These are:

* 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 education and informing.
* To set priorities and work out solutions that society can afford

The protection and management of the environment by the Agency is based on powers and duties provided by a number of different Acts which are brought together under the Environment Act 1995 (see Appendix 4, page156). The Agency protects the environment by issuing consents and licences for activities which have an environmental impact, for example, water abstraction, the management and transport of waste, and the disposal of waste water following treatment. We also regulate the releases into the environment from some of the larger and potentially most polluting industries. This system of integrated pollution control regulates releases to air, to controlled waters and wastes that may be sent for disposal to land.

More detail about the Agency's regulatory powers and monitoring responsibilities can be found throughout this document and in Appendices 2 and 4, pages 152 and 156.

The Agency comprises of seven regions in England and Environment Agency Wales (see Figure 1 below) sub divided into twenty-six areas. The Midlands Region comprises four areas; the Severn Uplands catchment lies within the Upper Severn Area. Most of the Agency's work operates at a local level and this allows an integrated and personal approach to managing the environment. Scotland is covered by its own Scottish Environmental Protection Agency and Northern Ireland has an Environment and Heritage Service and Rivers Agency.

Figure 1: The Environment Agency's Seven Regions and Environment Agency Wales

1.1.2 Responsibilities outside the Remit of the Agency

The Environment Agency does not cover all aspects of environmental legislation and services to the general public. There are other statutory and non-statutory bodies who have responsibility within the plan area. Some of these agencies and organisations are further discussed in Section 4, A Better Environment through Partnership.

The Local Authorities deal with environmental health issues and statutory nuisance problems, including noise and litter, as well as air pollution arising from traffic, household areas and small businesses and industry. They also deal with contaminated land issues in liaison with the Agency and are responsible for land use planning with the Agency, among others, as statutory consultees. Problems with water supply, such as discoloured water or burst water mains should be directed to either Severn Trent Water Ltd, North West Water Ltd, or Dwr Cymru/Welsh Water. Further details can be found in your local telephone directory.

Table 1- Environmental concerns which are generally the responsibility of regulatory bodies other than the Environment Agency

Environmental concern	Responsible party
Local planning issues	Local Authority
Health and hygiene issues	Local Authority
Noise	Local Authority
Litter	Local Authority
Smoke from bonfires	Local Authority
Smoke from domestic chimneys	Local Authority
Air pollution from traffic	Local Authority/Police
Air pollution from industry	Local Authority (*or* Environment Agency)
Contaminated land	Local Authority (*or* Environment Agency)
Strange taste, smell or colour of tap water	Water Company
Problem with water supply	Water Company
Burst water mains	Water Company
Flooding to property from foul sewer	Water Company
Navigation on canals	British Waterways
Maintenance of ordinary watercourses/drainage activities	Local Authority
Co-ordinating and promoting Local Agenda 21	Local Authority

1.1.3 The Agency's Statutory Committees and Other Groups

In order to ensure openness, objectivity and accountability, the Agency is required by law to consult committees on all aspects of its work. Membership of the committees consists of local people drawn from public life, including industry, agriculture, Local Authorities and environment groups.

The Midlands Region is served by three statutory committees:

* **Regional Environment Protection Advisory Committee (REPAC)**
* **Regional Flood Defence Committee (RFDC)**
* **Regional Fisheries, Ecology & Recreation Advisory Committee (RFERAC)**

Its own advisory, non-statutory, Area Environment Group (AEG) also serves the Upper Severn Area of the Midlands Region. Membership consists of people who live and work in the area and who represent a range of interests. These include Local Authorities, industry, agriculture, conservation, fishing, amenity and recreational interests. The group advises the Agency on LEAPs, on other important local environmental issues and on the delivery of local services. It acts as a link between the local community, the Agency and its statutory committees. Meetings are held four times a year and are open to the media and the public. The current Chairperson of the AEG is Mr Michael Barker. A sub-group of the main AEG has been set up for this LEAP and includes members from varying backgrounds who have expressed an interest in the Severn Uplands area. The group has had opportunities to input into the plan process from an early stage. The sub-group consists of Mr Tony Bostock and Mr Selby Martin.

1.2 Local Environment Agency Plans

The Agency is committed to delivering environmental improvement at the local level, and one of the ways to do this is through Local Environment Agency Plans (LEAPs). The plans will reflect our close contact with industry, the public and Local Government and will contribute towards achieving sustainable development. They are non-statutory, integrated action plans based on local river catchments.

The process of drawing up the plans involves close consultation with all interested parties. It will promote the effective, accountable and integrated delivery of environmental improvement at the local level. The plans will translate policy and strategy into delivery on the ground and will result in actions, either for the Agency to fulfil, or for others to undertake through influence and partnership. We believe the process will benefit the local community by influencing and advising external decision-makers and public opinion. It will build trust by being open and frank when dealing with all issues.

LEAPs provide a focus for those concerned with the future of the local area. We are committed to producing LEAP Consultation Reports for all areas in England and Wales by December 1999.

LEAPs play a key role in:

* Promoting openness and accountability
* Developing liaison and partnership with key groups
* Educating the public on local environmental issues
* Prioritising issues and establishing an action plan for managing and Improving the local area over the next five years

The Severn Uplands LEAP is the third of four LEAPs to be published for the Upper Severn Area. A timetable for LEAP production in Upper Severn Area is set out in Table 2. Until LEAPs have been produced, the former NRA's Catchment Management Plans will be used.

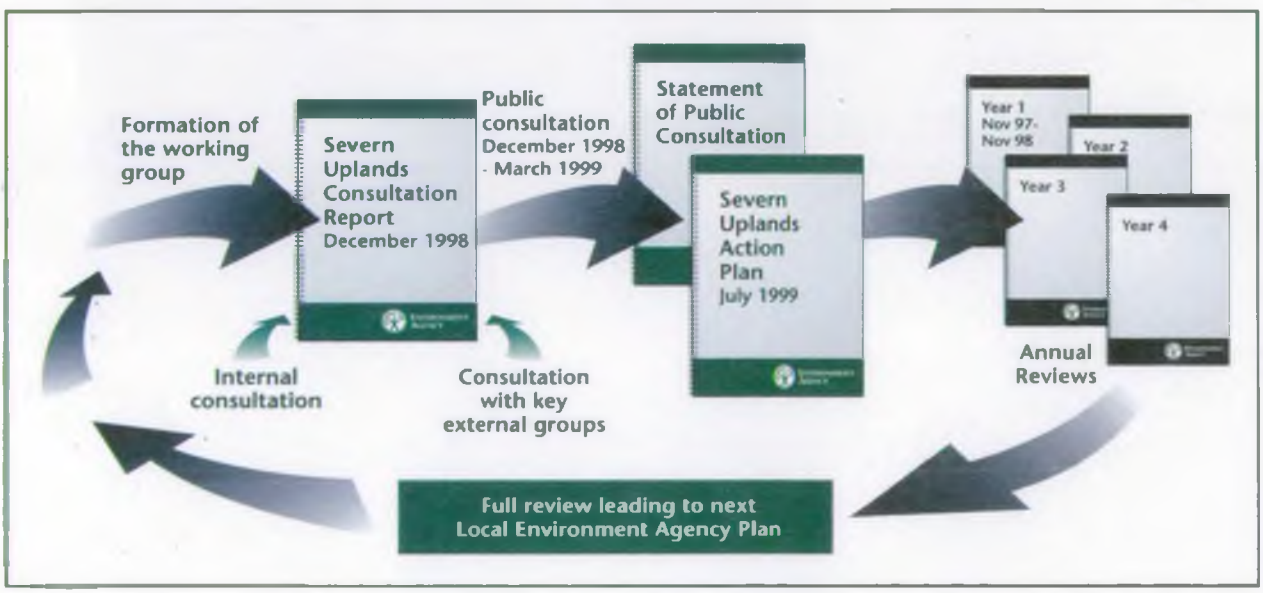
Table 2 - Upper Severn Area LEAP Programme

LEAP	Consultation Report	Action Plan	1st Annual Review
Middle Severn	April 1997	November 1997	January 1999
West Midlands Stour	March 1998	October 1998	December 1999
Severn Uplands	December 1998	July 1999	September 2001
Teme	December 1999	July 2000	September 2002

Six other LEAPs, the Middle Severn, the Teme, the Dee, the Meirionnydd, North Ceredigion, and the Wye share boundaries with the Severn Uplands (the latter four fall within the Welsh Region of the Environment Agency, now known as Environment Agency Wales). The adjacent LEAP areas are shown on the map below.

Figure 2- The Severn Uplands and adjacent LEAPs

Figure 3 The Severn Uplands LEAP Process and the Main Outputs in the five-year Cycle



1.2.1 The Consultation Report

This document, the Consultation Report, is the first output from the LEAP process, and is not the final plan. To assist in the preparation of this report, an informal issues consultation exercise with a range of organisations and groups took place in June 1998. The results of this exercise are summarised in Appendix 7, page 160.

1.2.2 The Consultation Process

The purpose of a three-month consultation period is to enable the Agency and all interested parties to liaise and reach a consensus about the management of the area.

It is your opportunity to influence the Action Plan that will be produced from this consultation report.

We need your views
Comments are required by 16 March 1999

During the consultation period comments can be submitted in writing to us at the address given at the front of the report. If you are reading this report after the consultation period has ended, we would still be interested in hearing your comments and views, as they will be useful for future plans, and possibly for our current activities. There is also a questionnaire included in the Summary Booklet, please use this if you prefer.

1.2.3 The Action Plan

Through consultation a shared vision will be developed, along with a strategy for action. The Action Plan will set out the vision and a costed action programme for environmental improvements for the Agency and others to implement. The target date for producing the Action Plan is July 1999. Implementation of the Action Plan will be the five-year period from publication (July 1999) through to 2004.

1.2.4 Annual Reviews

Regular monitoring and updating of the plan will be an integral part of the process. Annual review reports will be published, with the full consultation process being repeated at the end of five years.

1.2.5 LEAPs and Other Plans

The Agency shares the regulation and management of the environment with others. Whilst LEAPs are the Environment Agency's plans, their content and development will reflect these shared responsibilities. LEAPs should compliment and integrate with other organisations' plans such as Local Waste Plans, Local Air Quality Management Plans, Local Development Plans, Local Agenda 21 Action Plans and Local Biodiversity Action Plans.

Where improvement works are required to overcome local issues, these may be the responsibility of other organisations or individuals. The achievement of some of the LEAP objectives will depend upon the Town and Country Planning policies of the County, Borough or District Councils in their Development Plans. The Environment Agency is a statutory consultee in the formulation of such policies. In Section 4,page 63, A Better Environment through Partnership, planning guidance statements are included which set out policies and approaches which could help to address longer term issues and problems highlighted in the plan.

The National Waste Strategy sets out targets for the reduction and use of waste (see Section 5.9, page 102), but the Agency has no powers to require businesses or the general public to reduce wastes or use more sustainable methods of waste management. Similarly, the National Air Quality Strategy sets out targets that need to be met (see Section 5.8, page 100), but the Agency has no powers to regulate emissions from motor vehicles, the main cause of air pollution. However, by identifying and publishing these issues in the LEAP, and through education the Agency can encourage and promote the means by which to achieve the targets set out in these documents.

Public participation in this plan will increase awareness of environmental issues and it is hoped this will lead to involvement in, and a feeling of ownership of our local environment.

1.3 Sustainable Development

The Environment Agency is committed through its principal aim to the principles of sustainable development. The most commonly used working definition was provided in 1987 in the Brundtland Report 'Our Common Future' as:

".Development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

Rather than predicting ever-increasing environmental decay and hardship in a world of ever decreasing resources, the report saw *"the possibility of a new era of economic growth, based on policies that sustain and expand the natural environmental resource base".*

Sustainable development does not necessarily mean less economic development. One of the challenges is to promote ways of encouraging environmentally friendly economic activity, and of discouraging or controlling environmentally damaging activity. Sustainable development requires a full consideration of environmental, social and economic issues during the decision making process. The UK Government is firmly behind the principles of sustainable development and has published *Sustainable Development - The UK Strategy.*

The Environment Agency, in carrying out its role, is required to act in accordance with the Government's overall environmental strategy, the basis of which is the commitment to the goal of sustainable development. This is reflected in the Agency's principle aim mentioned in section 1.1.1, page 3. In November 1996 Ministers issued statutory guidance to the Agency on its contribution to sustainable development.

Integrated environmental management is a means by which the Agency can promote sustainable development, and LEAPs are an important part of this process.

1.4 Biodiversity

The term 'biodiversity' is commonly used to describe the number, variability and variety of living organisms. The loss of biodiversity may take many forms but at its most fundamental and irreversible it involves the extinction of species. The Biodiversity Convention signed by the UK Government at the Rio 'Earth Summit ' in 1992, seeks to ensure that the full range of animal and plant species are conserved. A national action plan for biodiversity was subsequently published in January 1994.

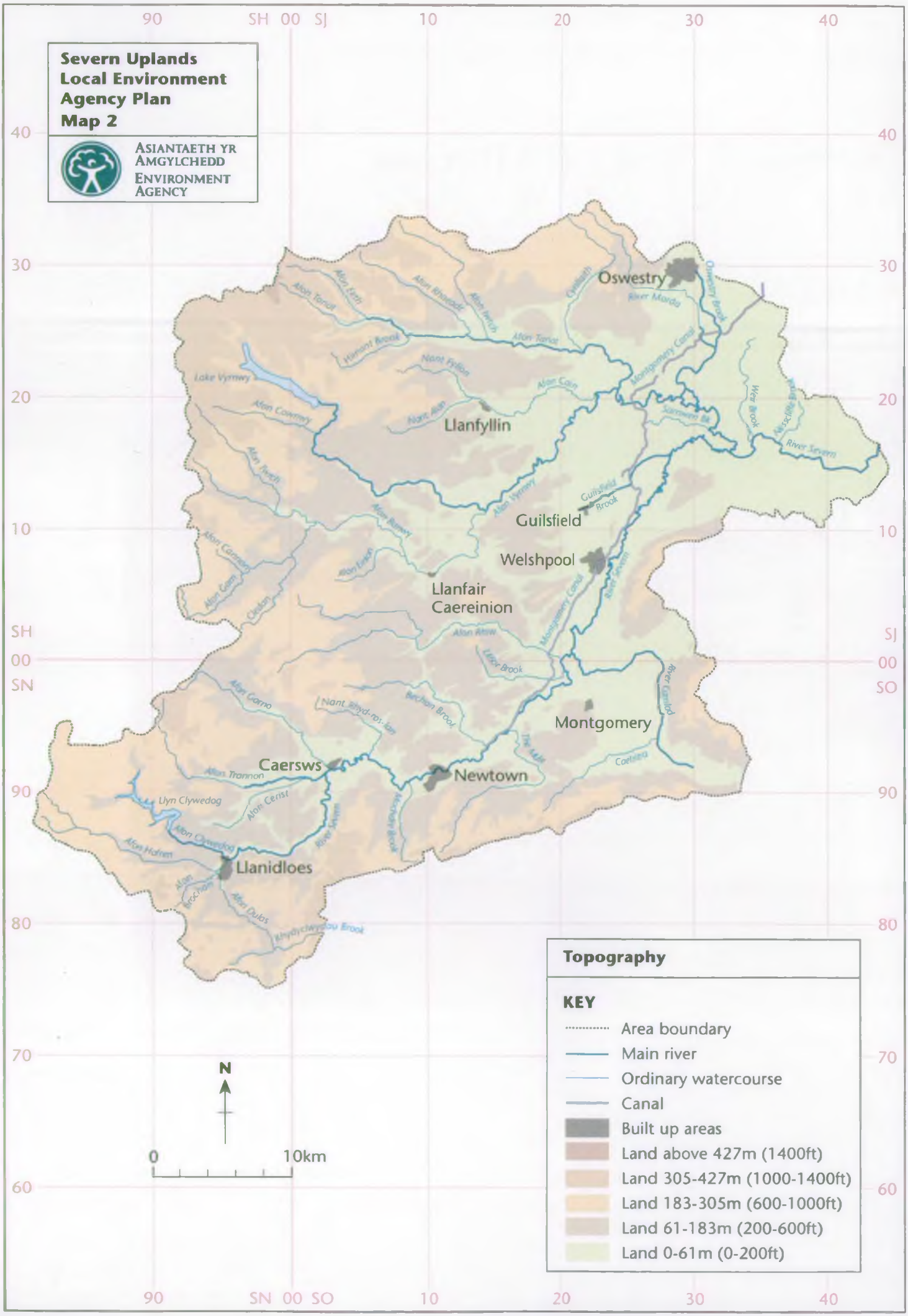
In pursuance of the Government's commitment to biodiversity conservation, the Agency has significant responsibilities regarding implementation of the UK Biodiversity Action Plan (BAP) and will be developing targets for species and habitats of conservation concern. These will relate to the targets for key wetland species and habitats as identified by the BAP. A Biodiversity Steering Group, established under the BAP has identified 116 key species and fourteen key habitats, many of them aquatic or wetland related.

We will be a 'contact point' (co-ordinating body) for twelve species and for chalk river habitats. Chalk river habitats are not found in this area, but six of the twelve species for which the Agency are responsible are found, or were historically found, in the LEAP area and the Agency will pay particular attention to these. They are the white clawed crayfish, water vole, great crested newt, freshwater pearl mussel, floating water plantain and otter. Additionally, there are other water-related species and habitats in the area, which have been identified in the UK Biodiversity Action Plan and will require protection.

All our operational and regulatory activities will take account of these species and habitats in the fulfilment of our commitment to biodiversity. Wherever possible the Agency will seek to meet targets for the restoration and recreation of priority habitats identified in the UK BAP and the Local BAPs. Additional work will be dependent on available resources and will involve collaborative work with other bodies (see Section 4 and Section 3, Issue 25, page 59 for further information).

Section 2 The LEAP Area

This section provides a brief/general description of the locality and describes the natural features and resources of the area. These are considered under the headings of land, air, water, wildlife, heritage and recreation.


Severn Uplands
Local Environment
Agency Plan
Map 2
Asiantaeth yr Amgylchedd
Environment Agency
Oswestry
Llanfyllin
Guilsfield
Welshpool
Llanfair
Caereinion
Montgomery
Caersws
Newtown
Llanidloes
Lake Vyrnwy
River Severn
Montgomery Canal
N
0
10km
Topography
KEY
Area boundary
Main river
Ordinary watercourse
Canal
Built up areas
Land above 427m (1400ft)
Land 305-427m (1000-1400ft)
Land 183-305m (600-1000ft)
Land 61-183m (200-600ft)
Land 0-61m (0-200ft)

2.0 Introduction

This plan considers the upper reaches of the Severn catchment, and includes the River Severn and lakes and tributaries from its source in Powys to where it is joined by the River Perry some 6 km to the north west of Shrewsbury.

The Upper Reaches catchment drains an area of 2,065 km², and has a population of just less than 75,000. The most populated parts of the area are the eastern and southern parts. Almost 86% of the plan area is within Wales, and most falls within the counties of Powys and Shropshire. Details of the administrative boundaries, together with information on Local Authority Development Plans, are given in Section 5. 2. Further information is also given in the Key Details inside the front cover.

The plan area is predominantly rural in character, and is known for its attractive upland landscape and natural beauty. The River Severn corridor is one of the most important environmental features of the Welsh Border area. Tourism is increasingly becoming an important activity within the area, and the River Severn, together with its tributaries, is an amenity enjoyed by many people. The rivers and canals in the catchment support high class fisheries and provide habitats for a wide range of flora and fauna such as floating water plantain, otters and crayfish.

The high standard of water quality, together with the reliable and large quantities of winter water, make this catchment one of the most important in the country for water resources. The River Severn is an important source of domestic water supply for surrounding areas, and extensive abstraction takes place further downstream. Ellyn Clywedog and Lake Vyrnwy reservoirs are situated near the western edge of the catchment. Llyn Clywedog, which was built between 1964 and 1967, supports the provision of water supplies to 6 million people, and Lake Vyrnwy has supplied water to North West England since the scheme was commissioned in 1892.

The Severn-Vyrnwy confluence area is one of the major flood plain environments in the catchment, and is historically nationally important for wading birds and over-wintering wildfowl. As the area is predominantly hilly, there is often pressure for development in lower lying flood plain areas. These areas and riverbanks need protection from the impacts of development.

Being primarily rural in character agricultural practices can have a significant impact on the quality of the watercourse and surrounding areas. Landspreading waste, such as slurry, is a common agricultural activity in the catchment that requires careful regulation by the Agency.

Air quality in the Severn Uplands catchment is generally high, as there are no significantly polluting industrial processes in the area. Although the industries in South West Wales and the power stations to the east may have a minor impact with prevailing winds. Due to the upland nature of the area the catchment is particularly sensitive to the effects of pollutants, which causes surface water acidification. (See Issue 9, page 34.)

The protection of the existing high quality water resources from the effects of land use changes and pressures for development is of vital importance in this area.

The sections on land, air, water, wildlife and heritage that follow provide a general outline of the local environment.

2.1 Land

2.1.1 Topography

The area is dominated on its western edge by the northern end of the Cambrian mountain range. Drainage from these mountains flows generally eastwards in deeply incised valleys through the rounded hill country that extends over almost 90% of the catchment. Moving eastwards, the hills give way to the Shropshire Plain, which includes areas of extensive flood plain at the confluence of the two principal rivers, the Severn and Vyrnwy, at the foot of the Breidden Hills.

2.1.2 Landscape

The area has a wide variety of attractive landscape types, ranging from the flat low lying Severn-Vyrnwy flood plain

in the east, through undulating hills to the moorland plateaux of the Berwyn Mountains in the west. The river valleys are an important feature of the landscape.

The landscape of the Severn Uplands catchment, occurring in England, falls into 4 main Character Areas, these are shown on a national map published jointly by the Countryside Commission and English Nature entitled *The Character of England; landscape, wildlife and natural features.* They are the Oswestry Uplands, the Shropshire, Cheshire and Staffordshire Plain, the Shropshire Hills, and the Clun and North West Herefordshire Hills. Details of these are given in Section 5.16, and the Countryside Character Areas are shown on Map 23 (page 140). A small area of the Severn Upland catchment falls within the Shropshire Hills Area of Outstanding Natural Beauty and is classified as an Environmentally Sensitive Area. The catchment also encompasses Stapeley Hill, which is considered to be an important archaeological landscape.

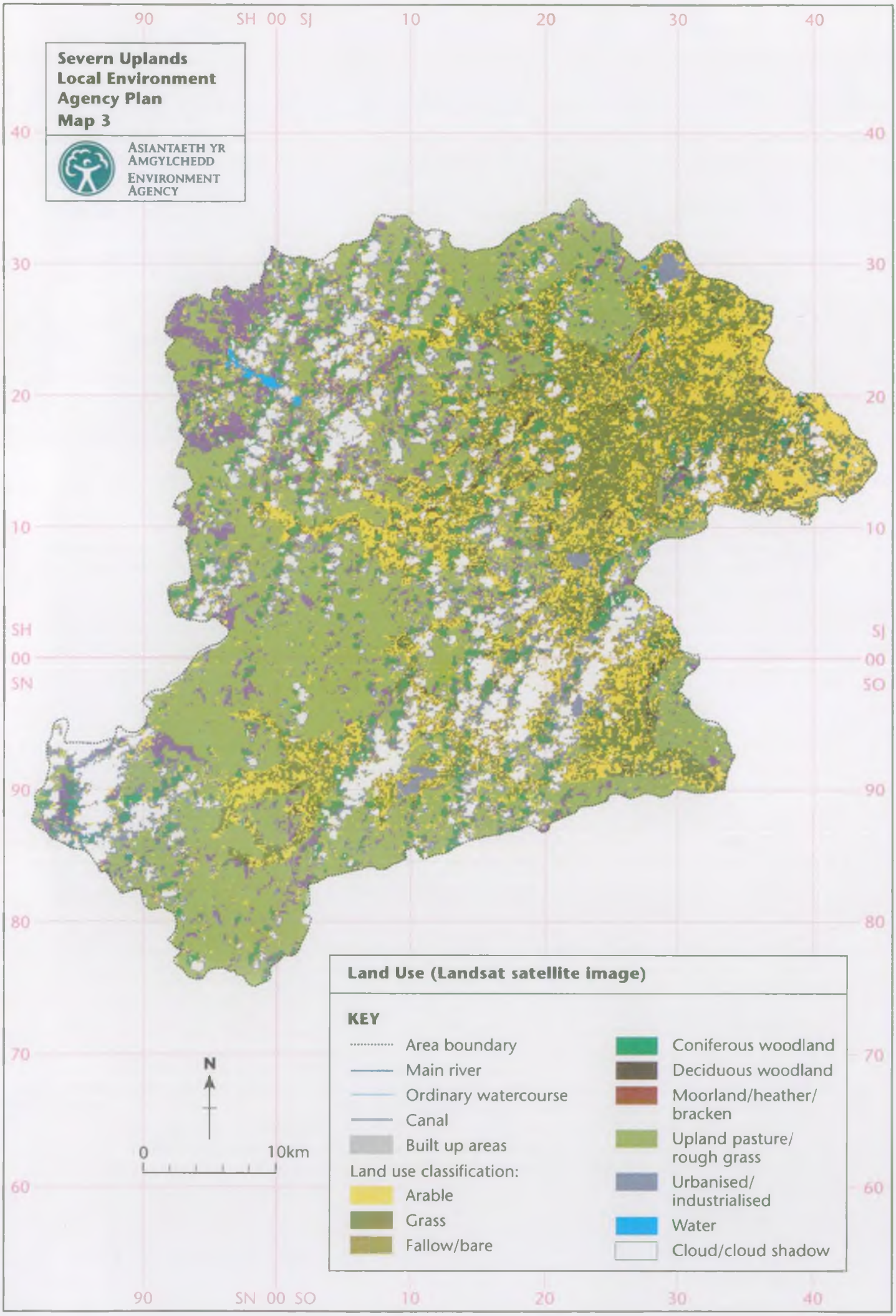
2.1.3 Land Use

The area is predominantly rural, with agriculture being the main land use. Upland pasture accounts for about a third of the plan area. Sheep farming is widespread in the western uplands, and dairy farming predominates in the river valleys. Arable farming is mainly concentrated to the north and east of the River Severn and also on lower lying land along the main west-east river valleys. Forestry constitutes a major land use in the plan area. Approximately 10% of the area is woodland, the majority being coniferous and mainly in the west.

Urban development within the area is characterised mainly by market towns and local administrative centres, such as Welshpool, Newtown, Oswestry and Llanidloes, many with business parks and light industrial estates. These towns and most of the population are located mainly in the eastern and southern parts of the area. There is very little major industry, but there are a number of quarries used mainly for extraction of stone for road construction.
Industrial activity tends to be centred around high-tech business parks and light industrial estates, often on the edge of the towns.

Full details of land use based on statistics from LANDSAT are shown in Table 4 Section 5.1.3 and Map 3.

The Source of the River Severn, Plynlimon


Severn Uplands
Local Environment
Agency Plan
Map 3
Asiantaeth yr Amgylchedd
Environment Agency
90 SH 00 SJ 10 20 30 40
40
30
20
10
SH
00
SN
90
80
70
60
SJ
00
SO
90 SN 00 SO 10 20 30 40
N
0 10km
Land Use (Landsat satellite image)
KEY
Area boundary
Main river
Ordinary watercourse
Canal
Built up areas
Land use classification:
Arable
Grass
Fallow/bare
Coniferous woodland
Deciduous woodland
Moorland/heather/ bracken
Upland pasture/ rough grass
Urbanised/ industrialised
Water
Cloud/cloud shadow

2.2 Air

The Severn Uplands LEAP area is predominantly rural in character and the levels of pollutants such as sulphur dioxide, oxides of nitrogen and fine particulates, which are associated with industrial and vehicle pollution, are likely to be very low. The air pollutant of significance in this area is ozone which is found in higher concentrations than in urban areas (refer to Section 5. 8, page 100, for more detail).

Central government and local authorities monitor air quality. The level of monitoring currently taking place in the LEAP area is very low, with nitrogen dioxide monitoring only being regularly undertaken at four sites in the borough of Oswestry.

Emissions from the most potentially polluting industrial processes are regulated by the Agency through the integrated pollution control (IPC) system. There are no such processes in the Severn Uplands area. However, due to the direction of the prevailing winds some industries in South West Wales may have a minor impact on the catchment area.

2.3 Water

2.3.1 Water Resources

Surface Water

Annual rainfall varies from over 2,500mm per annum along parts of the main divide from Plynlimon to the Berwyns, to only 660mm per annum at the lowest point of the catchment just to the west of Shrewsbury. The variation is not evenly distributed, however, with most of the Vale of Powys receiving less than 1,000mm per annum.

During the winter river flows are adequate but in summer flows often need to be topped up so that there is enough water available for vital water supplies downstream. This is achieved by releasing water from Llyn Clywedog and sometimes from Lake Vyrnwy. Additional water can be pumped into the River Severn from the Shropshire Groundwater Scheme boreholes sited in the sandstone in the north east of the plan area.

Groundwater

The Permo-Triassic Sandstones are the primary aquifer in the catchment, but they are limited in extent to a small area in the north east of the catchment (see Map 16, page 125). The sandstones are highly permeable and able to sustain high and reliable yields. The groundwater is utilised for Public Water Supply, agricultural purposes and for flow augmentation of the River Severn via the Shropshire Groundwater Scheme. Groundwater from the sandstone also provides natural baseflow to support rivers and streams during dry periods.

2.3.2 Flood Defence

The Severn and its tributaries are prone to frequent flooding, with floods of major note in 1946, 1947, 1948, 1960, 1964, 1965,1968,1990,1993,1994 and 1998.

The Environment Agency's flood defence powers relate to the control of structures on all watercourses, and the carrying out of maintenance and improvement schemes on Main River. The extent of Main River is shown on Map 20, page 131.

In addition to continuous records at gauging stations, there are flood level records at significant points throughout the catchment, usually adjacent to structures such as bridges. Aerial photography of the 1948, 1960, 1990 and 1993 floods, but confined to the lower reaches of the catchment, has helped define the extent of flood plain. On watercourses which are not Main River ('ordinary watercourses') there is little information on the extent of flood plains. There are 289.5 kilometres of Main River in the catchment.
Flood defence works were built following the floods in the 1960s to alleviate the risk to some flood prone towns specifically at Caersws, Meifod and Newtown. A comprehensive system of over 50 km of embankments (known locally as argaes) provide limited protection to over 5,000 hectares of land around of the confluence of the Rivers Severn and Vyrnwy.

Where catchment response times allow, a flood-warning scheme operates to enable land and property owners to lessen the

damage from floods. The Agency issues warnings on the River Severn downstream from Llandinam and on the River Vyrnwy downstream from Newbridge, Meifod. Map 20, page 131, shows the locations of the flood alleviation schemes and flood warning reaches. Recorded, up to date, local, information is available by telephone on **Floodcall 0645 88 11 88.**

The Environment Agency maintains main river channels and flood defences, including dredging, tree and brushwork, debris removal, weed cutting and reconstruction of argaes. These all help to maintain the flow capacity of the river. The Environment Agency issues consents for structures in, over, under or near a watercourse and works through the Local Planning Authority to control developments in the flood plain or those likely to cause flooding problems.

Flooding in the Severn-Vyrnwy Confluence Area.

2.3.3 Water Quality

Surface Water

The Upper Severn contains the highest proportion of top grade rivers within the Midlands Region. The 1997 General Quality Assessment (GQA) of water quality covered approximately 500 km of river and canal, with 90% achieving the category of Good, (Grades A & B for the chemistry component and Grade A for the biological component). With their high dissolved oxygen and high velocity, the rivers support a diverse fauna with stoneflies, mayflies and caddisflies being found in large numbers. This high quality water provides a perfect basis for a wide range of aquatic habitats for birds and animals and extensive salmonid and cyprinid fisheries, many of which are EC designated. The high quality of the water enables large-scale abstraction for drinking water to take place within the catchment, and equally important downstream in neighbouring catchments.

Headwaters of many streams and rivers along the western uplands are affected by either acid run-off or drainage from abandoned metalliferous mines, and in some cases, both. A current concern is the impact that increased use of synthetic Pyrethroid sheep dips is having on the water quality of the area. To assess the impact of, and sensitivity to, the effects of acidification and synthetic Pyrethroid sheep dips additional, non-routine sites are sampled. In addition, farms are visited to give advice and gather information on the location of dipping-baths, the chemicals used and disposal methods for the excess solution.

Groundwater

Historically groundwater quality has not been extensively monitored in the catchment. However, the development of the Shropshire Groundwater Scheme along the North Eastern boundary of the catchment has initiated sampling and analysis of boreholes in this area to assess the impact of support water on the Receiving River Severn.

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

2.4 Wildlife, Heritage and Recreation

Rich and varied plants and wildlife are found in the area, occupying the wide range of landscape and habitat types. Conservation value is consequently relatively high, with large numbers of designated sites, including 77 Sites of Special Scientific Interest. The catchment occurring in England, falls within four of English Nature's Natural Areas: Oswestry Uplands, Mosses and Meres, Shropshire Hills and Clun and North West Herefordshire Hills. (Refer to Section 5.16 for Countryside Council for Wales).

Historically, the area has been important in terms of agriculture, settlement and commerce, especially along the river valleys, and the border region was of particular military significance, leading to a wealth of archaeological sites.

The fisheries of the area are characterised by their high quality. Fish populations in rivers and streams are predominantly salmonid in the upper reaches of large rivers and the tributary streams, with coarse fish becoming increasingly significant with distance downstream. Extensive lengths of the area's rivers are designated salmonid fisheries under EC legislation and the Montgomery branch of the Shropshire Union Canal is a designated cyprinid fishery for the whole of its length. The many stillwaters in the area support a variety of fish life, including wild brown trout and coarse fish as well as managed fisheries for trout and other species.

Angling is an important recreational activity in the area, especially for salmon, trout and grayling in the rivers and for stocked brown and rainbow trout in Llyn Clywedog, Lake Vyrnwy and smaller stillwaters. Coarse angling is important on the Severn from Llanidloes downstream and on the lower reaches of the Vyrnwy and many stillwaters. Other recreational activities are important in the area, with canoeing; walking, ornithology and sailing taking place at numerous locations. General tourism is also an important part of the local economy.

Section 3 Issues and Proposed Actions

This section of the plan details specific environmental issues in the area.

The issues have been identified by:

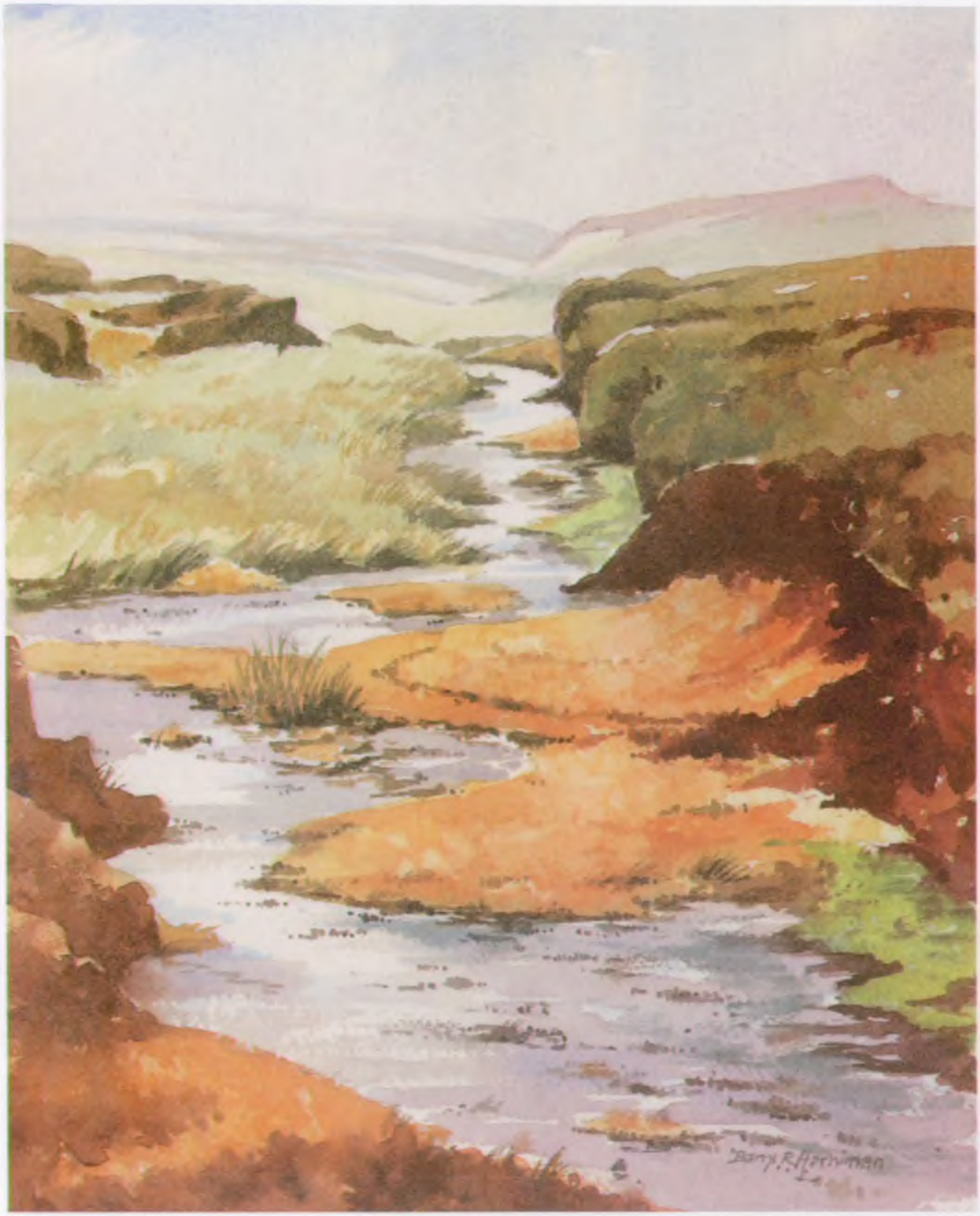
* Using the local knowledge of Environment Agency staff,
* Informal consultation with a range of organisations and interested groups,
* Assessing information about the current state of the environment.

Your views and comments on the issues and proposed actions are requested, together with any new suggested options for action. We will welcome any comments, particularly on:

* Whether there are problems or opportunities that you know of but which we have not included,
* How important you believe the issues are,
* What you believe should be done about them, and especially what you think of our proposals,
* Whether you can help tackle any of the issues.

The proposed actions are intended to facilitate improvements to the local environment for the benefit of all users. Their implementation will require the co-operation and commitment of many organisations and individuals.

The costing and timescales given are indicative only at this stage, they have not been agreed or approved. The Action Plan will include the agreed and approved costing and timescales for the five-year period.



The Source of the River Severn - Plynlimon
by Barry R. Herniman

3.0 Summary

The Plan Area

The Severn Uplands LEAP area is renowned for its rural, upland landscape and natural beauty. The rivers are an important environmental feature of the area and support high-class fisheries and provide habitats for a wide range of flora and fauna.

The Challenges

In partnership with other organisations, our role is to maintain and enhance the largely unspoilt nature of the area by ensuring any activities and developments are managed in an environmentally sustainable way. Due to the rural nature of the catchment, we especially need to ensure that the needs of the farming community are balanced against the natural resources of the area.

Our aim is to address the following major issues in the area in order to achieve our vision for the future:

* The River Severn, Llyn Clywedog and Lake Vyrnwy provide an important source of domestic water supply to millions of people both within the catchment and elsewhere. Substantial progress has been made on reviewing the River Severn regulation controls and the reservoir operations, this must continue to ensure there are no detrimental effects on other sources, surface water, soil moisture or wetlands. In addition, to protect future water resources all new abstraction licences in the River Severn catchment will be limited to a predetermined flow level.

* Despite the largely unspoilt nature of the catchment, a variety of activities continue to cause damage to wildlife habitats and species within the Severn Uplands. We need to conserve and restore our wildlife resources through the implementation of strategies and promotion of good agricultural and wetland management. The salmon, trout and coarse fisheries in the Severn Uplands are diverse and numerous. We intend to enhance these and increase the recreational value (without jeopardising the genetic integrity of fish populations) by addressing obstacles to fish migration and continue with stocking programmes and strict stocking consent policies.

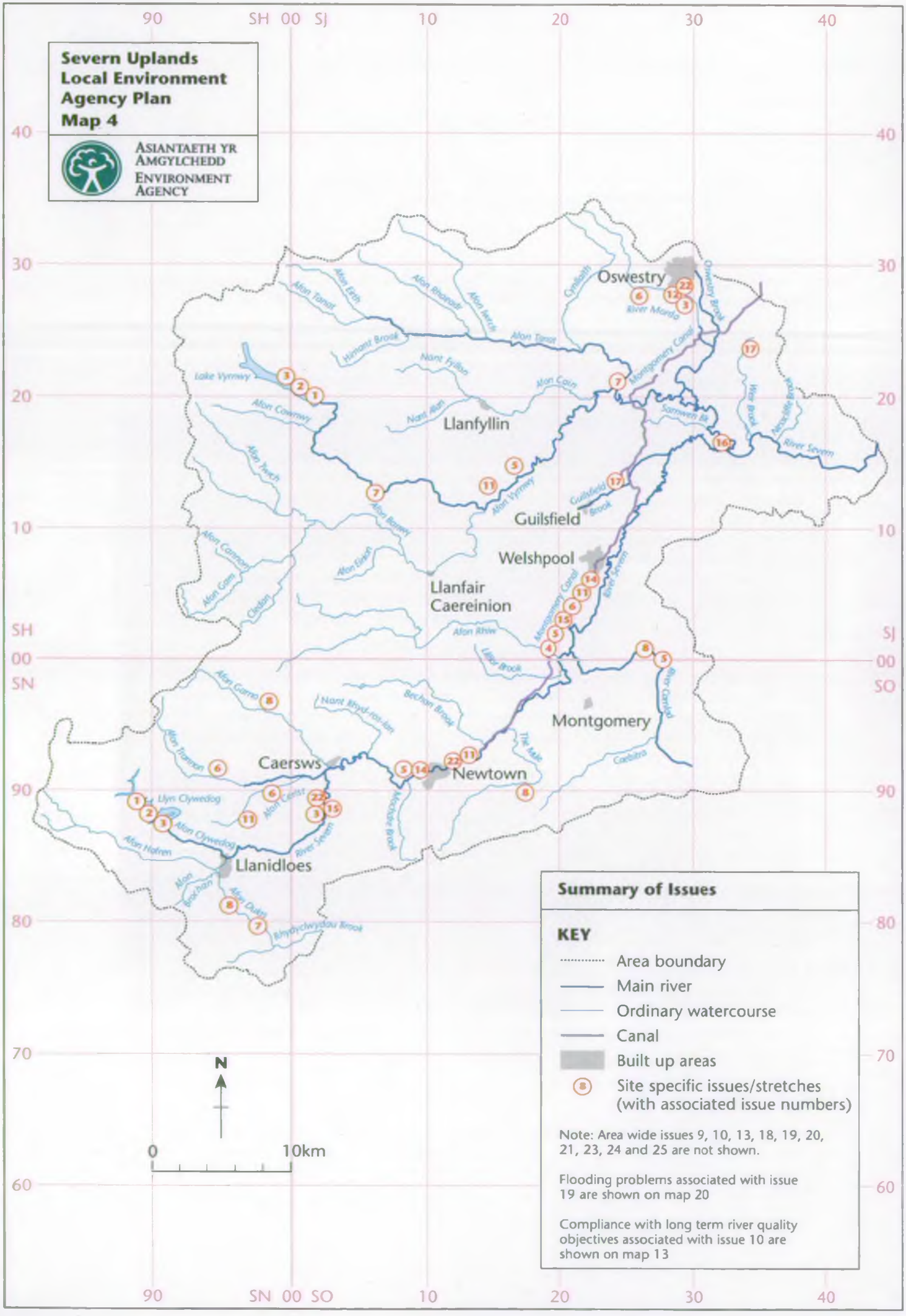
* A combination of factors within the catchment has resulted in a number of rivers failing to meet the RE targets. The Agency will continue to seek out the reason behind this non-compliance. Corrective measures will include implementation of good practice guidelines and also innovative measures, such as, the use of the Forestry and Water Guidelines, to minimise the impact of forestry on acidification of the water environments and the promotion of safer sheep dipping practice.

* The floodplain environment of the Severn-Vyrnwy confluence area was once of national importance for its ornithological interest lost primarily through changing agricultural practice and improved drainage. By producing a strategic environmental statement to reduce the impacts of flood defence we aim to recreate and improve the former habitats. We will also assist in developing the agri-environment scheme, providing financial support to farmers who reduce the intensity of their agricultural practices in the area. Within the confluence area there is a 200-year old flood embankment system (argae) of historical importance. The argae are deteriorating due to river erosion and damage by livestock and burrowing mammals. The Agency will continue to reconstruct the argae, creating wetland habitat where the opportunity arises.

* Landspreading of waste for agricultural improvement is a common activity in the Severn Uplands area. The waste is usually highly polluting and can contain potentially damaging amounts of heavy metals. The Agency recently jointly commissioned a research project with MAFF and the Department of the Environment, Transport and the Regions (DETR) on landspreading, the results of which are being used by the Agency to establish national guidance. We intend to step up our regulatory activities and increase advice to industry, contractors and farmers on best practice.

How you can help

We aim to make a positive contribution to the sustainable management of the Severn Uplands area over the next five years and beyond. To maximise our efforts we will continue to build upon existing partnerships with organisations, companies and local people and create new ones. After the three-month consultation period an Action Plan will be published to address the challenges listed above.


Severn Uplands
Local Environment
Agency Plan
Map 4
Asiantaeth yr Amgylchedd
Environment Agency
90
SH 00 SJ
10
20
30
40
SN 00 SO
60
70
80
Oswestry
Llanfyllin
Guilsfield
Welshpool
Llanfair
Caereinion
Montgomery
Caersws
Newtown
Llanidloes
Lake Vyrnwy
River Severn
Montgomery Canal
N
0
10km
Summary of Issues
KEY
Area boundary
Main river
Ordinary watercourse
Canal
Built up areas
Site specific issues/stretches (with associated issue numbers)
Note: Area wide issues 9, 10, 13, 18, 19, 20, 21, 23, 24 and 25 are not shown.
Flooding problems associated with issue 19 are shown on map 20
Compliance with long term river quality objectives associated with issue 10 are shown on map 13

3.0.1 Issues and Proposed Actions

This section provides a detailed description of the issues, which the Environment Agency considers, need to be addressed in the Severn Uplands area.

Tables are included which set out proposed actions or options. **The costs and timescales given are indicative only at present, and have not yet been approved. The Agency will use the tables of proposals as the basis for a five year Action Plan, which will confirm details of what will happen, when and how much it will cost.** Following consultation, the Action Plan will be published in July 1999, covering the financial year's 1999/2000 to 2003/4.

The issues are wide ranging and cover all the aspects of the environment which the Agency is responsible for managing or which the Agency assists others in their management. It does not include other environmental issues in which the Agency is not, and cannot be, involved. Wherever possible, the individuals or organisations responsible for carrying out each proposal have been identified.

LEAPs translate the Agency's long term *'Environmental Strategy for the Millennium and Beyond'* into action on the ground. The Environmental Strategy sets out nine environmental themes:

* **Addressing climate change**
* **Improving air quality**
* **Managing our water resources**
* **Enhancing biodiversity**
* **Managing our freshwater fisheries**
* **Delivering integrated river-basin management**
* **Conserving the land**
* **Managing waste**
* **Regulating major industries**

Your views and comments on the issues and proposed actions are requested together with any new suggested options for action.

Abbreviations:

BW	British Waterways
CC	County Council
CCW	Countryside Council for Wales
CoCo	Countryside Commission
DBRW	Development Board for Rural Wales
EN	English Nature
FA	Forestry Authority
FE	Forest Enterprise
FWAG	Farming and Wildlife Advisory Group
LA	Local Authority
MAFF	Ministry of Agriculture, Fisheries & Food
MWRT	Montgomery Waterway Restoration Trust
RSPB	Royal Society for the Protection of Birds
STW Ltd	Severn Trent Water Ltd
WCA	Welsh Canoeing Association
WOAD	Welsh Office Agriculture Department
WT	Wildlife Trust (M- Montgomery, S- Shropshire)

CS	Commercially Sensitive
R	Recurring/Routine
U	Unknown
*	To be confirmed at Action Plan stage.

The issues that follow are grouped into sections according to the nine themes in the Environmental Strategy. There is no priority order to the sections or the issues within each section. Some issues are site specific (see map 4, page 21) whilst others can affect many parts of the area. A number of issues have been brought forward from the existing River Severn - Upper Reaches Catchment Management Plan, produced by our predecessors the National Rivers Authority in 1994.

3.1 ADDRESSING CLIMATE CHANGE

No specific local issues in this category (see page 24).

3.2 IMPROVING AIR QUALITY

No specific local issues in this category (see page 24 and refer to Issue 9, page 34).

3.3 MANAGING OUR WATER RESOURCES

Issue 1: Review of River Severn regulation controls and reservoir operations
Issue 2: The role of strategic water resources
Issue 3: Reliability of water supplies in meeting peak demands

3.4 ENHANCING BIODIVERSITY

Issue 4: Loss of Biodiversity
Issue 5: Protection of rare and threatened species
Issue 6: Restoration of damaged habitats

3.5 MANAGING OUR FRESHWATER FISHERIES

Issue 7: Obstacles to salmon migration
Issue 8: Protection and maintenance of native brown trout populations

3.6 DELIVERING INTEGRATED RIVER-BASIN MANAGEMENT

Issue 9: Surface water acidification
Issue 10: Non compliance with River Quality Objectives (RQOs)
Issue 11: Non compliance with EC Directives for 1997
Issue 12: Reduction in dilution afforded effluent discharges to River Morda
Issue 13: Sewerage and sewage disposal in rural areas
Issue 14: Increased demand for amenity and recreation opportunities
Issue 15: Unauthorised and other environmentally damaging river works
Issue 16: Environmental strategy for the Severn-Vyrnwy Confluence area
Issue 17: Severn-Vyrnwy Confluence - maintenance of the argae system
Issue 18: Increased threats of pollution from sheep dipping
Issue 19: Development of flood warning system

3.7 CONSERVING THE LAND

Issue 20: Floodplain management
Issue 21: Impact of land use changes, including hill land improvements and afforestation, on rates of run-off

3.8 MANAGING WASTE

Issue 22: Landspreading for agricultural improvement
Issue 23: Sustainable waste management
Issue 24: Illegal waste deposits

3.9 REGULATING MAJOR INDUSTRIES

No specific issues within this category.

In addition (general):

3.10 PUBLIC AWARENESS AND EDUCATION

Issue 25: The need to raise and promote environmental awareness and education

3.1 Addressing Climate Change

Climate change is perhaps one of the most important international issues. Burning fossil fuel in cars, power stations and in industrial processes emits gases into the atmosphere, greenhouse gases that are believed to contribute to long- term climate change. Addressing it in the UK will require action by all of us. The Department of the Environment, Transport and the Regions (DETR) will need to be involved through local authorities, along with businesses and every member of society. As part of its overall aim of contributing to sustainable development, the Agency is addressing climate change as part of our work.

The Agency's main influence on climate change will be to help ensure that the Government's greenhouse gas reduction targets are met by regulating emissions from major industrial processes. However, as the Severn Uplands area has no heavy industry or sites that are regulated by the Environment Agency, we have not identified any specific local issues within the LEAP area. We will, however, set an example by reducing our own energy and fossil fuel consumption by having targets to achieve by March 1999 to; reduce energy use in our offices and depots by 20%, compile "Green transport plans" to reduce commuter transport impacts at all key sites, reduce mileage on Agency business by 5% and improve overall fuel efficiency for badged vehicle fleet by 3 miles per gallon.

3.2 Improving Air Quality

The major sources of air pollution are transport and industry. Air pollution from transport is the responsibility of local authorities and not the Agency. The Agency is working with local and national government to ensure that the National Air Quality Strategy improves air quality and that emissions from major industries are reduced. We are also reducing emissions from our own vehicles by reducing mileage and encouraging the use of public transport. Section 5.8 gives detailed information on air quality. Air quality in the Severn Uplands area is generally good, and we have not identified any specific local issues within this category.

3.3 Managing Our Water Resources

Water shortages can lead to dry taps for consumers and cause river levels to fall, killing wildlife. The Agency's responsibilities include ensuring that water companies, industry and the public use water more efficiently. We urge water companies to reduce leakage and manage the water demands of their customers more effectively, and we advocate targets to Government and the Office of Water Services (OFWAT) to reduce losses. This will help limit the damage to the environment during a drought. We also set ourselves targets on water use to help reduce the impact on the environment. Section 5.13 provided detailed information of water resources in the Severn Uplands area.

Issue 1: Review of River Severn regulation controls and reservoir operations

The Environment Agency is in the process of reviewing the way in which the River Severn is regulated and causes releases to be made from Llyn Clywedog and Lake Vyrnwy.

The River Severn is regulated mainly by releases from Llyn Clywedog with some releases from Lake Vyrnwy. During dry summers the small area of sandstone aquifer in the north east of the catchment is also partly used to regulate River Severn flows with five Shropshire Groundwater Scheme boreholes within this area.

The regulation of the River Severn has to take account of the needs of the upper reaches, for this reason Dolwen has been chosen as a location to monitor flows in this area during times of river regulation.

Direct impact from the operation of the Shropshire Groundwater Scheme (SGS) on the watercourses of the upper reaches is minimal because the outfall pipeline discharges to the River Severn only 0.5 km upstream of the catchment boundary. Operation of the scheme is monitored to ensure impacts on other sources, surface water, soil moisture and wetland are acceptable.

Issue 1: Review of River Severn regulation controls and reservoir operations

Options/proposed actions	Responsibility	Benefits	Constraints	Cost (£k)	1999/ 2000	2000/ 2001	2001/ 2002	2002/ 2003	2003/ 2004
1.1 Review River Severn control rules/ operating guidelines for Llyn Clywedog and Lake Vyrnwy using Dolwen as the control point for the upper reaches, also taking account of the operation of SGS phases 2 and 3.	Environment Agency	Provision of more environmental benefit to the upper reaches when flows at Bewdley are adequate.	Need to construct gauging station at Dolwen.	230	═══				

Issue 2: The role of strategic water resources

This issue is closely linked with the control of the River Severn discussed in Issue 1.

Water has been exported to North West England from Lake Vyrnwy for over a hundred years, initially to serve the needs of Liverpool. Some water is also released from Lake Vyrnwy to augment River Severn flows in summer, however Llyn Clywedog is the main source of flow augmentation for the River Severn.

Llyn Clywedog was constructed for the purpose of storing water for subsequent release to the River Severn during times of reduced natural flow. The level of the River Severn is maintained by these releases to enable abstractions further downstream to continue. Through the abstraction of water for public supply purposes water is exported from the Severn basin. Any future developments involving the large-scale export of water from the catchment will need to have a comprehensive impact assessment carried out, supported by detailed justification of need.

In order to protect the resources of the River Severn all future licences from the river will have a clause stating that abstraction must cease when flows fall below a predetermined level. This issue has been encompassed in the Regional and National Water Resources Plan proposals. (Refer to Section 5.13 for more detail on abstraction licensing).

Issue 2: The role of strategic water resources									
Options/proposed actions	Responsibility	Benefits	Constraints	Cost (£k)	1999/ 2000	2000/ 2001	2001/ 2002	2002/ 2003	2003/ 2004
2.1 Establish optimum use of Lake Vyrnwy and Llyn Clywedog as a provider of supplies outside the catchment.	Environment Agency STW Ltd NWW Ltd	Improved distribution of water resources between areas of plenty and areas of shortage.	Environmental impacts of 'imported' and 'exported' water on receiving watercourses.	10	—				

Issue 3: Reliability of water supplies in meeting peak demands

Due to the limited groundwater resources in most of the catchment area, upland streams dry up rapidly during summer dry spells. Agricultural users in particular are therefore more dependent than might be expected on piped water supplies for livestock watering. This places high peak demands on water supplies across an extensive distribution system.

Local public and private water supplies are drawn from river gravels and other superficial deposits in the main valleys of Powys and Vyrnwy. This water is drawn from strata below and alongside the riverbed. The strata are recharged by rainfall on a seasonal basis and by induced infiltration through the bed of the river that occurs all the year round. These abstractions, as do all groundwater abstractions, need to be carefully monitored to ensure that demands do not exceed the reliable long-term yield of the gravels.

The very limited extent of groundwater in the catchment puts an upper limit on groundwater fed development that can take place without unacceptable environmental impacts. This means that any substantial new development would require provision of surface water resources.

Severn Trent Water Ltd are in the process of developing an additional source to augment the existing Llandinam supply, which is currently the sole supply for the district. This will enable possible peak demands to be met but the source remains vulnerable to pollution from anywhere upstream in the catchment due to the high degree of continuity with the River Severn. In the Oswestry area the pressure of having one public water supply source has been relieved by an agreement between Severn Trent Water Ltd and North West Water Ltd to import water into the area from the North West Water's supply zone (Lake Vyrnwy).

Issue 3: Reliability of water supplies in meeting peak demands									
Options/proposed actions	Responsibility	Benefits	Constraints	Cost (£k)	1999/ 2000	2000/ 2001	2001/ 2002	2002/ 2003	2003/ 2004
3.1 Appraise adequacy of public water supply provision to meet future peak demands in the catchment, including development at Llandinam.	STW Ltd Environment Agency	Improved reliability of supplies and improvements in quality control of water.	Complex water supply system infrastructure is uneconomic in an area of low population density.	CS R	—				

3.4 Enhancing Biodiversity

Growing awareness of the importance of the natural environment to our wellbeing has recently prompted radical changes of attitude to the environment. In nature conservation there has been a shift from protecting individual sites and species towards maintaining biodiversity. Biodiversity means 'the variety of life', encompassing all the forms of life which constitute the living world. The signing of the Biodiversity Convention by the UK Government at the Earth Summit in 1992 has given a high profile to biodiversity protection.

Maintaining biodiversity is essential in respect of many species and habitats. However, limited resources mean that priorities have to be set, and most Biodiversity Action Plans focus initially on those species and habitats most at risk. Sections 1.4 and 5.15 give more information on biodiversity.

Issue 4: Loss of Biodiversity

A variety of activities continue to cause damage to wildlife habitats and biodiversity within the Severn Uplands area.

Agricultural practices

Agricultural improvements continue to be driven by the Common Agricultural Policy (CAP) which, by offering subsidies and guaranteed payments, encourages the drainage of wetlands, high stocking densities and use of fertilisers and pesticides, and ploughing to the edge of many valuable and fragile habitats. Such improvements continue to damage and destroy old hay meadows, woodlands, moorland, riverine and wetland habitats and can threaten the survival of many of the once common species in the catchment.

Restoration of the Montgomery Canal

Following its closure in 1944 the Montgomery Canal was subsequently colonised by a diverse range of plants and animals and two lengths of the canal are now of such high conservation value they have been designated Sites of Special Scientific Interest (SSSIs). Recent restoration works along the northern section of the canal has led to a decline in biodiversity within parts of the canal. Mitigation measures being proposed for the remainder of the canal need further consideration if the canal's biodiversity is to be safeguarded. The design of the canal and the long-term management proposals also need to be reviewed.

Windfarms and Hydroelectric schemes

The proliferation of windfarms in the catchment can potentially impact on the biodiversity of the uplands. The infrastructure associated with the installation of turbines, particularly the creation of new roads, fragments upland habitats. Care is needed through the planning process to protect these habitats. Although the Agency supports the principles of sustainable development, the development of hydroelectric schemes can have adverse impacts on the biodiversity of watercourses. The Agency will require that hydroelectric schemes do not cause adverse environmental impacts (see Section 5.7).

Phytophthora (Alder Tree Root Disease)

Excessive sheep grazing has already damaged much of the tree cover along watercourses in the catchment. The problem is now being exacerbated by the spread of phytophthora, which is attacking and killing alders, the dominant tree species along many of our watercourses. This now poses a major threat to riverside biodiversity.

Issue 5: Protection of rare and threatened species

Otters, Crayfish, Water Voles, Great Crested Newts, Floating Water Plantain and Freshwater Pearl Mussel have all been identified in the Midlands Region Biodiversity Action Plan as in need of special protection. Other species, most notably Black Poplars, also require special attention.

Although the Environment Agency has a wider remit than its predecessor organisation, the National Rivers Authority, our conservation remit is still focused primarily on the water environment, hence the emphasis on wetland habitats and wetland species. The Agency will, however, continue its involvement with other biodiversity species, most notably Snipe, Lapwing and Barn Owls.

Issue 4: Loss of Biodiversity									
Options/proposed actions	**Responsibility**	**Benefits**	**Constraints**	**Cost (£k)**	**1999/ 2000**	**2000/ 2001**	**2001/ 2002**	**2002/ 2003**	**2003/ 2004**
4.1 Review proposals for canal design, mitigation and long term management.	MWRT BW			U	—				
4.2 Undertake riparian fencing and habitat improvement.	Environment Agency WOAD	Greater biodiversity.	Landowner permission.	25	5	5	5	5	5
4.3 Monitor spread of Phytopththora within Catchment.	Environment Agency FA	Possible development of cure		R 5	—	—	—	—	—
4.4 Highlight loss of biodiversity arising from agricultural improvements.	Environment Agency	Reduction in loss of biodiversity			—	—	—	—	—
4.5 Ensure windfarms and hydroelectric proposals safeguard biodiversity and landscape.	Local Authorities CCW Environment Agency Developers	Maintain biodiversity			—	—	—	—	—
4.6 Eradicate signal crayfish upstream of Dolanog	Environment Agency	Protect native crayfish population			—	—			
4.7 Undertake baseline survey for great crested newts				3	*				

Otters

Otters are a protected species under the Wildlife and Countryside Act 1981. The Upper Severn catchment is a national stronghold for otters and a resource from which future expansion to other parts of the country will take place. The habitat requirements of otters include undisturbed areas of river plus bankside tree and shrub cover. The preservation of existing high quality habitats is vital for the protection of otters and for any future recolonisation of their former range. Conservation bodies are also concerned about the disturbance of otters by mink hunting. Mink have spread into the upper reaches of both the Severn and Vyrnwy in recent years and this has been followed by the use of hounds to hunt them. A number of otters have also been killed in recent years by road traffic.

The Native, White-Clawed Crayfish

Crayfish

The native British crayfish is a protected species under the Wildlife and Countryside Act 1981 and populations in the catchment are under serious threat of extinction from the farming of non-native signal crayfish that carry a disease, "crayfish plague", which is invariably fatal to the native species. Once the disease gets into a watercourse the entire population of native crayfish within that river system is often eradicated. Within the catchment, this is known to have occurred in the River Camlad. In 1997 a previously unknown wild population of signal crayfish was discovered in a pool which discharged into one of the tributaries of the upper Vyrnwy. Small numbers of juvenile signal crayfish were also found in the stream below the pool. It is believed that the pool population has now been eradicated but further checks will be necessary to assess the status of the stream population. Controls on the introduction of signal crayfish are now exercised by MAFF.

Water Vole

Very few records exist for Water Voles within the catchment and the predation by mink along with fragmentation of habitats are significant factors causing their decline. It is possible that a population of Water Voles exists in natural and semi natural upland habitats, which are away from mink populations.

Great Crested Newt

Under recorded within the Montgomeryshire catchment, scattered records exist in ponds along the Severn Valley. There are ten known sites in Montgomeryshire. Agricultural improvements, infilling of ponds and the introduction of fish threaten the species.

Freshwater Pearl Mussel

This species appears to be at its southern most limit in the midlands region, but although historic records exist for a site on the River Vyrnwy its current status is uncertain. Acidification, poor water quality and conifer planting adversely affect pearl mussel populations.

Floating Water-Plantain

Well established on the Montgomery Canal and to a lesser extent in upland lakes, its distribution is likely to be reduced with the re-opening of the canal when increased boat traffic will increase the turbidity of the water which will in turn suppress plant growth. Floating water-plantain is to become a protected species under the EC Habitats Directive.

Black Poplars

In general, the area supports a sparse and aged population of native black poplar. However, one of the finest specimens nationally can be found in the riverside car park in Newtown. This catchment falls within one of the areas targeted nationally by the Black Poplar working Party for a re-planting programme.

Issue 5: Protection of rare and threatened species									
Options/proposed actions	Responsibility	Benefits	Constraints	Cost (£k)	1999/ 2000	2000/ 2001	2001/ 2002	2002/ 2003	2003/ 2004
5.1 Maintain and improve bankside cover for otters.	Environment Agency Landowners	Safeguard biodiversity species.	Landowner permission.	25	5	5	5	5	5
5.2 Identify road traffic blackspots for otters and take remedial action where feasible.	Highways Department MWT Otters in Wales River Severn Otter Project Environment Agency	Safeguard biodiversity species		5		5			
5.3 Eradicate escaped non-native crayfish from the catchment.	WOAD/MAFF Environment Agency EN/CCW	Safeguard biodiversity species.	MAFF crayfish policy.	U					
5.4 Increase size of existing population of floating water-plantain.	EN/CCW Environment Agency BW	Safeguard biodiversity species.	Restoration of Montgomery Canal.	15	5		10		
5.5 Develop objectives for the protection and enhancement of Black Poplars.	Environment Agency FA/FE Wildlife Trusts	Safeguard biodiversity species.		C<5	—	—	—	—	—

Issue 6: Restoration of damaged habitats

Rivers

Although many fishery and aquatic habitats in the catchment are of high quality, previous engineering works has damaged some rivers. In particular the Afon Trannon/Cerist was badly affected by a land drainage scheme in the late 1970s. The lower reaches of the river remain canalised, supporting very few fish, and a legacy of frequent maintenance works further upstream hinders its recovery to a stable and diverse environment. Investigations will be required to determine if engineering practices can be modified to meet flood defence, conservation and fisheries requirements. Salmon spawning grounds have also deteriorated on some rivers through compaction and changes in size composition of the gravels. The reasons for this are presently unclear, although land use changes are a likely contributory factor.

Following Powys County Council's successful restoration scheme at the Van lead mines, the Agency undertook successful habitat improvements to the Afon Cerrist. However, reluctance by landowners to grant permission for further work is preventing the ecological value of the watercourse being maximised.

The lower reaches of the River Morda are an impoverished habitat for fish and other wildlife. The river is maintained in a relatively canalised state with very few riparian or instream features, but has considerable potential for improvement.

Improvements to damaged watercourses can only be achieved with the permission and co-operation of the riparian landowners. Some incentives may be needed to encourage this process, such as the Tir Cymen/Countryside Stewardship schemes which have been used elsewhere in the country.

Wetlands

Although the Agency's successful Severn Valley wetlands project has created in excess of 170 acres of wetland habitat along the Severn Valley in recent years, a great deal more improvement work is needed to compensate for the continuing loss of natural and semi natural habitats. Funding partnership changes in agricultural practices, and agri-environment incentive schemes may be needed to reverse this trend.

Invasive Plants

Invasive weeds such as Japanese Knotweed, Giant Hogweed and Himalayan Balsam are becoming increasingly common in the catchment, posing an increasing threat to native flora by dominating riparian habitats. Measures are required to prevent further spreading and to reduce the current distribution of these alien species. Giant Hogweed, unlike the other two species poses a threat to public health. Contact with the sap can lead to severe blistering of the skin, dizziness and respiratory problems.

Issue 6: Restoration of damaged habitats

Options/proposed actions	Responsibility	Benefits	Constraints	Cost (£k)	1999/ 2000	2000/ 2001	2001/ 2002	2002/ 2003	2003/ 2004
6.1 Restore old and create new wetland habitats through Severn valley wetlands strategy	Environment Agency Wildlife Trusts EN/CCW Landowners WOAD	Increased biodiversity.	Landowner permissions.	c75	15	15	15	15	15
6.2 River restoration scheme for Afon Trannon/Cerist.	Environment Agency	Increased biodiversity, especially otters, water voles, great crested newts & wading birds.	Landowner permissions.	300	—	300			
6.3 Improve salmon spawning gravels where appropriate.	Environment Agency	Increased range of species. Improved stocks.		c15	3	3	3	3	3
6.4 Improve riparian and instream habitat on River Morda.	Environment Agency	Increased habitat diversity. Protection of biodiversity.	Increased maintenance requirement.	20			7	7	6
6.7 Maintain biodiversity of Montgomery Canal.	BW/MWRT EN/CCW	Protection of biodiversity.	Redevelop-ment of canal. Lack of financial resources	U	—				

3.5 Managing Our Freshwater Fisheries

The Agency's vision for fisheries is that all water in England and Wales will be acceptable of supporting thriving fish populations and everyone will have the opportunity to experience a wide range of good quality fishing. Section 5.17 gives more detailed information of fisheries in the Severn Uplands area.

Issue 7: Obstacles to salmon migration

Many kilometres of potentially high quality spawning and nursery rivers are presently inaccessible to salmon because of obstacles, both natural and man-made.

The upper 10km of the River Severn is blocked off to salmon by a weir at Felindre, and many of the tributary streams also have impassable weirs such as those on the Mule. Natural barriers occur at Dolanog Falls on the River Vyrnwy and Tylwch Rocks on the Afon Dulas. Opening up of such areas to salmon by the removal of weirs or the construction of fish passes can make a significant contribution to enhancing salmon runs in the River Severn. An example is the salmon pass at Carreghofa Weir on

the River Tanat, constructed in 1976 and improved in 1984, which allowed access to what is now one of the most important salmon spawning areas in the whole of the Severn catchment.

Where a pass or weir removal is not viable or environmentally acceptable, adult salmon can be physically placed above an obstacle to spawn or the upstream area can be stocked with hatchery-reared salmon fry to make use of the potential rearing capacity of the river.

The Environment Agency is likely to be faced with a shortfall in Grant in Aid (GIA) funding for salmon work in the future. Alternative sources of funding may therefore need to be sought if the above improvements are to be realised.

In order to protect native brown trout stocks in some parts of the catchment some inaccessible streams will not be made available to salmon nor have salmon fry stocked.

A detailed assessment of the status of the salmon fishery in the whole of the Severn catchment is currently in preparation and due for completion in October 1998. The Severn Salmon Action Plan addresses all of the issues affecting this valuable resource, including difficulties of access, and lays the foundation for future salmon management in the catchment.

Issue 7: Obstacles to salmon migration

Options/proposed actions	Responsibility	Benefits	Constraints	Cost (£k)	1999/ 2000	2000/ 2001	2001/ 2002	2002/ 2003	2003/ 2004
7.1 Stock rivers above other obstacles with local hatchery reared juvenile salmon and/or transport adult salmon upstream.	Environment Agency	Increased range of salmon. Potential increased stocks and fishery value.	May conflict with Brown trout protection. National Stocking Policy.	c40	<=10	<=10	<=10	<=10	<=10
7.2 Investigate alternative funding for improvement projects in light of diminishing Grant in Aid.	Environment Agency	Increased likelihood of salmon protection. Other benefits occurring from collaboration,	Finding suitable collaborators. Uncertainty of future legislation/ funding.	U	—				

Issue 8: Protection, maintenance and improvement of native brown trout populations

Native brown trout populations are a nationally threatened resource. Many of the rivers in the Upper Severn catchment still contain thriving stocks of these fish, particularly the upper reaches of watercourses and in the smaller tributary streams such as the Afon Dulas, the Mule, Afon Garno and River Camlad.

The genetic integrity of native trout stocks may have been impacted in other rivers such as the Tanat and Severn through introductions of hatchery-reared trout of diverse origin, and numbers of wild fish have declined in some instances. Rainbow trout have also been introduced into the Tanat and Severn, and are known to breed occasionally in the feeder streams of Llyn Clywedog and Lake Vyrnwy following many years of stocking in those waters. To protect native brown trout populations, stocking of rainbow trout in rivers is no longer allowed. The Agency is implementing a Brown Trout Strategy whereby currently pristine populations of trout, those above impassable obstructions to migration for example, will be protected by retaining the obstruction to prevent ingress of farmed trout which may have been stocked downstream (e.g. Tylwch Rocks, Afon Dulas).

The high quality habitats that are required to support brown trout will also need protection through the application of the Environment Agency's regulatory powers. The decline of wild brown trout stocks in some rivers, such as, the River Vyrnwy, will require investigation including assessments of the genetic composition of sub-populations and remedial action where appropriate.

Issue 8: Protection, maintenance and improvement of native brown trout populations									
Options/proposed actions	**Responsibility**	**Benefits**	**Constraints**	**Cost (£k)**	**1999/ 2000**	**2000/ 2001**	**2001/ 2002**	**2002/ 2003**	**2003/ 2004**
8.1 Assess present status of native brown trout populations in the catchment.	Environment Agency	Allows early identification of potential difficulties.		R50	10	10	10	10	10
8.2 Protect isolated population of native brown trout in upper reaches of Afon Dulas.	Environment Agency	Status of pristine stock conserved.	Restricted access of salmon.	R	—				
8.3 Complete and implement S30 Stocking Consent Policy for brown and rainbow trout in rivers.	Environment Agency			R	—				
8.4 Determine measures to mitigate any declines in river brown trout populations.	Environment Agency	Conservation of genetic integrity and river populations.	Cost.	30	15	10	5		

3.6 Delivering Integrated River-Basin Management

Integrated river basin management is a way of looking at the river and its surrounding land as a whole. It not only looks at the quality and quantity of water in the river but also at its physical environment, including landscape, recreational use, flood control works and the wildlife of the river and the surrounding land (or catchment).

Issue 9: Surface water acidification

Acidification is the lowering of soil or surface water pH. Gaseous pollutants, such as sulphur dioxide and oxides of nitrogen produced through the burning of fossil fuels, are converted in the atmosphere to sulphuric and nitric acids. These acids gases can travel large distances before being deposited on land in rain, snow and fog, often known collectively as "acid rain".

Large areas of upland Wales are sensitive to acidification due to a combination of high rainfall, geology and land use. Significant quantities of acid rain fall across Wales, and the dominant geology of slow weathering rock with thin soils, leads to poor natural neutralising capability. Therefore, acidic pollutants may not be neutralised and acidic surface water may result. Increased acidity also acts to increase levels of metals which when dissolved in water may be toxic, such as aluminium.

Increased acidic and aluminium-rich surface water changes the biology of lakes, streams and rivers resulting in less diverse populations of insect, fish and subsequently bird life.

Conifer afforestation can compound the effects of acidification by scavenging pollutants from the atmosphere, and by further reducing the neutralising capacity of the soils. The presence of metal ores and mining activities can also further increase levels of toxic metals.

The problem of acidification is a strategic issue. Together with the Scottish Environmental Protection Agency (SEPA) in Scotland, we regulate about 80% of sulphur dioxide releases under the Environmental Protection Act 1990. Although sulphur deposition is decreasing in Wales, that of nitrogen oxides is increasing due to road traffic, despite the introduction of catalytic converters since 1993. It is estimated that transport sources of account for about 46% of all nitrogen released, and large proportions of the remainder come from combustion processes.

There are no major industrial contributors to acidification located within the area. However, the release of acid gases from industries within neighbouring LEAP catchments may contribute to the acidification problem in parts of the Severn Uplands. There are major sources of acid gases at the oil refineries near Pembroke, the industrialised parts of south Wales and from the heavily industrialised parts of Central England which lie to the east of this area.

Locally the effects of acidification are apparent in the upper reaches of the Severn. This has resulted in some of these rivers failing to meet their RE targets. Surveys of these streams and headwater tributaries have demonstrated reduced biological quality. Poor water quality is limiting the distribution and numbers of aquatic insects and salmonid fish, which in turn restrict otter and river bird populations (such as dippers and grey wagtails).

The Agency is working in partnership with Forestry companies to minimise the impact of Forestry on acidification of the water environment and together developed the "Forestry and Water Guidelines". Good Forestry practice may help protect watercourses from pollution. These pollution prevention measures include using buffer zones, avoiding planting conifers in the most sensitive areas, and maintaining the age range and varieties of the trees in the forested areas.

Although steps are being taken to reduce emissions of acid gases, it may be many years before the effects of acidification are reversed in soils and surface waters. Therefore it may prove necessary to restore the pH in some watercourses artificially through liming as a temporary measure in order to maintain viable fish populations.

Llyn Clywedog is one of the prime trout fisheries in mid Wales, hosting several national and international fly-fishing tournaments and providing sport for up to 10,000 local and visiting anglers each year. The fishery is managed by Llanidloes and District Angling Club who rear stock fish in cages in the lake under the guidance of Dyfi Valley trout farm.

A significant proportion of the catchment area of the reservoir is afforested as part of the Hafren Forest, which was planted 40-50 years ago and is now entering the harvesting phase. This particular land use, combined with the nature of the geology and soils of the area, makes Llyn Clywedog susceptible to problems.
In recent years, studies of the water quality of the inflowing streams have shown that the Afon Biga and Afon Llwyd exhibit symptoms of periodic acidification associated with high rainfall and surface water runoff. During these times, levels of acidity and aluminium increase significantly. On many occasions water quality conditions considered to be toxic to fish have been observed in both of these streams.

Coinciding with the onset of harvesting the Hafren forest, there has been an increase in the number of incidence of excessive mortalities in the trout rearing cages and areas of the lake near to the inflow of the Biga and Llwyd have fished extremely poorly. There has been apparent correspondence between periods of heavy rainfall and observed mortalities and it is likely that the poor quality of water entering the lake is responsible. The increased losses of fish and poor performance exert an increasing economic pressure on the fishery and if unchecked could threaten the continued existence of this recreational asset.

Trial Liming Work Already Undertaken

Limestone is the neutralising agent most commonly used to mitigate acidification. In addition to chemically improving the water by raising pH levels, increased calcium concentrations allow fish to better resist the physiological damage associated with acidified water. Preliminary experiments carried out on the fish rearing cages in conjunction with Dyfi Valley Trout Farm, whereby sacks of powdered limestone were suspended in the cages. This demonstrated benefits in terms of reduced mortalities, but once the fish had been stocked they were still subject to the vagaries of water quality fluctuations in the lake.

In recent years trial liming of the Biga has been carried out to see if it was possible to influence the quality of the lake by treating the afferent streams with crushed limestone. These trials have proved successful and in February 1997 a major experiment was carried out to see if it was possible to dose the whole lake. This has also proved to be very successful, with levels of pH and calcium on the increase and mortality rates in the fish cages back to normal levels. It is intended to continue liming, with the process being made more efficient by the importing of lime dosing equipment from Sweden.

Issue 9: Surface water acidification

Options/proposed actions	Responsibility	Benefits	Constraints	Cost (£k)	1999/ 2000	2000/ 2001	2001/ 2002	2002/ 2003	2003/ 2004
9.1 Promote Forest Design Plans to influence the control and management of coniferous forests.	Environment Agency	Reduced impact of forestry on water environment.		R	—	—	—	—	—
9.2 Look to influence the control and management of forests through consultation via The Forestry Authority on: i. Woodland Design Plans ii. Felling licences	Environment Agency	Reduced impact of forestry on water environment.		R	—	—	—	—	—
9.3 i) Monitor impacts of acidification on water quality, fish population and aquatic fauna. ii) Continue to develop the use of Acid Neutralisation Capacity as a technique for reassessing Acid Sensitive Areas.	Environment Agency	Quantification of changes in water quality, fish stocks and aquatic fauna. Better definition of Acid Sensitive Areas.	Resources/ funding	22.5	4.5	4.5	4.5	4.5	4.5
9.4 Investigate and implement instream liming techniques for mitigating acidification impacts.	Environment Agency	Short-term expedient to improve water, biological and fishery quality.	Resources/ funding	50	10	10	10	10	10

Issue 10: Non compliance with River Quality Objectives (RQOs)

River Quality Objectives (RQOs) are applied to all significant rivers and canals. The objectives, both medium and long term, are based on chemical criteria and are set by the Agency. RQOs are currently non-statutory, but may be made statutory in the future. The objectives provide a measure of performance and indicate a standard for the watercourse.

This issue addresses 16 river/canal stretches where there was a significant failure in water quality. It is worth noting that 3 years data is used to determine 'present' quality so that some of the failures were due to poor quality in 1995 or 1996 since when remedial work has already been instigated and results achieved. Furthermore, acidification (see Issue 9) causes low hardness, which reduces the allowable metal concentrations in the RQO Classification Scheme.

River Severn between the confluence's with the Mochdre Brook and River Mule (10.9km) also failed to comply on Biochemical Oxygen Demand (BOD). This involved a single high BOD result obtained in 1995 and does not require any specific investigation. *

Afon Vyrnwy between Lake Vyrnwy Dam spill and confluence with Afon Cownwy (4.5km) failed on pH. This was due to acidification (see Issue 9).

Afon Vyrnwy between Lake Vyrnwy Dam spill and confluence with Afon Cownwy (4.5km) failed on zinc. This was due to acidification and diffuse run off from abandoned metalliferous mines. The Agency is in the process of gradually identifying and prioritising the abandoned mines within Wales, although funding to instigate actual remedial work at these sites is already committed on existing projects within the 5 year cycle of this LEAP.

River Morda between Llanforda Water Treatment Works (WTW) and Oswestry Mile Oak Water Reclamation Works (WRW) (1.5km) failed on BOD. This is from an unknown source and requires further investigation since the biology has also been reduced on this stretch. There may be possible farm influences.

River Morda between Oswestry Mile Oak WRW and Newbridge (1.6km) failed on BOD. Asset Management Plan (AMP) 2 work is due for completion in autumn 1998 (see also Issue 12).

Afon Twrch between Nant-Yr -Helyg Bridge and the confluence with Afon Vrynwy (7.5km) failed on BOD. This was caused by isolated incidents of elevated BOD levels. *

River Camlad between Caebitra Brook and the confluence with River Severn (23.2km) failed on BOD. A farm pollution campaign was undertaken in 1996/97 and improvement works were identified, some of which are not yet complete.

Afon Trannon between Llawryglen ford and the confluence with Afon Cerist (8.5km) failed on BOD. Two failures occurred in 1995, since when there have been no failures. No further action is deemed necessary.*

Afon Carno between Afon Cledan and the confluence with River Severn (10km) failed on BOD. This was caused by intermittent identifiable storm related exceedences.*

Montgomery Canal between A5 roadbridge and Morton Farm (4.5km) failed on BOD and Dissolved Oxygen (DO). The BOD was algae related and is expected to improve with increased traffic following restoration of some stretches of canal in 1996. The DO has shown improvements since the restoration.

Montgomery Canal between Pant-Plas Cerrig and Wern outfall (9km) failed on DO. This is related to algae/weed growth in the canal (diurnal effect pronounced) which is causing mainly marginal failures, although there was a very low recorded DO level in August 1997. The Agency has installed monitors to measure the DO range during the summer.

It is proposed to set a RQO of RE1 for the **Afon Eirth.**

**For these results the Agency continues to monitor the situation and is assessing the water data constantly to identify any problem areas that require further investigation.*

Issue 10: Non compliance with River Quality Objectives (RQOs)									
Options/proposed actions	**Responsibility**	**Benefits**	**Constraints**	**Cost (£k)**	**1999/ 2000**	**2000/ 2001**	**2001/ 2002**	**2002/ 2003**	**2003/ 2004**
10.1 Critical assessment of water quality data to identify trends and significant problem areas, requiring site investigations.	Environment Agency	Proper targeting of resources.		R	—	—	—	—	—
10.2 Monitor effectiveness of remedial work within the River Camlad catchment.	Environment Agency	Compliance with RQO.		U	*				
10.3 Investigate the failure to achieve the RQO for the River Morda.	Environment Agency	Compliance with RQO.		1	1				
10.4 Continue to monitor the restoration of the Montgomery Canal.	Environment Agency BW/MWRT	Improvement in Dissolved Oxygen levels and reduction in plant/algae growth by increased flows.		5	1	1	1	1	1
10.5 Continue to assess impact of abandoned metalliferous mines on water quality in order that future remedial work can be prioritised.	Environment Agency	Better targeting of any future funding.	Lack of funding.	U					
10.6 Set RQO target for the Afon Eirth	Environment Agency	Improve level of protection for fish stocks.	Resources.	R	—				

Issue 11: Non compliance with EC Directives for 1997

Listed below under (i) - (iii) are the failures under the Surface Water Abstraction Directive, the Dangerous Substances Directive, and the Freshwater Fisheries Directive for 1997.

i) Surface Water Abstraction Directive

This Directive sets standards for water quality where it is used for a potable supply abstraction.
There were two failures in 1997 under the Surface Water Abstraction Directive, both of which were at Llanforda WTW. These two failures were colour (20 Hazen limit) and total phenols (limit of 0.001mg/l).

Previous investigations have demonstrated that the colour is natural and is associated with upland peaty soil. These investigations have, however, proved inconclusive as to whether the total phenols levels are natural. Since the water is abstracted from Lake Vyrnwy and piped to Llanforda for treatment it is planned to carry out further sampling on the Lake Vyrnwy tributaries to assist in identifying the source.

ii) Dangerous Substance Directive

This Directive sets standards for water quality downstream of a consented discharge containing a List I or List II substance.

In 1997 there were no failures for List I Substances caused by consented discharges but the following have occurred for List II Substances:

River Cerist, failure for Zinc with other metals, for example copper, showing elevated levels. This is due to groundwater discharges from the old Van Lead Mine despite the installation of a wetland treatment at the site. Further improvement of this treatment system is now complete, but it is expected to take several years before the full benefit becomes apparent. It is worth noting that sampling has demonstrated a gradual reduction in metals levels since the wetland treatment was first installed.

River Severn at Aberbechan, failures for zinc and copper. These levels are not associated with the Newtown STW since there are similar levels upstream of the STW, they are however due to historical mining activities, and acidification (see Issue 9) since this causes low hardness which reduces the allowable metal concentrations. A potential failure for OP pesticides exists downstream of Newtown STW due to the discharge of trade effluent from a local fellmongery.

iii) Freshwater Fisheries Directive

This Directive set standard for water quality where a river/canal has been designated an EC Fisheries stretch.

In 1997 there were two failures under this Directive:

River Vrynwy - downstream the dam, failure for pH. This is caused by acidification (see Issue 9).
Montgomery Canal - at Parsons Bridge, failure for Dissolved Oxygen. This was due to a combination of low flows and algae/plant growth. (See Issue 10 for more information).

iv) New EC Fisheries Designations

The Agency is keen to seek new designations, in particular for the following rivers: Trannon; Clywedog; Dulas; Eirth and Rhaeadr. This will improve the level of protection for existing fish stocks.

v) Asset Management Plan (AMP3)

Every five years the Water Industry Companies have to agree their investment programme with the Director General of OFWAT. We are now in the third review, which will cover the period 2000 to 2005, and the Agency is anxious to ensure full consideration is given to securing environmental improvements.

The Agency has reviewed the Water Industry sewage treatment works (STW) within the catchment and has identified a number of discharges that will breach the EC Fisheries Directive (and the River Quality Objective) if they were to discharge to the limit of their existing consents. The Agency is therefore keen that funding is secured under AMP 3 for the following STWs:

Caersws; Carno; Church Stoke; Kerry; Llanidloes; Llanrhaeadr; Montgomery and Welshpool.
Newtown and Oswestry Mile Oak STWs (see Issue 12) are currently being improved under AMP2.

Montgomery Canal, north from Navigation Inn, Maesbury Marsh – above with heavy algae growth and below with clearer blue water (second photo courtesy of John Tucker, SWT.)

NB Some failures under EC Directives have the same actions as for the 'Non Compliance with River Quality Objectives' and 'Acidification' Issues. This table should be read in conjunction with the Action Tables for Issues 9 and 10.

Issue 11: Non compliance with EC Directives for 1997

Options/proposed actions	Responsibility	Benefits	Constraints	Cost (£k)	1999/ 2000	2000/ 2001	2001/ 2002	2002/ 2003	2003/ 2004
11.1 Investigate source of phenols at Llanforda WTW.	Environment Agency	Identify whether phenol levels are from natural source.	Resources.	2	1	1			
11.2 i) Continue to monitor the effectiveness of land reclamation and wetland system at Van Lead Mine. ii) Continue to assess impact of abandoned metalliferous mines on water quality in order that future remedial work can be prioritised.	Environment Agency	Identify effectiveness of treatment system. Better targeting of any future funding.	Resources.	5	1	1	1	1	1
11.3 Seek EC Fisheries designations on Rivers: Trannon; Clywedog, Dulas, Eirth, Rhaeadr and Caebitra Brook.	Environment Agency	Improve level of protection of existing fish stocks.		U	*				
11.4 Promote the inclusion of funding under AMP3 for possible improvement work at the following STWs: Caersws; Carno; Church Stoke; Kerry; Llanidloes; Llanrhaeadr; Montgomery; Oswestry Mile Oak and Welshpool	STW Ltd Environment Agency	Ensure future compliance with EC Directives	Resources.	U					
11.5 i) Monitor the impact of Newtown STW on the River Severn, with particular reference to the presence of OP pesticides. Ii) When appropriate review the OP pesticides limit on the consent for Newtown STW.	Environment Agency Environment Agency	Identification of levels of OP pesticides in the river. Ensure future compliance with EC Directives.	Resources. Resources.	U U					

Issue 12: Reduction in dilution afforded effluent discharges to River Morda

Oswestry Mile Oak sewage treatment works (STW), which is operated by Severn Trent Water contributes in excess of 98% of the treated sewage effluent discharged into the River Morda. At present there is a dilution of 2:1 afforded the discharge by the current river flow. Llanforda Water Treatment Works (WTW), operated by North West Water Ltd (NWW), provides full treatment to water abstracted from Vyrnwy Reservoir that supplies Liverpool with drinking water. The treatment system includes slow sand filtration through 23 filter beds. NWW are currently undertaking a programme of filter bed refurbishment to reduce water wastage from leakage through these beds. This leakage combines with other waste process water and is discharged to the River Morda. The Environment Agency through a stringent conditional consent to discharge controls this discharge. It is anticipated that this programme will reduce the volume of discharge by at least half, from 8.5 megalitres per day (Mld) to 4.0 Mld.

The adverse effect of this, whilst a more naturalised flow in the River Morda, will be a significant reduction in the dilution for the effluent discharges to the river. In particular it is calculated this will, at times, reduce the dilution afforded Oswestry Mile Oak STW to 1:1. The likely result of this will be the further failure of the River Morda to achieve its River Quality Objectives (RQOs) downstream of the STW discharge.

Under Asset Management Plan (AMP) 2, work is being carried out at Oswestry Mile Oak STW to ensure compliance with EC Fisheries Directive with existing river flows. These improvements will not be sufficient to ensure continued compliance with RQOs when the anticipated reduction in flow has taken place. Further allocation of funds under AMP3 are therefore to be sought to ensure the river meets its RQO and complies with the EC Freshwater Fisheries Directive.

Issue 12: Reduction in dilution afforded effluent discharges to River Morda

Options/proposed actions	Responsibility	Benefits	Constraints	Cost (£k)	1999/ 2000	2000/ 2001	2001/ 2002	2002/ 2003	2003/ 2004
12.1 Promote the inclusion of funding under AMP3 for further work at Oswestry Mile Oak STW.	Severn Trent Water Ltd Environment Agency	Future compliance with River Quality Objective and EC Fisheries Directive.	Funding.	U	*				

Issue 13: Sewerage and sewage disposal in rural areas

All towns and many villages in the catchment are served by public sewers and sewage treatment works. Outside the sewered areas, properties are served either by private treatment plants with consented discharges of treated effluent to a watercourse, or by septic tanks with soakaways for effluent disposal. Although these are adequate for the majority of cases several communities have growing pollution problems caused by the concentration of properties, poor ground conditions for soakaways, increased water consumption, and infilling development. In some instances, satisfactory provision of drainage for sites allocated for development in Local Plans will be problematic. (See Section 5.10 for further information)

Designated settlements where these methods of sewage disposal are currently causing odour, nuisance, health or pollution problems, or where these are considered likely to occur should further development take place, include: Aberhafesp, Cefn Coch, Coedway, Cwmbelan, Dolfor, Forden, Hyssington, Leighton, Llanfihangel, Llanmerewig, Maesbury Marsh, Upper and Lower Road and Milford Road, Newtown, Pontdolgoch, Rhos-y-Brithdir and Sarnau.

Septic tanks are sometimes installed in unsuitable locations or with poorly designed drains because responsibility for septic tank soakaways is unclear. Soakaways are not covered by the Building Regulations, so building inspectors can neither prevent installation in unsuitable conditions nor ensure proper construction in others. Existing controls include the planning process, building control, public health legislation and the regulatory powers of the Environment Agency to protect surface and groundwater quality. In practice, these deal effectively with identified problem installations but do not address the issues of location or maintenance directly.

The Environment Act 1995 introduced a new provision (Section 101A, Water Industry Act 1991) which requires water companies to provide a public sewer for existing properties in circumstances where it is cost effective and an environmental impact can be demonstrated. Landowners or parish and district councils can now apply to the appropriate Water Company and ask them to provide a public sewer. If the Water Company turns down the application, the applicant may appeal to the Environment Agency. The Agency will then review the Water Company's decision.

Issue 13: Sewerage and sewage disposal in rural areas

Options/proposed actions	Responsibility	Benefits	Constraints	Cost (£k)	1999/ 2000	2000/ 2001	2001/ 2002	2002/ 2003	2003/ 2004
13.1 Promote policies in Powys County Structure Plan and other Structure and Local Plans to prevent further problems in identified critical locations.	Environment Agency Powys CC LAs	Existing problem locations do not become worse.	Not a long term solution.	R					
13.2 Make detailed assessment of foul sewage disposal proposals for new development within locations *listed in Land Use Statement LU3)*	Environment Agency Powys CC LAs	Existing problem locations do not become worse.	Not a long term solution.	R					
13.3 Investigate the installation of sewerage schemes within critical locations.	Severn Trent Water Ltd Powys CC LAs Environment Agency	Long term solution.	Schemes not always viable. Cost to householder.	U					

Issue 14: Increased demand for amenity and recreation opportunities

Montgomery Canal

The proposed restoration of navigation on the Montgomery Canal may result in the loss of some botanically rich lengths of canal. 17 compensatory nature reserves to mitigate this loss have been agreed by British Waterways, Countryside Council for Wales and English Nature at various sites along the canal. General recreational use of the canal will increase considerably, as will local business opportunities. Economic benefits derived from these activities will help to ensure maintenance of the canal and the reserves to a high standard.

Increased boat traffic will impact on the existing high quality fishery, with a likely decline in the existing roach, tench and bream populations. These may be replaced by other species, such as gudgeon, with numbers of fish possibly increasing but with a lower biomass. Extra lengths of canal will be opened up which will provide new fishing facilities.

The Montgomery Canal, north from Queen's Head.
(Courtesy of John Tucker, SWT).

Navigation

A public right of free navigation exists on the River Severn downstream of Pool Quay. This right is currently exercised mostly by canoeists, but access problems occur and the Environment Agency has received requests to construct suitable access and egress points. The Agency does not own land along the river and has to date been unable to obtain landowner permissions to develop such facilities. No right of navigation exists upstream of Abbey Weir, Pool Quay, where use of the river for boating is dependent on riparian owner permissions.

Footpaths

Despite the recent creation by the Agency- led Severn Way Partnership of a footpath from the source of the Severn to Bristol, there are few definitive riverside footpaths in the area, thus limiting the potential for public enjoyment of many rivers. Scope therefore exists for collaborative projects with owners; local authorities and other bodies to increase access opportunities. Any recreational developments need to be considered carefully in relation to the need to safeguard high quality habitats.

Angling for Coarse Fish

Angling activity in the catchment is predominantly for game fish species in rivers and still waters. Large proportions of tourists visiting the area, however, are from the Midlands where coarse fishing interest is high. Opportunities exist for collaborative ventures to increase the availability of high quality stillwater and river coarse fisheries to the benefit of visitors and residents.

Issue 14: Increased demand for amenity and recreation opportunities

Options/proposed actions	Responsibility	Benefits	Constraints	Cost (£k)	1999/ 2000	2000/ 2001	2001/ 2002	2002/ 2003	2003/ 2004
14.1 Develop new amenity/ recreation and fishing facilities on Montgomery Canal.	BW/ MWRT	Increased availability of recreational opportunity.	Cost. Possible environmental damage.	U	═══				
14.2 Improve canoe facilities at Newtown for disabled users.	Environment Agency LA WCA DBRW	Access for disabled and youth groups.	Landowner permissions.	c10	8				
14.3 Produce joint Agency/Powys County Council leaflets for Severn Way.	Environment Agency LA	Improved recreation opportunity.	Cost. Litter.	c5	5				
14.4 Promote and develop coarse fishing opportunities in stillwaters and rivers.	Environment Agency Angling Clubs Fishery and land owners	Improved amenity. Increased tourism revenue.	Cost.	25	5	5	5	5	5
14.5 Establish an Agency view on recreational use of the River Severn, including potential increased navigation.	Environment Agency	Protection of interests of all river users.		R	═══				

Issue 15: Unauthorised and other environmentally damaging river works

Significant damage continues to be caused to aquatic life in recent years by localised river works of an unauthorised nature, including the removal of gravels for building works and the alteration of river courses to combat erosion problems.

The catchment has a considerable proportion of medium gradient rivers and watercourses flowing through alluvial soils in flat-bottomed valleys. Under these conditions rivers erode and deposit at considerable rates, creating meanders and oxbows in what is often the more productive farmland. On the scale of human lifetimes and land ownership, substantial land losses can be incurred through the effects of erosion. The process of deposition and rebuilding of land to useable agricultural quality is a much more gradual process.

Threatened by such losses the landowner naturally wishes to protect his land. The availability and cheapness of suitable machinery for restoring the river to its former course, cutting off meanders, and tipping of demolition materials has given rise to a number of instances of unauthorised works. Although at first these works would not appear to affect anyone other than the immediate landowner, this is not the case. Preventing erosion in one place will often exacerbate it in another. Cutting off a meander will increase the gradient, setting off erosion downstream and sometimes upstream.

Most of the spawning grounds and nursery areas that support salmon runs in the River Severn are located in this catchment. Atlantic salmon populations are generally considered to be in decline and under threat throughout their natural range and protection of spawning areas is therefore of vital concern. The activities referred to above have caused significant damage to salmon spawning grounds in recent years, most notably on the River Severn at Llandinam, Penstrowed and Trehelig. Legal action had been taken against a landowner for the destruction of fisheries habitat.

The effect of straightening, tipping, infilling of old meanders and the removal of river and bankside gravels has damaging implications for many waterside birds such as sandmartins, kingfishers and little ringed plovers as well as for fish and other aquatic life. In addition to Scheduled Ancient Monuments, Listed Buildings and large numbers of unscheduled sites, many unrecorded archaeological features lie within or close to the river. Old meanders and palaeochannels can contain important evidence for past environments sealed within the substrate. The anaerobic conditions act to preserve organic materials that would normally decay if exposed to air. Where river works are proposed which are potentially damaging to archaeological features, appropriate liaison with archaeologists will take place. Some of the sites of river movement are nationally important and the River Severn from Dolwen to Penstrowed is a proposed geomorphological SSSI. These works can also have a significant effect on archaeology.

Controls on these activities are exercised through such legislation as the Environment Act 1995, Environment Agency Byelaws and the Salmon and Freshwater Fisheries Act 1975. The Agency has recently produced a bilingual leaflet in partnership with the Farmers Union of Wales (FUW) which informs landowners of the environmental damage caused by such river works and encourages them to contact the Agency for advice and the appropriate consents.

At issue is to what extent these activities should be controlled and the appropriate method of control.

Gravel shoals in the River Severn, Llandinam.

Issue 15: Unauthorised and other environmentally damaging river works									
Options/proposed actions	**Responsibility**	**Benefits**	**Constraints**	**Cost (£k)**	**1999/ 2000**	**2000/ 2001**	**2001/ 2002**	**2002/ 2003**	**2003/ 2004**
15.1 Promote awareness in agricultural community of damaging environmental impacts of unauthorised river works.	Environment Agency FUW NFU	Improved biodiversity.		5	5				
15.2 Enforce Fisheries legislation and Water Resources Act 1991 to prevent unauthorised river works.	Environment Agency	Protection of riverine habitat.		R	═══	═══	═══	═══	═══
15.3 Notification of Dolwen/ Penstrowed geomorphological SSSI on River Severn.	CCW	Improved legislative power of protection.		U	═══				
15.4 Promote the use of 'soft' bio-engineering works for bankside protection.	Environment Agency	Increased habitat quality in protected lengths.	Increase in maintenance requirement.	U/R	═══	═══	═══	═══	═══
15.5 Promote all Wales Agri-Environment Scheme.	WOAD, CCW, WWT	Improved biodiversity. Maintenance of agricultural incomes.	Resources.						

Issue 16: Environmental strategy for the Severn-Vyrnwy Confluence area

The hollows, ponds, rough tussocky pasture, hedgerows and trees together with the effects of seasonal flooding, provide a mosaic of habitats in the Severn-Vyrnwy confluence area. The area is one of the major floodplain environments within, not only the catchment, but also within the region, and was historically of national importance for wading birds and wintering wildfowl. Archaeological features also add to the overall importance of the area.

The loss of this range of habitats through changing agricultural practice and improved drainage has had an adverse impact on many species in the area especially breeding wading birds. A recent survey of breeding wading birds undertaken for the Agency by Shropshire Wildlife Trust highlighted a dramatic decline of 68% and 44% in the respective breeding populations of Curlew and lapwing between 1987 and 1996 in the confluence area.

The Agency has recently produced a **strategic environmental statement** for flood defence planning combining the potential of the Severn-Vyrnwy confluence for habitat re-creation with the Agency's role in managing the flood defences within the confluence. This will minimise the impact of Agency work in the area whilst at the same time maximise opportunities for habitat creation and habitat improvements.

Likewise the Countryside Commission led land use project is attempting to develop an agri-environment scheme for the area which will financially support farmers to reduce the intensity of agricultural practices in the area. This will then benefit the area's biodiversity. To date, the payment offered by agri-environment schemes are insufficient to encourage landowners, in these difficult times, to alter their farming regime.

Issue 16: Environmental Strategy for the Severn -Vyrnwy confluence area									
Options/proposed actions	Responsibility	Benefits	Constraints	Cost (£k)	1999/ 2000	2000/ 2001	2001/ 2002	2002/ 2003	2003/ 2004
16.1 Develop an agri-environment scheme for Severn-Vyrnwy confluence area.	CoCo MAFF/WOAD SWT, MWT Environment Agency EN/CCW	Greater biodiversity.		30	10	10	10		

Issue 17: Severn-Vyrnwy Confluence - maintenance of the argae system

The flood embankments (argae) alongside the rivers Severn and Vyrnwy between Melverley, Pool Quay and Llanymynech were for the most part constructed in the late 18th century under powers conferred by the Enclosure Acts. They only provide limited protection from flooding, with the argaes on the Vyrnwy and Severn below Llandrinio overtopping every 2-3 years and those on the rest of the Severn overtopping every 5-10 years.

Constructed without the benefit of modern machines, the minimum amount of material was used, rendering them liable to degradation by livestock and vermin and prone to washout and breaching when water flows over them. They were also constructed close to the banks of the rivers where they were vulnerable to river erosion and bank slips. Over the 200 years since their construction, their maintenance has involved repairing livestock and vermin damage, repairing breaching, reconstructing them in situ and reconstructing them further away from the river to avoid erosion and bankslip. Standards of structural integrity have gradually improved.

Although not constructed to any overall design as regards level or function, the system as a whole has a major impact on flood flows passing downstream, preserving and increasing the volumes available for storage of flood water at high flows. Major floods passing downstream are usually substantially reduced by the system. However, it is also very sensitive to any changes. Argae levels can not be altered in one place without the regime of the commencement of overtopping being affected over much of the rest of it.

Allowing the argaes to deteriorate would not only put land and property (presently given limited but nevertheless valuable relief from frequent flooding) at high risk again, but would reduce the attenuating impact of the whole system on floods passing downstream. Abandoning the argaes to deteriorate is not an option either economically or politically.

The Environment Agency has produced a strategic plan to secure the long term future integrity of the system and minimise the needs for, and expenditure on, the maintenance activities previously mentioned. Essentially this entails reconstructing the argaes to a sufficiently broad cross section (3 metre crest, 5:1 side slopes) that they will endure overtopping without risk of erosion and breaching, will not be vulnerable to livestock and vermin damage, and are sufficiently far from the river bank to minimise erosion and bank slip risks.

Approximately 50% of the total of 41 kilometres have either already been improved or are programmed for improvement. It is anticipated that much of the remainder will need to be constructed over the next 10 - 20 years. The necessary works involve both short-term impacts on the local environment and longer term changes to ecological regimes.

The need for considerably larger volumes of spoil on the argae reconstruction than is at present contained by the existing necessitates either the import of material from external sources, involving road transport down narrow lanes, or the local sourcing from adjacent borrow pits. The latter presents the opportunity to create wetland habitats (see Issue 6) and offset some of the environmental impacts of the work.

The Agency will continue to consult with archaeologists to preserve the features of the argae system earthworks in a near original state as possible, as an integral part of the wider landscape within the Severn Vyrnwy Confluence.

In accordance with environmental legislation, an Environmental Statement for the Strategy has been produced and published for public consultation during February 1998. The principal requirements of the statement are that all individual projects will have specific environmental action plans that include opportunities to conserve and enhance the natural environment to create wetlands and minimise the impact on the landscape and archaeology. There is a presumption that any borrow areas will be located within the confluence area.

At issue is the conflict of interest between the need for sustainable flood mitigation and the environmental impacts involved in the works needed to achieve this. Works currently identified and included in the capital works programme are as follows:

Guilsfield Brook (New Cut)	A483 - The Wern
River Vyrnwy	The Haim
River Severn	Mount to Haimwood
River Severn	Weir Brook Outfall and High level Outfall

Issue 17: Severn- Vyrnwy Confluence - maintenance of the argae system

Options/proposed actions	Responsibility	Benefits	Constraints	Cost (£k)	1999/ 2000	2000/ 2001	2001/ 2002	2002/ 2003	2003/ 2004
17.1 Carry out argae/outfall reconstruction at: Guilsfield Brook(New Cut) A483 - The Wern R Vrynwy – The Haim R Severn - Weir Brook Outfall R Severn - Mount -Haimwood	Environment Agency	Long term future and historical value of argae construction secured. Propagation of Severn Valley wetland sites via borrow pits.	Costs. Temporary and longer term environmental impacts.	U	═══	═══	═══		

Issue 18: Increased threats of pollution from sheep dipping

Close control of sheep ectoparasites is essential for good sheep husbandry. Since 1985, the principal means of treatment has been to dip sheep in baths containing organophosphates (OP) compounds. However, concerns over risks to human health from the use of OP sheep dips, coupled with the need to obtain a certificate of competence before being able to purchase these dips, has led to an increase in the use of synthetic pyrethroid sheep dips over the past few years. Although these compounds, notably flumethrin and cypermethrin are considered safer for humans, they are believed to be up to one hundred times more toxic to many forms of river life.

In the Severn Uplands catchment there were 10 incidents during 1997 where the invertebrate life along large stretches of river were either seriously affected or wiped out, with sheep dip suspected as being the cause. This compares to only one suspected incident in the previous 5 years.

Work is being undertaken to assess the impact of sheep dip chemicals on the water environment, in particular synthetic pyrethroids. In 1998 15 further river catchments in this area are being monitored to examine the effects of last year's incidents. There are also increases in the random monitoring programs. All the general quality assessment points in the upper reaches are now being routinely tested for the four main chemicals found in sheep dip. Farms are being visited to gather information on the location of dipping-baths, the chemicals used and disposal methods for the waste solution.

The Government is currently considering improvements to legislation and some control over the disposal of sheep dips will come into force with Groundwater Regulations in April 1999. An Agency-wide "Action Plan" is in the process of being implemented in an attempt to minimise the risks of pollution, by such initiatives as reducing toxicity of used dip, improved notification procedures and reducing the need to treat sheep by better flock management.

Sheep in the process of being dipped (RSNC).

Issue 18: Increased threat of pollution from sheep dipping									
Options/proposed actions	**Responsibility**	**Benefits**	**Constraints**	**Cost (£k)**	**1999/ 2000**	**2000/ 2001**	**2001/ 2002**	**2002/ 2003**	**2003/ 2004**
18.1 Assess current situation, 3 phases: a) Identify catchments for investigation. b) Identify peak period of dipping. c) Identify monitoring requirements and capabilities.	Environment Agency	Reduced pollution and health risks. Efficient targeting of resources. Knowledge of area activities.	Scarcity of manpower resources. Costs of sampling and analysis.	<5	*				
18.2 Undertake visits to sheep dipping and disposal sites in areas identified above.	Environment Agency	Reduced risk of pollution and environmental impact.	Resources.	U	*				
18.3 Continue and expand the campaign to increase awareness and promote safer practice for farming.	Environment Agency Government Farming organisations	Reduced risk of pollution and environmental impact.	Resources, effective liaison with other organisations.	U	*				
18.4 Influence legislative change to improve regulatory measures.	Environment Agency Government Farming organisations	Improved regulation of sheep dipping activity.	Resources.	U	*				

Issue 19: Development of flood warning system

A procedure for warning those at risk of flooding has been in operation in the Severn and Vyrnwy valleys for over 50 years. In that time it has developed to make use of improving technologies in deciding when warnings are needed and to be more specific in the way the warnings are disseminated.

The dissemination of warnings has relied on volunteer flood wardens since its inception, cascading the warnings to those at risk. At each layer in the cascade the number of people involved in helping to pass on the warning increases by a factor of anywhere between 3 and 10, effectively mobilising a large number of people to assist. The system has been proven to achieve a 60-70% success rate in warning those at risk, but it has its limitations. The wardens take on considerable trouble and expense in their role and it can be difficult to recruit replacements.

The system is regularly used, with a long-term average of 8-10 floods a year necessitating at least the first level of warnings. This frequent exercise ensures that problems are quickly identified and rectified. However, the organisation was set up primarily to serve the farming community and the need to move livestock. It is also over 30 years since a major flood occurred, and the ability of the system to cover those properties only flooded at the higher levels is unproven. The Agency also has doubts about the extent of the coverage of the warning system at these higher levels.

When the police's role in disseminating flood warnings was passed to the Environment Agency in September 1996, the Agency commenced a five-year project to enhance the standards of the flood warning service on a national basis. The role played by the police had been one of primary communications linking the Agency to the dissemination system and the flood wardens.

The Agency invested in automated telephone messaging equipment to fulfil this role. This equipment has the ability to simultaneously telephone 30 different lines and deliver a pre-recorded message of the warning being issued.

The warden dissemination system minimises the capacity needed to do this such that the equipment is operating well below its abilities. The opportunity is therefore available to use the equipment to pass messages direct to those at risk, replacing the wardens, and potentially reducing the time needed for messages to get through. The initiative to move to this was instigated in April 1998 following consultation with all concerned.

It is also intended that as part of the five-year project to improve the flood warning system, the coverage of flood warnings will be completely reviewed. This involves determining both the extent and levels of flooding and the threshold levels of all property that may be affected (refer to Issue 20). The project also involves reviewing the timeliness and accuracy of flood warnings and finally the need/feasibility of extending the system further upstream or to other rivers.

At issue will be the need and locations for extending the service, its cost effectiveness and the methods to be used.

Issue 19: Development of flood warning system

Options/proposed actions	Responsibility	Benefits	Constraints	Cost (£k)	1999/ 2000	2000/ 2001	2001/ 2002	2002/ 2003	2003/ 2004
19.1 Review data on flood levels/extents and property thresholds covered by existing warning service.	Environment Agency	Maximises effectiveness of flood warning system.							
a) Consult 'at risk' property/owners on inclusion and method of warning.	Environment Agency/ Local Authorities	Reduced flood damage and lives lost in extreme events.			—	—	—		
b) Include all properties that wish to be included in existing system.			Rapidity of catchment response.					—	—
c) Review need for feasibility and method of flood warning for rivers in addition to existing service coverage.			Methods of dissemination.						

3.7 Conserving The Land

The Agency will do its best to prevent housing and industrial development in the wrong places, by influencing the Town and Country Planning systems. This will include discouraging development in floodplains and ensuring the availability of water resources, waste, and sewerage infrastructures are considered when new developments are planned. We will also encourage development on "brown field" sites. With local authorities, we will identify and report on the extent of contaminated land and will regulate identified special sites. Sections 5.2, 5.10 and 5.14 give more detailed information.

Issue 20: Floodplain management

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

The inappropriate development or use of floodplain will:

* Create flood risks to the developments themselves necessitating otherwise avoidable expenditure on their control.
* Increase flood risks elsewhere by restricting floodplain flows and reducing the floodplain storage effect on flows passing downstream.

The effects are cumulative, particularly the reduction on floodplain storage, making it impossible to set any "limits" which over a period of time will not negate the objectives of any flood plain preservation policy.

The Environment Agency, as a statutory consultee of the Planning Authorities, seeks to prevent development encroaching into the floodplain to avoid any increase in flood risk to people and property. What may start off as only an innocuous proposal can rapidly snowball into a totally inappropriate use of floodplain, an airport is a prime example. What starts off as a grass landing strip then needs aircraft hangers, fuel storage, tarmacadam runway, offices, passenger facilities, more aircraft hangers, security fencing etc. Even sports fields generate the need for facilities such as changing rooms, toilets, social facilities and grandstands.

Of further concern is the development of riverside floodplain caravan sites. Tourism is a major activity in the Welsh part of the catchment and the provision of caravan sites, both touring and static, contributes significantly to this activity with riverside sites seen as an idyllic setting. Caravan sites in flood risk areas causes potential risk to damage the caravans and even life, portrayed by the recent scenes of floating caravans being crushed under bridges. Also, experience shows an inevitable progression from touring caravans to statistic caravans to mobile homes to permanent residential development.

Although the main season of use of caravans is the summer months when flood risks are lowest it must be remembered that summer storms in hilly areas have produced some major floods, notably 1886 and 1973, with disastrous consequences. Such floods can happen very quickly and cannot be adequately catered for with flood warning systems.

Floodplain areas are also important for nature conservation interests, and have the potential to be greatly improved with suitable management. Although some lengths of the major rivers (notably the Severn and Vyrnwy) do have definitive floodplain, the extent of the definitive (1 in 100 year return period) floodplain is not mapped for all major watercourses in the catchment. Where actual flood information is not available computer models can be used to calculate flood levels. This is both costly and time consuming and resources need to be allocated on a priority basis. Floodplains areas contain high concentrations of archaeological sites preserved either as standing structures or as buried deposits. Some of these sites will be protected by law as Scheduled Ancient Monuments (SAM) or As Listed Buildings, but by far the majority of sites will have no designation, although they may be of equal importance. Any form of development within the floodplain can have detrimental impacts on the archaeological resources and biodiversity of the area.

Department of Environment Circular 30/92 (Welsh Office Circular 68/92) required that a major input into development plans should be surveys of flooding problems and flood plain (under Section 105(2) Water Resources Act 1991). A Memorandum of Understanding with Local Authorities, regarding the programming of the surveys was originally signed in 1994, and continued under the 1997 Memorandum of Understanding. However, problems are likely to arise where, for example, pressure is placed on Local Authorities to include these surveys in development plans without regard to the programme in the Memorandum.

Issue 20: Floodplain management

Options/proposed actions	Responsibility	Benefits	Constraints	Cost (£k)	1999/ 2000	2000/ 2001	2001/ 2002	2002/ 2003	2003/ 2004
20.1 Define floodplain: a) Complete modelling and mapping of R. Severn floodplain Llanidloes - Buttington. b) Complete modelling and mapping of Severn/Vyrnwy floodplain Buttington/ Llanymynech - Montford Bridge c) Model and map R. Vyrnwy Pont Robert - Llanymynech.	Environment Agency Environment Agency Environment Agency	Flood risks more clearly and readily available to planning authorities. Flood risks to new properties avoided. Existing flooding not made worse. Data also used in advising prospective developers or property buyers of flood risks and for flood warning.	Costs. Modelling resources.		—	—			
20.2 Extend floodplain mapping to other rivers.	Environment Agency	As above					—	—	—
20.3 Complete and distribute S.105 Survey review.	Environment Agency	As above.			—				
20.4 Review Local Plan policies to protect floodplain from development, strengthening as necessary and including policies for removal of redundant development obstructing floodplain.	Environment Agency Local Authorities	Alleviation of existing flooding.			—	—			
20.5 Review Local Plan policies relating to caravan sites in floodplain and amend/strengthen where necessary.	Environment Agency Local Authorities	Minimises flood risks to people and property and use of emergency services.	Impact on tourism.		—	—			

Issue 21: Impact of land use changes, including hill land improvements and afforestation, on rates of run-off

When land use changes occur on sufficiently large scale within a catchment, they have an impact on run-off from rainfall reaching the watercourse. There is incomplete evidence that the extensive afforestation and hill land improvement that has taken place over the last 50 years in this catchment has been on a large enough scale to produce changes in the response of the catchment to rainfall. The effects are various, with impacts on both low river flows and on flooding risk.

Initially the drainage required for afforestation can increase the magnitude and swiftness of response but as the forest matures the opposite effect will be manifest. Felling and replanting will set back any reduction in run-off and slow down of response. Afforestation also poses a threat to remaining areas of unimproved or semi-improved land including blanket bogs, wet flushes, small pools and other wetland habitats.

Hill land improvement with the replacement of water retaining blanket bog, rough pasture, and moorland with relatively smooth surfaced grassland, often with underdrainage, will increase the rate of run-off, giving faster rising river levels and higher peak flood flows and levels.

Quantitative data on the scale of land use changes over the last 50 years is incomplete -particularly as regards hill land improvement. Although some research into the effects of afforestation on run-off has been carried out, little has been done on the effects of hill land improvement.

Urban development increases the impermeable area in a catchment and increases the rate of run-off and peak levels. However, urban development in this catchment is unlikely to be a on sufficient scale to have anything other than very localised impacts. Increased rates of run-off will also impact adversely on erosion rates, giving a knock on effect on other issues.

Issues arising from these effects:

* Are controls or limits needed on the extent of the above land use changes?
* What should those limits be if they are needed?
* Are there underlying limits anyway - there must be a limit to the amount of hill land that can be improved dictated by altitude, slope and existing unimproved hill land area.
* How could any limits be implemented?

Issue 21: Impact of land use changes, including hill land improvments and afforestation, on rates of run-off

Options/proposed actions	Responsibility	Benefits	Constraints	Cost (£k)	1999/ 2000	2000/ 2001	2001/ 2002	2002/ 2003	2003/ 2004
21.1 Investigate scale of impact.	Environment Agency *LAs*	Improved understanding of land use change and improved input to planning process.		5	═══				
21.2 Use results of investigation to give improved advice to LAs.	Environment Agency	Protection of the environment.	Possible limitations on land use.	R		═══	═══		

3.8 Managing Waste

A major pressure on the environment arises from the wastes produced as a by-product of industrial and domestic activities. The Agency is responsible for regulating the treatment, storage and disposal of controlled waste, as well as other responsibilities including the apprehension of fly-tippers. Waste regulatory duties are growing in the wake of new regulations governing the disposal of packaging and dangerous wastes and its duty to advise Government on developing a national waste strategy. We are urging consumers to consider waste when selecting products and industry to reduce the amount of waste it produces. Refer to Section 5.9 for further details.

Issue 22: Landspreading for agricultural improvement

Organic wastes from sewage treatment works and other industries in the area can be applied to agricultural land where the application will result in agricultural or ecological improvement. Techniques for spreading the waste include surface spreading and sub-surface injection, and operations are undertaken according to The Sludge (Use in Agriculture) Regulations 1989 (as amended) for the spreading of sewage sludge, and The Waste Management Licensing Regulations 1994 (as amended) for the spreading of controlled waste. In addition, codes of practice have been issued as to how these wastes should be spread onto land. Animal wastes from farming practices are also commonly spread onto land, but this is not subject to regulation, except in nitrate vulnerable zones. There are no such zones present within the plan area.

The two main types of waste which are used for landspreading purposes in the Severn Uplands area are sewage sludge and abattoir waste. These are often of high strength and highly polluting in the event of being allowed to enter a watercourse, the risk of which is a problem where the local soils are thin. Such waste types also have the potential to cause pollution or harm to human health through the contamination of soil by heavy metals and transmission of pathogenic diseases.

In the plan area sewage sludge is treated by anaerobic digestion at the Newtown and Oswestry sewage works, each of which produces approximately 10,000 cubic metres of sludge per annum. A private contractor then takes the treated sludge on behalf of Severn Trent Water Ltd for spreading over designated land. The sludge that is applied is known to contain significant amounts of heavy metals, in particular copper and chromium. Digested waste from two abattoirs (Bishop's Castle and Llandinam) is also applied to farmland in the surrounding area.

Due to the pollution potential of this activity strict regulation is necessary. We will therefore inspect landspreading activities as a priority to reduce the risk of pollution and to ensure the activity is in accordance with the MAFF Codes of Good Agricultural Practice.

The Agency recently jointly commissioned a research project with MAFF and the Department of the Environment, Transport and the Regions (DETR) to investigate the criteria for, and advise on, guidance for the landspreading of industrial wastes. The results of this project are being used by the Agency to establish national guidance for the requirements for land spreading of wastes. The guidance will enable the Agency to enforce the requirements of the Regulations in a consistent manner across the UK. This will include a joint public consultation on such issues for revising exemptions from waste management licensing.

Issue 22: Landspreading for agricultural improvement

Options/proposed actions	Responsibility	Benefits	Constraints	Cost (£k)	1999/ 2000	2000/ 2001	2001/ 2002	2002/ 2003	2003/ 2004
22.1 Inspect land spreading activities as a priority. Provide advice to industry, contractors and farmers on best practice.	Environment Agency Industry Contractors STW Ltd Farmers FWAG	Better monitoring of processes. Reduced pollution risk.	Manpower resources.	R	═══	═══	═══	═══	═══
22.2 Adopt policies put forward as recognised by national guidelines	Environment Agency	As above.		R	═══	═══	═══	═══	═══

Issue 23: Sustainable waste management

Every year in the UK we produce about 245 million tonnes of household, commercial and industrial waste, most of which (70%) is currently disposed of to landfill. There are a number of issues associated with the production of waste and its management. In particular waste represents a loss of natural resources and there are a limited number of sites that are suitable for landfilling of wastes.

We therefore need to reduce the amount of waste we produce and make the best use of that waste which is produced.

Industrial and Commercial Waste

There is much scope for commerce and industry to reduce the quantity of waste being produced. Currently waste is often given low priority by companies who do not quantify how much waste is being produced, from which processes and why. Its management therefore has tended to concentrate on how to handle the waste once it has been produced, rather than addressing the reasons why it is produced in the first place. Waste minimisation is a method of reducing or eliminating wastes at source or finding ways to re-use unavoidable wastes. It is also the best way the environmental impact of waste can be reduced and has the added benefit of reducing a company's production and disposal costs.

Waste minimisation can be achieved by industry through the design of processes and the selection of raw materials which produce less initial waste or a waste which is less environmentally damaging; by using less packaging and by considering the environmental impact of the product and its packaging and its potential for post consumer recycling. Opportunities for waste minimisation may occur at all stages in the development, production, marketing and use of products.

Recent legislation aims to ensure that some of the environmental costs of waste production and disposal are borne directly by the producers of that waste. For example wastes sent to landfill for disposal are now subject to a tax; fees have been introduced for the movement of special (i.e. hazardous) wastes and certain businesses are now required to recover and recycle a proportion of packaging waste. Increasing costs will make waste minimisation, re-use and recycling more attractive waste management options to businesses.

However there are barriers which prevent companies from starting a waste minimisation programme; these barriers can be cultural, technical or in the case of small to medium sized companies may be due to a lack of staff resource or expertise. In an attempt to overcome these barriers, the Agency in partnership with others will promote waste minimisation to local companies.

Household Waste

Achieving reductions in the levels of household waste production requires action by individual households. Key to this will be the need for them to be made aware of the issues associated with waste production and the need for sustainable waste management, as well as action taken by local authorities in providing the necessary facilities e.g. recycling banks, and household waste reclamation sites.

Within Shropshire, the County Council and its constituent local authorities have recently commissioned a study to look at alternative ways to manage waste (household and construction waste have been investigated), with the main consideration being the development of a sustainable waste management strategy for the whole of Shropshire.

The study, which is expected to be complete by mid 1998, will examine:

* The existing waste situation in Shropshire and expected changes
* Government and local waste policies and targets
* Potential for introducing new practices and technologies in Shropshire
* Environmental, planning and economic impacts.

Within Powys a Corporate Waste Strategy is currently being developed for completion by the end of 1998, which will include elements of sustainability in respect of waste management.

Issue 23: Sustainable waste management									
Options/proposed actions	Responsibility	Benefits	Constraints	Cost (£k)	1999/ 2000	2000/ 2001	2001/ 2002	2002/ 2003	2003/ 2004
23.1 Promote waste minimisation to local companies	Environment Agency and partners	Increased environmental awareness. Reduced commercial and industrial waste arising.	Process of culture change within companies is slow. Resources.						
23.2 Develop a strategy to increase the recovery of household waste.	Local Authorities Environment Agency	Reduced quantity of household waste requiring landfilling; increased environmental awareness.	Public participation Resources.						

Issue 24: Illegal waste deposits

In common with other areas in the Region, the Severn Uplands LEAP area suffers from general flytipping of waste as well as other illegal deposits of wastes. Flytipping is one form of illegal waste deposit and involves the abandonment of waste on unlicensed land, both private and public. The waste involved may range from a single black bag of domestic refuse, to large scale dumping of construction/demolition waste. Often if the guilty party cannot be found the landowner (who is responsible for the security of his land) has to bear the costs of clean up and the subsequent removal of the abandoned waste. In order for further investigations to be pursued the Agency relies heavily on local authorities and members of the public reporting such activities or incidents.

A similar type of illegal deposit of waste is that involving material left in lay-bys, which results from road maintenance, such as salt, grit and sweepings. Even though this waste is often subsequently removed its presence has often caused pollution problems due to its oil content, which during wet weather may be washed into nearby trout fisheries, or other sensitive watercourses.

Much of the flytipping within the catchment occurs along the Guilsfield/Caerenion road section of the Severn corridor, probably due to the often, secluded nature of the forested areas which run alongside it. Such waste largely comprises domestic waste, although it can also occasionally include dead farm livestock.

The flytipping of domestic type waste most likely results from individuals trying to dispose of extra or bulkier items of waste than are normally collected from their households, or which would incur a charge. A possible solution to ease this problem would be the increased provision/accessibility of civic amenity sites. These controlled facilities are provided by the County Council Waste Disposal Authority in Shropshire and unitary authorities in Wales as a requirement under Section 51 of the Environmental Protection Act 1990, and allow residents to drop off such wastes free of charge. At present there is one such site in the LEAP area, located in Oswestry.

In contrast to flytipped domestic waste, flytipped construction and commercial waste is potentially more likely to be linked to the introduction of the landfill tax (little information is available however on the positive/negative environmental impacts the tax has had.) As such the Agency needs a greater degree of control over these activities, and better data on the levels of waste going to landfill.

Both the Environment Agency and the local authorities have powers to take enforcement action to control flytipping. A Memorandum of Understanding between the Environment Agency and local authorities of England and Wales has been established in order to promote a lasting framework for consultation and co-operation in order to make the best use of limited resources. On a local basis agreements between Agency Areas and the local authority will be drawn up by negotiation and agreement in order to overcome difficulties of responsibility.

Issue 24: Illegal waste deposits										
Options/proposed actions		**Responsibility**	**Benefits**	**Constraints**	**Cost (£k)**	**1999/ 2000**	**2000/ 2001**	**2001/ 2002**	**2002/ 2003**	**2003/ 2004**
24.1	Prioritise enforcement action, as high profile cases may deter further illegal activity.	Environment Agency	Reduction in illegal waste deposits. Increased amenity value of area.	Manpower and time. Resources.	<5	U	U			
24.2	Increase publicity of the need to deposit waste legally, including likelihood of fines.	Environment Agency LAS	Reduction in illegal waste deposits. Increased amenity value of area.	Manpower and time. Resources required to investigate and prepare cases for prosecution.						
24.3	Promote household collection services.	LAs	Reduction in flytipping.	Cost.	U					

3.9 Regulating Major Industries

Pollution from industrial sources has the potential to harm all living things. One of the Agency's key responsibilities is to prevent the release of pollutants into air, water or land through integrated pollution control (IPC). Where releases do occur, we try to ensure they are minimised and made harmless.

A similar approach to IPC will be introduced throughout the European Union under the new EC Directive on integrated pollution prevention and control (IPPC) which will become UK law by 31 October 1999. IPPC regulates more industrial sectors and takes into account more environmental concerns than IPC, including energy conservation and the clean-up of sites when activities stop. *Section 5.12 gives more information.*

There are no specific local issues within this category as there are no sites within the LEAP area which are regulated by the Environment Agency under Part 1 of the Environmental Protection Act 1990.

3.10 Public Awareness And Education

Raising environmental awareness and education is a key objective for the Agency. It is essential for the delivery of a cleaner more sustainable environment in the long term. In many cases a lack of information and awareness is one of the factors, which leads to environmental damage or neglect whether it be accidental or deliberate, and we need to encourage ownership and responsibility for the local environment.

Issue 25: The need to raise and promote environmental awareness and education

Education will play a key role in enabling us to achieve our vision for the Severn Uplands area. There is a need for a greater level of educational involvement by the Agency and a need to raise awareness of environmental issues amongst the general public, industry and special interest groups. Section 4, A Better Environment through Partnership, highlights some areas where the Agency is successfully working with others to achieve this aim.

To develop the education strategy and co-ordinate its implementation the Agency has recently appointed an education officer for the Region and has Customer Contact teams in each of the four Area offices. Local plans will be delivered, taking into account different area needs, whilst working towards the overall aim of the national strategy. To add value however in the wider field of environmental education, it will be vital that the Agency has a co-ordinated approach and works in partnership with other organisations.

Eco-schools

This project encourages and acknowledges whole-school action for the Environment. The scheme is managed by the Tidy Britain Group and promoted and supported by the Going for Green campaign. The Agency's commitment:

* Target of 15 trained assessors per region – commitment of approximately 2 assessments (2 hours duration) per year per individual. Training of assessors will occur regionally.

* Promotion of the scheme.

The Agency educates industry through consultation, collaboration activities and focussed campaigns to promote the culture of prevention rather than cure. In particular working with local partners to facilitate graduate placements in local Small Medium Enterprise (SME's) and developing case studies for industry which tie in with the 9 environment themes.

The Agency is keen to raise public awareness of environmental issues to engender in a society a common ownership of the environment and its challenges through:

* Participating in community events that translate information about overall environmental issues down to local action points i.e. what individuals can do in their own communities by way of recycling/reuse, campaigning for minimisation generally, walking to school/work, preserving local sites of interest and conservation.

* Providing information on local action points as above.

* Ensuring good access to Information on above through libraries, supermarkets, shopping mall, business parks etc.

Pond dipping at Newtown Sewage Reservoir.

Issue 25: The need to raise and promote environmental awareness and education

Options/proposed actions	Responsibility	Benefits	Constraints	Cost (£k)	1999/ 2000	2000/ 2001	2001/ 2002	2002/ 2003	2003/ 2004
25.1 Develop a local education strategy and establish partnerships to deliver it.	Environment Agency	Target actions, secure resources, and strengthen partnerships.	Staff resources		—	—	—	—	—
25.2 Promote Eco-school Project. Select and train an assessor to cover the LEAP area.	Tidy Britain Group, Going for Green. Environment Agency	Encourages whole-school action for the environment	Resources	U	*				
25.3 Raise public awareness of environment issues	Environment Agency and partners.	Encourage common ownership of our environment	Resources	U	—	—	—	—	—
25.4 Consultation with industry	Environment Agency	Promote culture of prevent rather than cure	Resources	U	*				
25.5 Promote environmental enhancement and aftercare programmes in developments	Developers, LPAs, Environment Agency, DETR, WO, Riparian owners.	Preservation and creation of habitats, discouragement of flytipping	Maintenance costs	U	—	—	—	—	—

Section 4 A Better Environment Through Partnership

This Section highlights the need to work together, if we are to make any lasting environmental improvements to the Severn Uplands area. As all aspects of the environment interrelate we must seek to manage the environment as a whole. This can be achieved through partnerships.

4.0 Introduction

Our natural environment is complex. Even where we do have a good understanding of a particular element of the environment, what is often much less clear is how it interacts with all other aspects of the local, regional, national and global environment. It is becoming clear that even local environmental impacts can have knock on effects on other parts of the environment. This kind of understanding led to the Rio Earth Summit in 1992, the adoption of Sustainable Development principles and the commitment to manage the environment in an integrated way through partnership, (see Section 1.3, page 9).

The Agency is well placed to influence many of the activities affecting the environment through legislation. However, achieving environmental improvement often depends on co-operation between the Agency and others. Partnerships will enable the key objectives and the long term vision of the plan to be realised; they will encourage local accountability as well as helping the financial need to pool limited resources. This plan discusses a number of issues and their progression will involve the joint action of a number of organisations, the general public and individuals within the Agency.

4.0.1 Working with Local Authorities

A Memorandum of Understanding has been drawn up between the Agency and the Local Authority Associations. It sets out how we will work with Local Authorities in protecting and improving the environment and in promoting sustainable development, better integrate our work and make the best use of limited resources. The agreement covers various shared responsibilities including, development control, flood defence, water resources, flytipping and air quality. The Agency already works closely with Local Planning Authorities on land use planning issues. This is explained in section 4.1 below.

4.1 Land Use Planning

4.1.1 Planning Liaison

Land use change is primarily the responsibility of the Local Planning Authorities (LPAs) through the implementation of the Town and Country Planning Acts. As planning decisions can have a significant impact on the environment, it is important that the Agency contributes to this process where appropriate. A considerable range of statutory and non-statutory planning consultations is received by the Agency from LPAs. A response is given by the Agency, enabling the relevant planning committee to consider our views in determining the planning application. Guidance regarding the applications the Agency would wish to see is contained in the publication *Liaison with Local Planning Authorities* (March 1997).

Development plans provide a framework for land use change and are the key consideration in the determination of planning applications. As a statutory consultee in the development plan process, we welcome this opportunity to join the LPAs in promoting sustainable development. To provide a guide to LPAs on what policies should be included in Development Plans and why they are important, an annex to the above mentioned document *The Environment Agency and Development Plans* is due to be published. Section 5.2; Table 8 (page 87) shows the current status of Local Development Plans in the area.

4.1.2 Land Use Planning and LEAPs

LEAPs, in addition to outlining a vision for the future, set out problems, issues and actions within the plan area and therefore act as an important source of information for LPAs. An example of the recognition of this is RPG 11 *Regional Planning Guidance for the West Midlands* (Government Office for the West Midlands September 1995), which indicates that LEAPs (as successors to Catchment Management Plans) should also be taken into consideration by LPAs when preparing Development Plans. Similarly, the Agency considers Development Plans and liaises with LPAs when preparing LEAPs.

4.1.3 Land Use Statements

The following statements relate to issues raised in the LEAP (Section 3) and to other areas of concern that will require the support of the LPAs in the area to seek a solution. It is hoped that we will receive comments from the Local Authorities during the consultation stage, so that these statements can be agreed with them and incorporated into the Action Plan. These statements will also apply to developers in relation to both the development and re-development of land (see Section 5.2, page 85). It is important that the information provided in the statements is incorporated into development proposals at an early stage, in order to ensure that development is sustainable and does not result in adverse impact on the environment.

Severn Uplands Stour LEAP - Land Use Statements			
Land Use Issue	**Land Use Statement**	**Issue & Site Examples**	**Development Plan Policy Examples***
SU/LUS 1 - Sustainable Development			
As increasing and often conflicting demands are being placed on the environment, a sustainable approach to growth and development is required to balance demands with the need to protect and enhance the environment for now and the future.	**The adoption of a precautionary approach to development that might affect the environment is encouraged. The environmental effects of development should minimise adverse impacts and maximise potential benefits. In particular, opportunities should be taken to incorporate natural features and environmental enhancements as part of development.**	General application.	PSP: EC5 PMLP: 2;16 MLP: ENV8 RLP: RCS1 SSP:M1 OLP: NE2; H19 SALP: GP1 SSLP: LN1
SU/LUS 2 - Energy Conservation and Waste Minimisation			
The waste management hierarchy (see Section 5.9) is a framework for sustainable development. Options towards the top of the waste hierarchy have the potential to contribute towards sustainable waste management where they are the best practicable environmental option (BPEO). Development consumes natural resources and waste disposal facilities both during and post construction. Opportunities to reduce waste must be promoted.	**To promote a pattern of development and use which is more sustainable; opportunities for recycling, waste minimisation and energy conservation must be considered. Energy saving construction and production, promotion of facilities enabling recycling of materials and encouraging, where possible, aggregate reuse and reclamation of production process base materials will be encouraged.**	Issue 23 E.g. Aberhafesp, Cefn Coch, Coedway, Dolfor, Forden, Fron Bank/Cilcewydd, Hyssington, Leighton, Llandrinio, Llanfihangel, Llanmerewig, Llanyblodwel/ Nantmawr/ Porthywaen/ Treflach, Maesbury Marsh, Nesscliffe (part) Priestweston, Refail, Sarn, Shrawardine & Queen's Head.	PSP: EC19; EC21 MLP: ENV23; ENV36 RLP: RCS11 SSP: 2/1; 2/100 SMLP: M1 OLP: NE16; H4 SALP: INF14 SSLP: GP5
SU/LUS 3 - Renewable Energy			
Renewable energy schemes are being encouraged but their location and by-products can, if ignored cause stress on sensitive environmental habitats, such as, wetlands, watercourse corridors and unimproved grass uplands.	**Non-polluting renewable energy proposals will be encouraged where the effect on the environment is minimised or improved. This includes access road erosion, loss of wetland habitat, effect on flora and fauna of watercourse corridors and combustion gases.**	Issue 4 Hydropower, windfarm and biomass proposals.	PSP: EC20 MLP: ENV24; RLP: REC17; REC18 OLP: NE17 SALP: INF 13 SSLP: GPC; GP7
SU/LUS 4 - Effluent Disposal			
The quality of groundwater, and surface waters is important for a wide range of users. Inadequate foul and surface water drainage provision can have an adverse effect on water quality, e.g. sewerage facilities with premature storm overflow discharges or lack of carrying or treatment capacity. Some smaller settle-	**The availability and provision of sewerage/drainage and pollution prevention facilities will be taken into account when development is planned so that adequate means of disposal for foul sewage, surface water and effluent are provided. The operation of effluent treatment/disposal sites must not be jeopardised by locating new,**	Issues 10, 11, 13, 22, 23 & 24. Intensive livestock units. Development near public water supply sources.	PSP: E1; H7; H15; TR1; TR21 MLP: DC1 RLP: RCS5 SSP: 2/1 OLP: H2

Severn Uplands Stour LEAP - Land Use Statements			
Land Use Issue	**Land Use Statement**	**Issue & Site Examples**	**Development Plan Policy Examples***
ments have no sewerage provision. Storage and use of some substances without adequate precaution poses a pollution risk and may not be safe at all in certain areas.	**sensitive development in the immediate vicinity. In the case of proposals producing effluent or waste it should be established that there is an adequate means of disposal. Developments involving the storage or use of potentially polluting toxic substances must incorporate adequate safe-guards, including measures to retain fire fighting water, to minimise pollution risk. Development, such as intensive livestock units, must be located where effluent and waste can be disposed of safely. The use of source control techniques to reduce diffuse pollution will be encouraged.**		SALP: INF2 SSLP: GP16
SU/LUS 5 - Water Resources			
Resources exist to support surface water and groundwater abstractions. Some abstractions are causing environmental damage. An available and adequate sustainable water supply is an important consideration for new development and its location. (See also "Policy and Practice for the Protection of Groundwater" - HMSO: ISBN 0 11 885822X). There is limited scope to meet increased demands from groundwater in the Vale of Powys and Alberbury Groundwater Unit.	**Full account will be taken of the availability of water resources and provision of water supplies in considering the location and extent of significant new developments. Key issues are quantity, location, and source (i.e. surface water or groundwater) of abstractions and the need to maintain aquifer recharge whilst protecting the resource from pollution. Measures to maintain aquifer recharge and minimise waste through leakage control and demand management is supported. The Water Companies are encouraged to meet current and increased demands in an environmentally sustainable manner.**	Issues 1, 2 & .3.	PSP: E1; H7; H15; TR1; TR21 PMLP: 2; 4; 7; 10 MLP: ENV21 RLP: RCS3 SSP: 2/1; 2/15 SMLP: M3; M9 OLP: NE12 SALP: INF6 SSLP: GP15
SU/LUS 6 - Floodplain and Surface Water Run Off			
Unsuitable development can itself be at risk from flooding, or increase flood risk elsewhere. This not only places lives and property in danger, but also can also adversely impact upon ecosystems by interfering with natural processes. (See also "Policy and Practice for the Protection of Floodplains" - Environment Agency 1997). Of particular concern is the intensification of use of caravan/camping sites in the floodplain.	**The floodplains of watercourses will be safeguarded from encroachment by development. Where appropriate, changes in land use, which will lead to a reduction in life and property at risk from flooding, will be sought. Additionally, development must not exacerbate flooding elsewhere due to increased rates of run off. To address these problems, the use of wetland restoration and source control techniques is encouraged.**	Issues 4, 5, 17 & 20 Possible floodplain development in Severn & Vyrnwy Valley, e.g. Aberbechan, Aberhafesp, Abermule, Bettws Cedewain, Churchstoke, Foel, Guilsfield, Llandinam, Llanfyllin,, Llangynog, Llanidloes, Llandrhaeadr YM, Meifod, Mid-Wales Airport, Newtown, Oswestry, Penybontfawr, Tregynon & Welshpool.	PSP: EC10; E1; H7; H15; TR1: TR21 PMLP: 2; 4; 9; 10 MLP: ENV22 RLP: RCS6 SSP: 2/1 SMLP: M3; M4: M9 OLP: NE11 SALP: INF5; INF7 SSLP: GP15; GP15A

Severn Uplands Stour LEAP - Land Use Statements			
Land Use Issue	**Land Use Statement**	**Issue & Site Examples**	**Development Plan Policy Examples***
SU/LUS 7 - Contaminated and Reclaimed Sites			
Development on or near contaminated land can cause the release of contaminants that may result in significant harm to the local environment.	**Contaminated sites, such as ex-industrial, gas works, waste disposal operations and old mine workings cause, or have the potential to cause, pollution problems. Any scheme for the redevelopment of such sites should be accompanied by a site investigation indicating the degree of contamination and, where appropriate, remediation proposals. The Agency will be consulted at the earliest opportunity in the pre-planning/planning application process for developments involving contaminated land.**	Issues 10 & 11	PSP: EC22 PMLP: 6; 21 MLP: ENV33 RLP: RCS4 SSP: 2/1 SMLP: M3; M27 SALP: INF11
SU/LUS 8 - Source Control			
Increasing areas of impervious surfaces contribute to rapid run off of rainfall, instead of the infiltration and slow greenfield run off. Rainfall and surface pollutants quickly access water-courses, exceeding their carrying and self- cleaning capacity.	**Local Authorities, in partnership with the Environment Agency, will encourage the use of environmentally sensitive techniques, such as source control, to ensure the problems of surges in surface water run off, pollution loads (including silt) and diminished aquifer recharge are not exacerbated by new development. Where possible, the solution adopted should address existing problems.**	Issues 1, 2, 3, 4, 5, 7, 8, 10 & 11. Development in Caersws, Castle Caereinion, Halfway House, Kingswood, Llansantffraid, Newtown, Oswestry, Sarn, Welshpool, West Felton/Queens Head.	PSP;EC22 PMLP: 4;7;8;9;10 MLP: ENV21 RLP: RCS3 SMLP: M3 OLP: NE12 SALP: INF6 SSLP: GP16
SU/LUS 9 - Mineral Extraction and Waste Disposal			
Mineral extraction can adversely affect the environment if appropriate safeguards are not put in place. Conversely restoration works may offer opportunities for environmental enhancement and water based recreation. Landfill, or land raising, unless effectively engineered, can pose a threat of pollution to the surrounding environment.	**The management of mineral extraction and waste disposal sites must provide for the protection of the environment from pollution in their construction, operation and aftercare. The effects on water resources, site drainage, leachate and air born litter will be considered. Care will be taken to avoid locating new, sensitive development in the immediate vicinity of these sites. Proposals for restoration of worked-out mineral sites that present opportunities for environmental enhancement will be encouraged. The Environment Agency will be consulted both prior to and at the planning application stage for developments involving mineral working and waste disposal.**	Issues 4, 5, 6, 7, 8, 10, 11, 14 & 23.	PSP: M2; L58 PMLP: 7; 14 MLP: ENV34 RLP: RCS9; RCS10 SSP: 2/1; 2/78; 2/99; 2/102 SMLP: M4 OLP: NE14 SALP: INF2 SSLP: LN16
SU/LUS 10 - Air Quality			
Many factors affect local air quality. Amongst these are vehicle emissions, heavy and light industry, weather, domestic emissions and climate	**Local Authorities will work in partnership with developers, the Environment Agency and others to meet the aims of the 'National Air Quality Strategy'. Development Plans**	Issue 21	PSP: E1; H15 SSP: 2/1 SMLP: M4; M9; M11

Severn Uplands Stour LEAP - Land Use Statements			
Land Use Issue	**Land Use Statement**	**Issue & Site Examples**	**Development Plan Policy Examples***
change. (See also "National Air Quality Strategy")	**will promote new development which does not adversely impact upon air quality and promotes improvements by minimising HGV and car journeys and encouraging the use of less polluting means of transport. Consideration will be given to avoid locating new, sensitive development in the immediate vicinity of sites discharging to air.**		SALP: INF3 SSLP: GP16B
SU/LUS 11 - Watercourse Corridors			
Water corridors are an important nature conservation resource. Development encroachment can adversely affect their character and nature conservation value. Conserving and where practicable enhancing biodiversity is an essential element of sustainable development.	**The conservation, fisheries, landscape, heritage/archaeological and recreational value of watercourse corridors will be protected and enhanced. Appropriate guidelines, such as those produced by the Forestry Authority, will be used. Inappropriate uses leading to degradation by soil erosion, increased flood risk, etc. will be avoided. This would include an authorised watercourse works, such as, gravel extraction, bank reinforcement and culverting. The value of buffer zones and sensitive riparian management is recognised.**	Issues 4, 5, 6, 7, 8, 14, & 24. River Severn from source to Vrynwy confluence. The Vrmwy and Tanat valleys.	PSP: EC10 MLP: ENV22 RLP: RCS6 SSP: 2/1 OLP: NE11 SALP: INF7 SSLP: GP15
SU/LUS 12 - Tourism and Recreation			
There is an increasing amount of tourism and countryside recreation occurring within the area. Watercourses, canals and lakes as an integral and attractive part of the countryside scene, have the potential to play an increasingly important role.	**Local Authorities in partnership with the Environment Agency will seek to ensure tourism and recreation developments are sympathetically designed and located to take into account the protection, and where possible enhancement, of the water environment. Promotion of water-based recreation facilities will take into account the need to safeguard high quality riverine habitats, with sensitive areas being monitored and protected from recreational pressure as appropriate.**	Issues 4, 5, 6, 10, 11 & 14.	PSP: TR1, TR21 MLP: LD1 RLP: RTR1 SSP: 2/64 OLP: TM1 SALP: TLR1 SSLP: RT5; RT7

PSP: Powys County Structure Plan 1991-2006 (February 1996)
PMLP: Powys Minerals Local Plan (March 1995)
MLP: Montgomeryshire Local Plan (including waste policies) (Deposit Draft October 1997)
RLP: Radnorshire Local Plan (Deposit Draft April 1997)
SSP: Shropshire County Structure Plan 1989-2006 (January 1993)
SMLP: Shropshire Minerals Local Plan (Deposit Draft April 1996)
OLP: Oswestry Borough Local Plan (Deposit Draft March 1996)
SALP: Shrewsbury & Atcham Local Plan (Deposit Draft November 1997)
SSLP: South Shropshire Local Plan 1996-2006 (Deposit Draft July 1998)

* Further relevant policies are contained in the remaining development plans listed in Table 8, page 87.

4.2 Partnerships with other groups

There are a number of joint initiatives with Local Authorities and other groups that have already been undertaken or are in progress. Examples are highlighted below.

4.2.1 Local Agenda 21

Sustainable development was given added impetus when the UK and other governments signed up to Local Agenda 21 at the United Nations Conference on Environment and Development held in Rio de Janeiro, 1992. Local Agenda 21 (LA21) is intended to be *"a programme of action needed throughout the world to achieve a sustainable pattern of development for the next century"*. The central role of Local Authorities, the local community and the value of partnerships is recognised in achieving sustainable development. This is also highlighted in the Agency's guidance on Sustainable Development (November 1996).

Local Agenda 21 recognises that action by governments alone is not enough and that all groups, civic, community, business and industrial, have to be involved to bring about change. The Agency supports this approach by providing information, expertise and support where possible. Government has produced guidance for Local Authorities on LA21 and expects each Local Authority to produce a LA21 plan by the year 2000. In the LEAP area the Local Authorities are all at different stages of this process. The Local Authority LA21 contacts and progress on LA21 are set out in the table below.

Table 3 Local Agenda 21 Contacts and Progress

Local Authority	Contact	Progress on LA21
Shropshire CC	Mr C J Harrison Tel: 01743 252565	Focusing on particular issues/area rather than producing one Action Plan e.g. Biodiversity, energy and air quality issues. Agency has recently supplied relevant publications and identified projects/key contacts relevant to Shropshire. LA21 Officer Group was set up earlier this year.
Oswestry BC	Ms Julie Williams/ Ms Jill Jones Tel: 01691 677298	At an early stage. Have held an Officers' working group meeting to discuss way forward, members' LA21 working group is planned. Member of Shropshire LA21 Officers' Group. *(Refer Shropshire)*
Shrewsbury and Atcham BC	Miss Sian-Elin Jones Tel: 01743 355874	At an early stage. LA21 co-ordinator appointed Jan 98. Member of Shropshire LA21 Officers' Group. *(Refer Shropshire)*
South Shropshire DC	Ms Belinda Colley-Davies Tel: 01584 874941 ext. 2374	Has adopted a Sustainable Development Strategy, and a new grant scheme - Local Environment Action Fund. Recycling initiatives. 6 Community Forums also include items relevant to LA21. Member of Shropshire LA21 Officers' Group. *(Refer Shropshire)*
Powys County Council	Mr Richard Pitts Tel: 01597 826573 Fax: 01597 826244 e-mail: richardp@powys.gov.uk	Have consulted widely and are now in process of forming Roundtables and fora to address issues and produce an Action Plan. The Council is committed to producing its LA21 plan by the year 2000..
Wrexham County Borough Council	Alison Jagger Tel: 01978 297029 Fax: 01978 297003	Have produced 'Wrexham Agenda 21, Environmental Review' (October 1997), and Wrexham Agenda 21 Forum has been set up. A Report on the State of the Environment and an Action Plan are to be produced.
Gwynedd Council	Mannon Lewis Tel: 01286 672255	Committed to implementing LA21 and working with the voluntary sector and community.
Ceredigion County Council	Brian Thomas Tel: 01545 570881	Working group formed to progress LA21 and produce LA21 strategy. A charitable trust (three partners) has been formed.

4.2.2 Shropshire Waste Minimisation Groups

On average companies spend 4% of their turnover on waste. This includes both the costs of disposal plus the time and resources spent on producing this waste as a by-product of the overall production process. In addition there is the environmental cost of this waste. A waste minimisation group has been set up for companies in Shropshire. The aims of the Group are to:

* Raise awareness of environmental, legislative and technical issues relevant to member companies and encouraging a networking forum
* Promote the efficient use of resources
* Achieve reductions in the waste arising from the participating companies
* Encourage companies to develop their own environmental management systems

The Group operates on a self-help basis providing companies with step by step training in waste minimisation.

The Group is a joint venture of the Environment Agency, Business Link Shropshire and the University of Wolverhampton.

Marches Environmental Business Partnership

The Marches Environmental Business Partnership is a two-year project, which has been set-up to assist businesses in the rural areas of Shropshire and Herefordshire to improve their environmental performance.

Support available to businesses includes on site advice and hands-on help, training and events, company to company mentoring and a waste minimisation programme.

The partnership comprises the Environment Agency, District and County Councils, the Business Links, the Chambers of Commerce and local business. The partners and the European Regional Development Fund have provided funding for the project.

Wales Supply Chain Project

The adoption of formal environmental management systems (e.g. ISO14001) by many companies within the UK is leading to pressure on the suppliers of these companies to undertake environmental reviews and publish environmental policies.

A partnership project is underway in rural mid Wales to engage customers and their suppliers to work together towards improved environmental performance. The project will provide the companies involved with training and environmental reviews.

The project is a joint venture between the Wales Environment Centre and the Environment Agency. The partners and the European Regional Development Fund and the Development Board have provided funding for the project for Rural Wales.

4.2.3 Pollution Prevention Projects

Oil Care Campaign

Waste oil can cause pollution to land and water through soil contamination and leaching into groundwater or rivers. In an effort to promote best practices for oil disposal, the Agency has funded a variety of campaigns within Shropshire to encourage people to take their waste oil to designated centres for recycling or proper disposal. There is currently no such campaign being undertaken within the Welsh area.

Work with Fire Services

The Agency has carried out pollution training with Fire Services in the area and worked with them to find out how best we can support their efforts in pollution control. We have now provided Fire Services, who are often, the first on the scene at incidents, with special pollution control chemicals and equipment.

Partnership Exercise with the Shropshire Fire and Rescue Service.

Industrial Estates

We are aiming to work with companies particularly in the building and construction industry to offer advice on how to minimise the impact of their work on the natural environment.

4.2.4 Raising Awareness of Water Resources

Since 1990 the country as a whole has suffered some of the most severe droughts of the century. The last two years have been the driest for two centuries. Compounding this problem is the steadily rising demand for water. Each of us today uses between 140 and 190 litres of water daily. With a population rise predicted in the catchment and the construction of more houses proposed, public demand is increasing. Some predictions suggest that if demand is not managed each of us will use a third as much water again by 2020. The Agency is committed to raising awareness and

encouraging wise and efficient use of water.

The Agency controls abstraction by issuing licences and enforcing licence restrictions when river levels are low, but is also working proactively with licence holders, particularly within the farming community, to ensure effective use of water through irrigation scheduling and soil moisture measurement. Farmers are encouraged to invest in winter storage reservoirs that enable them to abstract water during less critical periods of the year.
The Agency is also working alongside water companies and OFWAT to promote measures to manage public demand. This joint approach relates to various areas where reduction in demand can be achieved, thus enabling reduction in abstraction. The main areas of activity are:

* Education and information
  (E.g. roadshows, high street displays, schools guides, gardening tips, help lines)

* Promotion of water efficient appliances
  (E.g. low flush or dual-flush WCs, water efficient washing machines and dishwashers, trigger-gun sprinklers, water butts)

* Promotion of low-cost retrofit water-saving devices
  (E.g. hippo bags in cisterns, low flow showerheads, sprinkler exchange schemes)

* Water audits
  (E.g. washer replacement schemes, fitting hippos, fitting urinal controllers, installing waterless urinals, water use surveys)

* Promotion of water recycling and re-use
  (E.g. grey water recycling systems, recirculation systems, water butts)

* Waste minimisation scheme.
  (E.g. industrial process audits, waste minimisation clubs)

* Leakage Reduction Programmes.
  (E.g. active leakage detection and repair, refurbishment and renewal programmes, for supply pipes, communication pipes, distribution mains, service reservoirs, raw water mains and reservoirs, installation of pressure reduction systems)

These activities are co-ordinated by the Environment Agency's Demand Management Centre at Worthing in conjunction with regional co-ordinators.

However, in order for the above demand management measures to be effective and to help reduce the demand for water in general, you need to be involved. If you would like to know more about water saving appliances or using water wisely please contact either John Ellis-Tipton who is the Agency's Regional Environmental Management Advisor, **Tel: 01743 272828**

Or the Customer Services department of the water company serving your area: Severn Trent Water Ltd, **Tel: 0121 722 4000 or 01743 231666.**

4.2.5 Local Biodiversity Initiatives

In addition to the Regions' own Biodiversity Action Plan, similar plans have been produced for Shropshire by Shropshire County Council, Shropshire Wildlife Trust and English Nature. Likewise, the Montgomeryshire Wildlife Trust has produced a Biodiversity Action Plan for Montgomeryshire.

The Agency is committed to the Biodiversity challenge and is working with these organisations to ensure actions identified in these plans are implemented.

4.2.6 Conservation, Recreation and other Collaborative Projects

The following are projects between the Agency and many partners including CCW, English Nature, Wildlife Trusts and local authorities, and are being undertaken within the LEAP area:

* Severn Valley Wetlands Project
* Research and protection of the White Clawed Crayfish
* Fisheries acidification project
* Black Poplar project
* Severn Way footpath

The community based Community Pride competition has also been launched in Shropshire and encourages local community groups to undertake environmentally friendly projects and schemes. This links into Agenda 21 initiatives, which encourage communities to work together in improving their environment.

4.3 Education

The Environment Agency sees education as an important part of its work. There is a need for a greater level of educational involvement by the Agency and a need to raise awareness of environmental issues (see Issue 25 page 59). The Agency's education strategy "Green Shoots" considers environmental education into the next century.

Our goals are to:

* Build positive partnerships through consultation, joint ventures and sponsorship
* Help educate young people through teaching aids and other initiatives
* Improve understanding of environmental issues, through links with education, work placements and an awards scheme
* Work with industry and produce marketing campaigns to promote prevention of pollution rather than its remediation;
* Foster public awareness of environmental issues to encourage responsibility for the environment and its challenges
* Build on established and create new international relationships to further sustainable development
* Increase awareness of more efficient waste disposal and avoidance of litter.

A Regional Education Co-ordinator has been appointed to translate these goals into actions at a regional level and consider the educational needs of the areas (see Issue 25).

CREST Awards

CREST Awards have been running since 1986, with over 100,000 students participating to date. The aim of the scheme is to educate young people to equip them to make informed judgements about future environmental decisions. The Environment Research Challenge, sponsored jointly by the Agency, the National Environment Research Council and Unilever, was trailed in 1997 and launched in March this year. The aim is to involve and reward young people as researchers in projects linked with their local environment. Challenges encompass eight subject areas - Natural Resources, Biodiversity, Pollution, Waste Management, Global Change, Energy, Environmental Risks and Hazards, and Environmental Impact, although these are not exclusive.

The awards are aimed at students from 10 years upwards, and accreditation can be gained at one of four levels - bronze, silver, gold and platinum, depending on the hours of work involved in the project. The awards complement the National Curriculum in a number of subject areas and can be accredited and profiled for personal records of achievement. The Platinum Award has been credit rated by the Open University.

A further educational scheme involving the Agency is Eco-school, managed by the Tidy Britain Group. Refer to Issue 25 page 59 for more details.

The Agency can support the scheme in a number of ways:

* Provide mentors for students undertaking challenges at the gold and platinum levels;
* Provide opportunities for student placements at gold and platinum levels, linking challenges with the needs of the Agency;
* Lend/supply equipment (subject to Health and Safety guidelines);
* Provide information for studies on request;
* Promote the scheme via Agency events.

The production of this LEAP, and the summary booklet that goes with it, is one step towards increasing the accessibility of information about the local environment. Many of the projects mentioned in Section 4.2 above have helped/are helping to raise awareness of the issues facing our local environment, however more needs to be done. We all have a role to play in making this happen.

The Agency has produced a wide range of leaflets and educational material and most of this information is free of charge and available from the Customer Services Team at our Area Office. Some of the leaflets produced are listed in Appendix 9 (page 164). Information is also available on the Internet at our web site.

Some useful numbers are listed below:

General Enquiry Line	**0645 333 111**
Upper Severn Area Office	**Tel: 01743 272 828 / Fax: 01743 272 138**
Flood Warning Information Service	**0645 88 11 88**
Internet World Wide Web	**www.environment-agency.gov.uk**
E-mail Messages	**enquiries@environment-agency.gov.uk**
ECOfacts[SM] 'fax back' Service	**0881 88 22 88**
Minicom Service	**01904 692 297**

Information exchange and education is a two way process. Please help us to protect the environment by reporting environmental incidents and emergencies on our:

Emergency Hotline - 0800 80 70 60 open 24 hrs a day

PART II SUPPORTING INFORMATION

Part II This part of the Consultation Report provides the background information to support the draft LEAP. It focuses on the uses, activities, pressures and environmental resources of the area in relation to the work of the Agency.

We welcome any comments on the accuracy and content of this part of the report, but this information will not be repeated in the Action Plan to be produced following consultation.

Part II

* **Section 5 Environmental Overview**
* **Appendices**

Section 5 Environmental Overview

This section provides the background information to support the draft LEAP. It outlines the uses and activities in the area which exert pressure on the environment, and provides information on the state of the local environment. A general description of the nature of the Agency's responsibilities is given in each section, with aims and *objectives from the relevant Functional Action Plans where appropriate*, followed by the local perspective.

National and European legislation impacts on the environment and on the activities of the Agency. Appendix 4 lists the legislation that has the greatest impact.

5.1 Physical Resources

5.1.1 Topography

The catchment is dominated on its western edge by the northern end of the Cambrian mountain range. Drainage from these mountains flows generally eastwards in deeply incised valleys through the rounded hill country that extends over almost 90% of the catchment. Moving eastwards, the hills give way to the Shropshire Plain, which includes areas of extensive flood plain at the confluence of the two principal rivers, the Severn and Vyrnwy, at the foot of the Breidden Hills.

The River Severn rises on the north eastern slopes of Bryn-Cras, one of the peaks of Plynlimon on the western border of Powys, just 25 km from Aberystwyth. It is only 3 km from the source of the River Wye, and 613 metres above sea level. By the time the Severn reaches Llanidloes only 19 km to the east, it has dropped 457 metres. The Severn then flows north-eastwards until it meets the River Vyrnwy, where it turns to follow the Vyrnwy's generally easterly direction. The total length of the River Severn to the point where it is joined by the River Perry on the downstream boundary is 112.4 km.

Overall, the catchment falls from 827 metres above sea level at the top of Moel Sych 55 metres above sea level at the downstream boundary near Montford Bridge, west of Shrewsbury.

5.1.2 Geology

Strata from the Ordovician and Silurian periods, which were deposited between 492 and 405 million years ago, dominate the geology of the plan area. The older Ordovician strata comprise mainly mudstones and shales, with thin interbedded sandstones, conglomerates and limestones. The Silurian period is predominantly represented by mudstones, with subordinate sandstones and limestones.

The bedrock in the north east of the area is the Permian Bridgnorth and Triassic Sherwood Sandstone Formations, a thick sequence of poorly cemented sandstones with interbedded thin marls and conglomerates. These were lain down under warm desert climatic conditions, which existed in Britain from 290 to 230 million years ago.

Separating the Permo - Triassic Sandstones from the Silurian mudstones to the south-west of Oswestry is a relatively small area of strata of Carboniferous age (355 to 290 million years ago), including Carboniferous Limestone, Millstone Grit and Coal Measures.

Overlying much of the Carboniferous and Permo - Triassic strata is a cover of glacial and post-glacial sands, gravel and clays. The superficial deposits in the areas of the Ordovician and Silurian strata are primarily alluvium and river terrace gravels occupying the valleys of the surface watercourses.

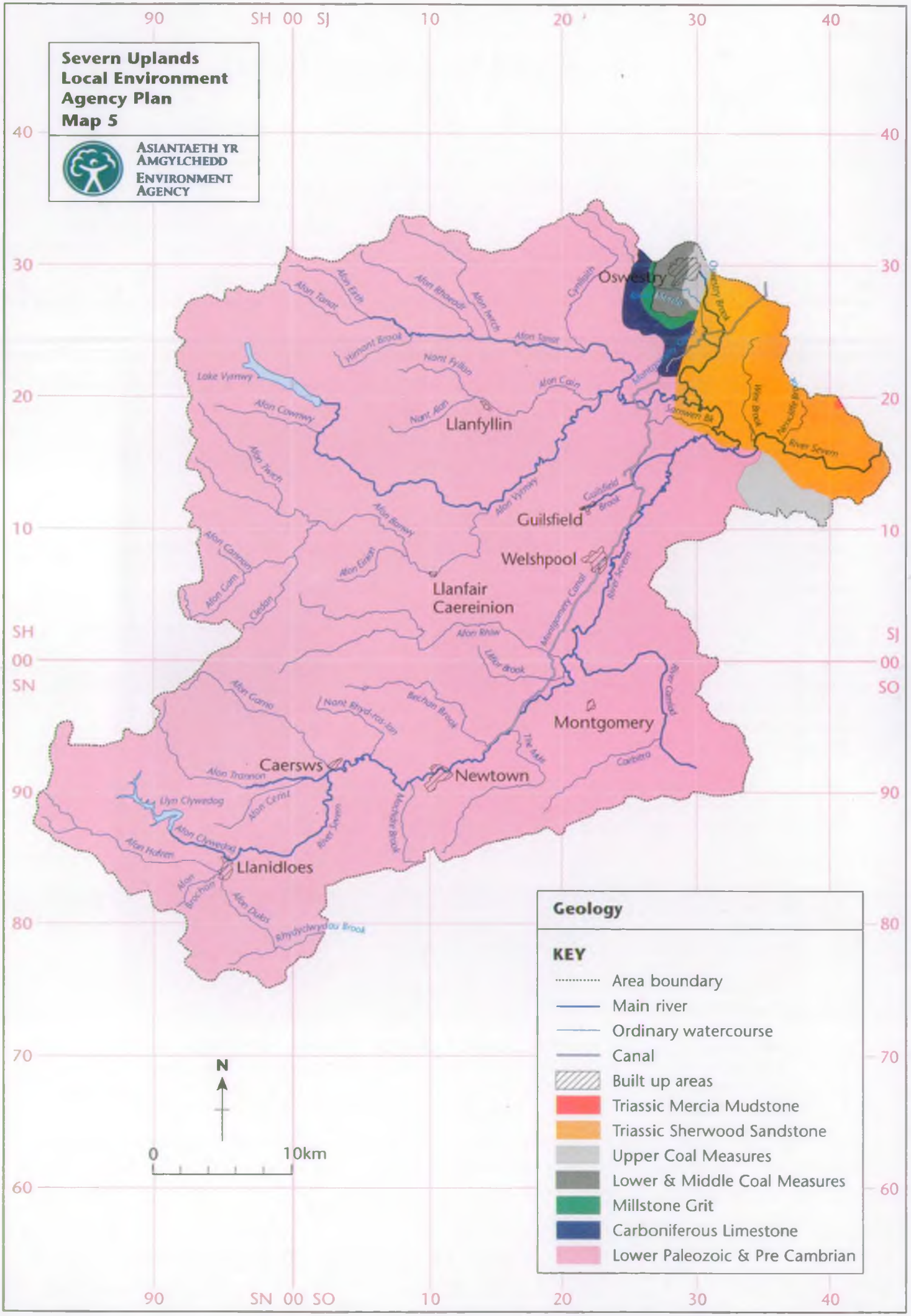
5.1.3 Land Use

The area is predominantly rural, with agriculture being the main land use. Upland pasture accounts for about a third of the plan area. Sheep farming is widespread in the western uplands, and dairy farming predominates in the river valleys. Arable farming (17% of the total area) is mainly concentrated to the north and east of the River Severn and also on lower lying land along the main west-east river valleys.

Forestry constitutes a major land use in the plan area. Approximately 10% of the area is woodland, the majority being coniferous and mainly in the west.

Urban development within the area is characterised mainly by market towns and local administrative centres, such as Welshpool, Newtown, Oswestry and Llanidloes, many with business parks and light industrial estates. These towns and most of the population are located mainly in the eastern and southern parts of the area. There is very little major industry, but there are a number of quarries used mainly for extraction of stone for road construction.

Industrial activity is centred on high-tech business parks and light industrial estates. These are usually found at 'edge of town' greenfield sites such as Buttington Cross Enterprise Park, Offa's Dyke Business Park near Welshpool, and Maes-y-Clawdd Industrial Estate, Oswestry.


Severn Uplands
Local Environment
Agency Plan
Map 5
Asiantaeth yr Amgylchedd
Environment Agency
90
SH 00
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10
20
30
40
SN 00
SO
Oswestry
Llanfyllin
Guilsfield
Welshpool
Llanfair
Caereinion
Montgomery
Caersws
Newtown
Llanidloes
Lake Vyrnwy
Llyn Clywedog
River Severn
Montgomery Canal
N
0
10km
Geology
KEY
Area boundary
Main river
Ordinary watercourse
Canal
Built up areas
Triassic Mercia Mudstone
Triassic Sherwood Sandstone
Upper Coal Measures
Lower & Middle Coal Measures
Millstone Grit
Carboniferous Limestone
Lower Paleozoic & Pre Cambrian

Tourism is another major contributor to employment in the area, but has an inevitable impact on infrastructure and Resources within the Severn Uplands area.

Full details of land use based on statistics from LANDSAT are shown in Table 3 and Map 3.

Table 4 Land Use Classification in the Severn Uplands Area

Legend	Area %	Area (km²)
Arable	16.65	343.7
Grass	12.06	249.02
Upland pasture/rough grass	33.05	682.56
Fallow/Bare Soil	3.29	68.04
Coniferous Woodland	8.46	174.79
Deciduous Woodland	1.35	27.78
Moorland	6.71	138.57
Urban Development	7.81	161.36
Water	0.13	2.72
Peat Bog	<0.01	0.03
Other/Cloud cover	10.49	216.71
	100.00	**2065.28**

(Source: LANDSAT 1990)

Centres of population and industry give rise to waste, which has to be managed. Whilst waste management facilities do not represent a significant land use in terms of the total area they cover in the plan, in terms of potential environmental impact they are very important unless suitably regulated. The more built up urban areas, of Oswestry, Welshpool, Newtown, and Llanidloes, contain the majority of metal recycling sites and waste transfer stations. The only licensed treatment plant in the plan area is Newtown sewage works, which is authorised to treat biodegradable industrial liquid waste, as well as cesspool waste and septic tank sludge.

Most of the waste produced within the plan area is deposited at the Bryn Posteg landfill site near Llanidloes, or *exported outside the area*. This site is the only landfill within the area licensed to accept a mixture of wastes including household and other biodegradable waste. This site also accepts household waste from outside the LEAP area.

5.1.4 Soils

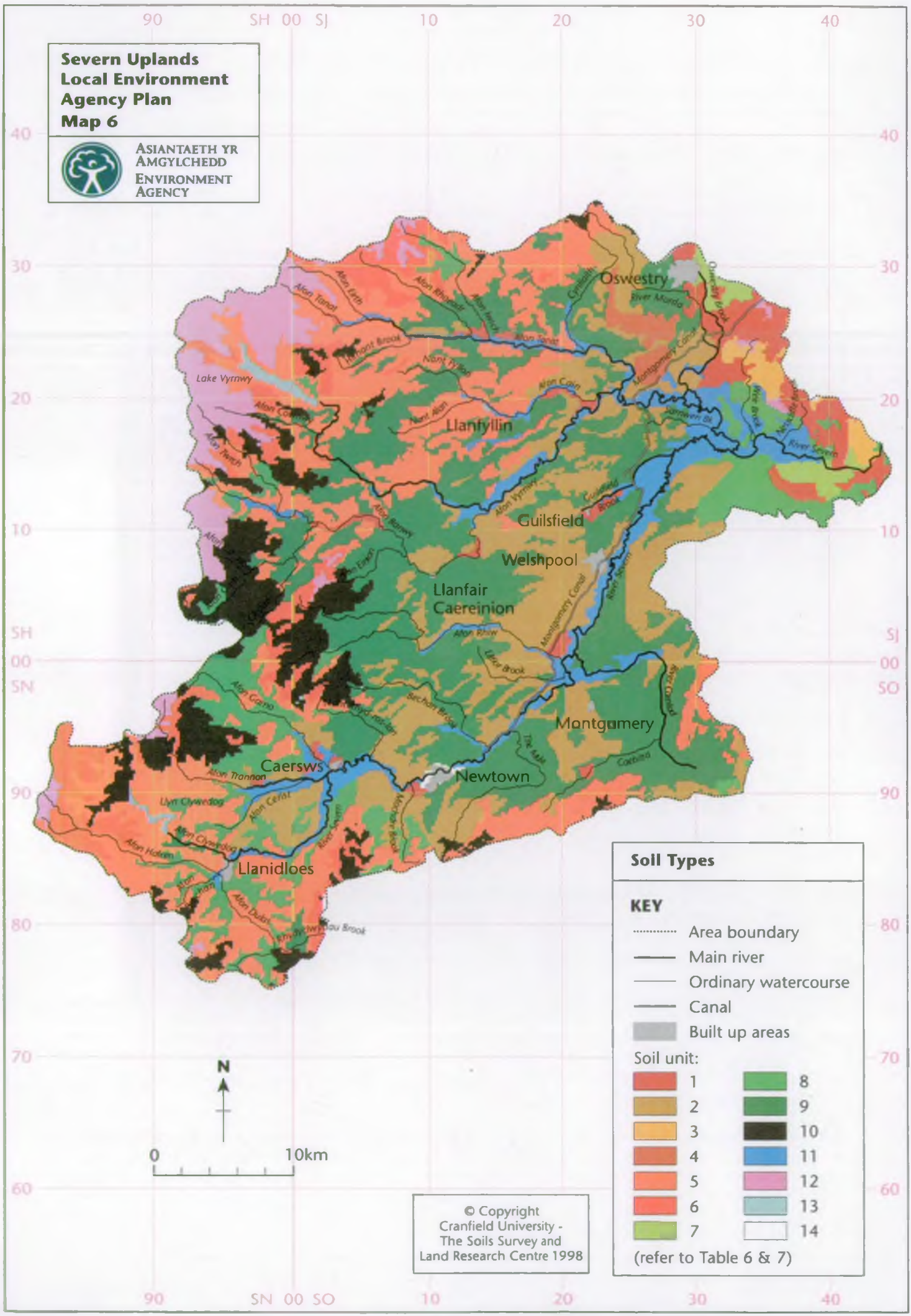
Soils are an essential part of the terrestrial ecosystem. They have a complex structure, consisting of minerals, dead and decaying organic matter, and living organisms. Soils provide a natural habitat for flora and fauna, preserve an archaeological record and have the ability to filter and buffer potential water pollutants. Soils are used for the production of food and timber, and as a source of raw materials, for example, peat.

There is no primary legislation dealing exclusively with the protection of soils. There are many laws containing an element of soils' protection including: the Town and Country Planning Act 1990; the Environmental Protection Act 1990; the Waste Management Licensing Regulations 1994; and the Sludge (Use in Agriculture) Regulations 1989, which aim to ensure that waste management activities are carried out without causing pollution of the environment; and the Environment Act 1995, including section 57, which has provision for the legislation relating to the remediation of contaminated land.

Human activities have a significant impact on soils. New urban areas are being created overall at a rate of 5000 hectares a year, with the potential to permanently remove or bury soil. The pressures we place on soils include agriculture, drainage, extraction, application of wastes, and urban development. These pressures can lead to loss of soil structure; soil erosion, contamination, acidification, and loss of biodiversity.

Severn Uplands Local Environment Agency Plan Map 6

Asiantaeth yr Amgylchedd
Environment Agency



Soil Types

KEY

- Area boundary
- Main river
- Ordinary watercourse
- Canal
- Built up areas

Soil unit:

1		8	
2		9	
3		10	
4		11	
5		12	
6		13	
7		14	

(refer to Table 6 & 7)

In upland regions, steep mineral soils in areas of high rainfall are particularly vulnerable to erosion, particularly without the protective cover of vegetation. Pressures on upland soils include grazing and trampling by livestock, drainage, forestry and recreation. Acidification (see Issue 9) is a natural process which takes place in all soils but has been increased by human activities. Acid deposition from the atmosphere occurs as a result of industrial emissions and transport. In acidified soils, metals become more readily available to plants and grazing animals. Water draining from acid soils may contain potentially toxic metals, which can harm plant and animal life in rivers and lakes.

The soils of the Severn Uplands catchment area are developed to depths from less than 0.4 to 1.2 m in a variety of hard and soft geological substrates. For the purpose of catchment management, soils may be characterised by their texture, drainage status and permeability. Map 6 shows the distribution of the main soil units (see Glossary) in the catchment and is based on the National Soil Map of England and Wales. Each unit comprises a dominant soil type (soil series) together with a range of associated soils having, in most cases, similar characteristics to the dominant soil. Table 5 describes the principle properties of the dominant soil in each unit. Some of the soil units are found across the catchment and therefore they cover a wide range of climate (rainfall and temperature), consequently Table 5 is based on an average for these units.

The most marked relief feature in the catchment is the valley of the River Severn and its tributaries, which flow in well-defined valleys flanked by a prominent floodplain from Llanidloes towards Shrewsbury. The west of the catchment is dominated by the mass of Pumlumon and Berwyns and is marked by the forests of Hafren and Aberhirnant and Dyfnant. The contrast between upland and lowland, forested, pasture, and cultivated land is reflected in the soils.

Moderately deep well drained loamy soil are developed on the shales and sandstones that typify most of the catchment with unit 2 in the lowlands (below approximately 200m) and unit 5 above 200m. Sloping land in the uncultivated uplands is associated with unit 6 where thin organic topsoil has developed. Basin and flush sites are underlain by unit 10 with deep peat (unit 12) on the plateaux tops. The river valleys are marked by alluvial soils of varying texture and drainage class (unit 11), often with very local variability. Bounding the alluvium are terraces with unit 1.

Downstream from Welshpool are more sandy well-drained soils of unit 3. Away from the river, unit 4 of deep loamy soils overlies outcrops of soft sandstone and shale. Wetter soils in the catchment can be divided into those with sandstone and shale above 80cm depth (unit 8) and those over thicker deposits derived from grey rocks (unit 9) and reddish rocks (unit 7).

Table 5 - Characteristics of Soil Units

Soil Unit (Area)	Description	Depth to impermeable layer	Depth to hard rock	Wetness Class	Water storage capacity	Likelihood of land drains	Rapid soil water flow mechanisms
1 (3.6%, .75mm)	Permeable course loamy, stony and very stony soils. Locally some similar soils affected by groundwater.	>1m	>1m (gravel at <0.8m)	I	Medium	Low	Micropore flow dominant, some fissure flow.
2 (16.6%, 337km²)	Permeable slightly stony, medium loamy and silty soils over rock or rubble. Some shallow soils locally.	>1m	<0.8m	I	Medium	Low	Fissure flow dominant. Micropore flow in upper layers
3 (1.0%, 19km²)	Permeable sandy and course loam soils over drift or soft sandstone deposits. Some soils affected by groundwater locally.	>1m	>1m	I	High	Low	Micropore flow dominant
4 (1.0%, 19km²)	Permeable medium silty soils over shale and siltstone. Some similar slowly permeable soils and light loamy soils over sandstone.	>1m	>1m	II	Medium	Low	Micropore flow dominant
5 (20.0%, 422km²)	Permeable slightly stony loamy soil on rock,. Some shallow.	>1m	<0.8m	I	Medium to High	Low	Fissure flow dominant with micropore flow in upper layers
6 (5.0%, 103km²)	Permeable loamy soils with wet peaty surface layers. Some deep peat on high ground. Rock and scree locally	>1m	<0.8m	IV	Low	Low	Micropore flow dominant
7 (1%, 20km²)	Deep slowly permeable seasonally waterlogged loamy soils in reddish drift. Some similar soils with only slight waterlogging	<0.4m	>1m	III - IV	Low	Medium to High	Micropore flow with some fissure flow to drains
8 (7.5%, 156km²)	Deep slowly permeable seasonally waterlogged and slightly stony medium silty and medium silty over clayey soils with similar soils on rock. Some soils with slight seasonal waterlogging.	<0.4m	<0.8m	III -IV	Low	Medium to High	Micropore flow dominant with some fissure flow
9 (25.5%, 527km3)	Slowly permeable seasonally waterlogged loamy and loamy over clayey soils with slight waterlogging. Locally soils with peaty tops.	<0.4m	>1m	IV	Low	Medium to High	Micropore flow dominant
10 (6.7%, 138km²)	Slowly permeable seasonally waterlogged medium loamy and medium loamy over clay acid upland soils with peaty surface layer.	<0.4m	>1m	V	Low	Low	Micropore flow dominant
11 (6.5%, 135km²)	Deep stoneless medium silty and clayey alluvial soils variably affected by groundwater. Risk of flooding.	>1m	>1m	I - IV	Low	Medium to Low	Micropore and fissure flow to groundwater table
12 (5.2%, 107km²)	Deep, perennially wet acid peat soils. Some shallow peat soils on rock locally.	>1m	>1m	V - VI	Low	Low	Micropore and fissure flow
13 and 14 (0.5%, 10km²)	Unsurveyed areas and lakes.						

An impermeable layer is defined as a layer with saturated conductivity of less than 10cm/day

Water storage capacity is a measure of the volume of course pore space to 1m that is air-filled in moist soil during the winter period, and is available for short-term storage of rainwater before that water percolates or flows laterally.

Wetness class range from I to VI and is based on the duration of water saturation within 0.4 and 0.7m depth in an average year.

Wetness class	Days wet within 0.4m	Days wet within 0.7m
I	-	<30
II	-	30 - 90
III	-	90 - 180
IV	< 180	> 180
V	180 > 335	> 335
VI	>335	-

Rapid soil water flow mechanisms by which surface water flows rapidly down cracks and channels through the soil to underlying layers are significant in the contamination of rivers and shallow groundwater. Substances applied to the land surface can be transported to rivers within minutes during heavy rain when such pathways are active. Where soils are waterlogged and cannot accept further rainfall excess water moves across the surface carrying suspended particles to ditches and rivers. This can cause problems of eutrophication and is exacerbated by stock disturbing and muddying the soil surface.

More information on the soils of the catchment is given in the Soil Survey and Land Research centre's National Soil map for Wales (1:250,000 scale) and in the associated Regional Bulletin, *"Soils and their use in Wales."*

The influence of soils on water resources

River flows and the quality of both ground and surface waters are strongly influenced by soil. Soils within the Severn Uplands area exhibit a range of hydrology.

For the rivers, predicted ranges for base flow index and standard percentage run-off associated with each soil type is given in Table 5. Stream response to rainfall will be most marked in areas dominated by unit 6, 10 and 12 where low water storage capacity, subsoil permeability and perennial wetness (unit 12) inhibit vertical percolation and lead to the lateral movement of soil water either across the surface or within the soil. If in agricultural use, these soils may contain land drains to remove water from upper layers and enhance lateral flow. The figures for standard percentage run-off (SPR) are an indication of the average proportion of rainwater that should reach a river within the days following significant rainfall (10mm in 24hrs).

In units 1, 2, and 3 infiltration rates are naturally good although, where cultivated, soil compaction and surface crusting can lead to artificially high rates of run-off from arable fields under autumn cultivation. Where rainfall exceeds infiltration, as is likely to occur regularly in units 6, 7, 8, 9, 10 and 12, soil erosion can occur, leading to enhanced river sediment loads which can be exacerbated by stock muddying the soil surface. Run-off water and drain flow from arable and grass fields can contain suspended soil particles and dissolved nutrients and agrochemicals. Changes in land use and management can increase or decrease the risk of erosion caused by agriculture and recreation with different soils reacting to different degrees.

Table 6 Land Characteristics associated with the Soil Units

Soil Unit (extent)	Stream parameters BFI	SPR	Nitrate leaching risk class	Soil erosion risk (risk of sediment loading and phosphorous transfer)	Risk of acidification	Soakaways and effluent infiltration fields - main limitations	Wetland habitat potential
1	0.9	14.5%	High (to local watertable)	Moderate	3	Good permeability but groundwater contamination possible locally	Low. Local potential where groundwater is a shallow depth
2	0.61	29.2%	High (to massive rock)	Moderate, locally high on steep slopes	3	Good permeability but soil depth restricted by rock	None
3	0.90	14.5%	Extreme to High	Moderate	4	Good permeability, no problems for well designed systems	None
4	0.52	47.2%	High to moderate	Moderate, locally high on steep slopes.	3	Good permeability , no problems for well designed systems	None
5	0.61	29.2%	High (to massive rock)	Moderate. High on steep slopes	4	Good permeability but soil depth restricted by rock	None
6	0.38	48.4%	Low	Moderate to high. High where stock density is high and from around feeders and gateways are not muddied	4	Permeable soils but winter and early spring waterlogging a problem	Moderate to high
7	0.31	39.7%	Low	High but moderate in the extreme east if stock density is not high and feeders and gateways are not muddied	3	Waterlogging in winter and early spring a problem. Locally some soils with less restrictions	High
8	0.31	39.7%	Low	High but moderate in the extreme east if stock density is not high and feeders and gateways are not muddied	2	Waterlogging in winter and early spring a problem. Locally some soils with less restrictions	High
9	0.31	39.7%		High	2	Waterlogging in winter and early spring a problem. locally some soils with less restrictions	High
10	0.24	58.7%	Low	High	4	Long periods of waterlogging a problem	High
11	0.73	25.3%	Moderate	Moderate	2/3	Good to moderate permeability Inundation in winter is a problem, summer percolation tests may mislead. Likely shallow groundwater contamination	High but may be moderate to low in places
12	0.23	60%	Low	Moderate but may be high along footpaths and sheep tracks	6	Very long periods of waterlogging a problem	High

Base flow index (BFI) is a measure of the 'flashiness' of a river. A BFI of 1 indicates that the river has no storm flow at any time while a BFI of 0.1 implies the river responds rapidly and significantly to rainfall events.

The **Standard Percentage Run-off** (SPR) of land indicates the average percentage of rainwater that runs off land to enter the river after an individual significant rainstorm.

Risk of Acidification is based on the ability for long term buffering. This is a function of soil mineralogy through cation exchange release as a result of weathering. The higher the acidification classes number (between 1 and 6) the lower the buffering capacity of the soil profile.

Table 6 also gives guidance on the likely principal water management concerns with regard to the disposal to land of organic wastes, and the installation of forms of soakaway or effluent infiltration fields. Those factors described in the table should be addressed when considering such activities. Detailed site investigations of the land and soil conditions are always advisable.

5.1.5 Hydrology

Annual rainfall varies from over 2500mm per annum along parts of the main divide from Plynlimon to the Berwyns, to only 660mm per annum at the lowest point of the catchment just to the west of Shrewsbury. The variation is not evenly distributed, however, with most of the Vale of Powys receiving less than 1000mm per annum. Map 15 (page 121) shows the distribution of rainfall.

Rainfall increases rapidly with height to the west of the Vale of Powys and, as altitude increases, exhibits a marked winter maximum. This is caused by the strong, moist south west airstreams in the winter being uplifted over the mountains to create plentiful 'orographic' rainfall.

The available *effective* rainfall, after allowing for evaporation losses and transpiration, varies from around 1500mm along the western ridge to less than 200mm in the lowlands.

River flows in winter reflect the rainfall distribution, with frequent flooding occurring from the numerous mountain streams as water accumulates in the flatter vales and around the Severn-Vyrnwy confluence. Summer flows are unreliable from the mountain streams, but progressively increase in reliability downstream of valley gravels and, particularly, downstream of sandstone groundwater storage. Artificial augmentation of river flows is practised in the rivers Severn and Vyrnwy.

The Permo-Triassic Sandstones are the primary aquifer in the catchment, but they are limited in extent to a small area in the north east of the catchment (see Map 5). The sandstones are highly permeable and able to sustain high and reliable yields. The groundwater is utilised for Public Water Supply, agricultural purposes and for flow augmentation of the River Severn via the Shropshire Groundwater Scheme. Groundwater from the sandstone also provides natural baseflow to support rivers and streams during dry periods.

Among the Ordovician, Silurian and Carboniferous strata, groundwater occurs in the more permeable, highly weathered and fractured rocks. Private abstractors primarily for domestic and small agricultural supplies use it. The mudstones and shales provide negligible quantities of groundwater.

The sand and gravel horizons in the superficial deposits are thin and variable in composition. Water can flow through them easily so that they can be important in supplying local needs, as well as providing baseflow to rivers and streams and sustaining wetlands and marsh areas along the valley margins.

Surface water streams from the mountains are steep and flashy. They locally benefit from undrained upland peat hags (known locally as "ffridd") which are the main natural sources of upland surface water in the mountains during severe droughts.

Streams and canals are used widely for cattle watering and wet fencing, and also for private domestic water supplies for farmsteads. The main lowland rivers, Severn and Vyrnwy, are slow moving in summer and provide abundant riparian meadows along their extensive flood plains.

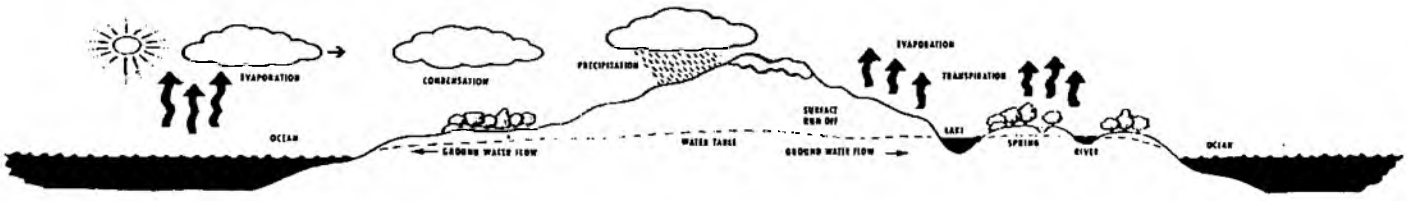
Some of the larger upland rivers, such as the Banwy and Rhiw, have mobile gravel beds, below, which the river level may fall during severe summer droughts.

Table 7 Long-term average flows

Name of watercourse	Flow under dry weather conditions (megalitres per day)	Average daily flow (megalitres per day)
River Severn (Montford)	446	3656.9
Afon Vyrnwy (Llanymynech)	182.6	1795.1

A simplified version of the 'hydrological cycle' is shown below in Figure 4. Superimposed on the natural flow regime of the river are the artificial influences of abstractions and discharges.

Figure 4 The Hydrological Cycle



Since the late 1980s the UK has experienced drier weather conditions, in the Severn Uplands area the previous three years have been slightly drier than average.

The Department of Environment, Transport and Regions (DETR) Climatic Change Impacts Review Group (CCIRG) has identified the climatic change implications to be considered by the Environment Agency. The evidence suggests that winters will be wetter/stormier and the summers warmer and dryer, especially in the south. There is also expected to be an increase in summer water demand. The Environment Agency will consider the implication of climatic change in the formulation of policy and in the delivery of its duties.

5.2 Development

General

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

The Agency is a statutory consultee under planning legislation and advises Local Authorities on development proposals that can have an impact on matters relevant to the Agency. To facilitate this process the Agency has published *Liaison with Local Planning Authorities* (March 1997). To provide a guide to LPAs on what policies should be included in Development Plans and why they are important, an annex to the above mentioned document *The Environment Agency and Development Plans* is due to be published.

The Agency operates at all levels of the planning system:
At the national level there is direct liaison with the Department of the Environment and Local Authority Associations, seeking to influence Planning Policy Guidance Notes (PPGs), Circulars and new legislation.

At the regional level there is liaison with government offices and regional steering groups with the aim of influencing Regional Planning Guidance.

At the local level we are statutory consultees for draft Structure and Local Plans, Minerals and Waste Plans to ensure our interests are protected and that development proposals have positive, sustainable, impacts on the environment. We also seek to pursue our aims and policies regarding development through the planning consultation process for individual proposals. Although the final decision on the planning matters rests with the LPA, government guidelines advise on the need to consider the Agency's concerns when determining proposals.

Local Perspective

Almost 86% of the LEAP area is within Wales, wherein Powys County Council is the predominant Unitary Authority. Shropshire County Council and the associated Borough/District Councils care for the remaining area within England. Map 1 (inside cover) shows the administrative boundaries and main infrastructure within the LEAP area.

The Powys Structure Plan (Replacement) February 1996 recognises a need for growth, and identifies a requirement for more than 4,860 dwellings to be built in Montgomeryshire between 1991-2006. The great majority of these will be within the area of the catchment. The main growth areas will be the towns of Newtown and Welshpool. In Shropshire, the County Structure Plan designates Oswestry as a strategic growth centre. An average growth in the catchment of over 500 houses per annum is estimated from proposals contained in the Development Plans.

The present status of Development Plans covering the catchment is shown in Table 8.

Powys, having no large towns or cities, has a rural based economy with a large portion of the landbase put to agricultural use. This is reflected in agriculture accounting for over half the businesses and the large proportion of small businesses. Employment is provided mainly in the manufacturing, agricultural, retail, distribution and repair, health and social work and public sectors with less than the national average employed in the financial and business services, construction and transport and communication sectors. The rural area of the catchment in Shropshire exhibits similar trends.

Initiatives for large-scale employment have centred on high-tech business parks and light industrial estates. These are usually found at 'edge of town' greenfield sites e.g. Buttington Cross Enterprise Park and Offa's Dyke Business Park near Welshpool, and Maes-y-Clawdd Industrial Estate, Oswestry. Montgomeryshire Local Plan (deposit draft) has identified further needs for new prestige sites and expansion of existing sites, and also for smaller scale sites in selected villages and rural workshop developments. The current planning permission for a large integrated meat processing facility on a greenfield site near Llandrinio has yet to be taken implemented, although the site has generated considerable interest. It is important that adequate drainage infrastructure can be provided for both new and expanded sites, such that there is no detriment to the environment.

Tourism has been identified as a major contribution to future employment in Mid Wales, and the Wales Tourist Board launched its strategy, Tourism 2000, in 1994. This is likely to lead to increased demands for recreation, leisure and accommodation facilities (caravan parks, hotels etc.) in the area, all of which may impact on the environment. Tourism 2000 identifies policies in relation to water quality and the environment.

Recent road schemes and improvements have made the area more accessible to the West Midlands, Merseyside and Greater Manchester by road transport. Further major road schemes that are being considered in the area include the A458 Welshpool-English Border scheme, A5 Nesscliffe Bypass and Newtown Bypass.

The Montgomeryshire Airport, near Welshpool, is identified by the local planning authority as having a role in attracting business growth to the area and is considered by the Welsh Office and Local Planning Authority as suitable for expansion. This raises considerable floodplain issues.

Around 95% of the area (including that part within Wales and the Marches Area of Shropshire) currently benefit from designation by the European Commission as eligible for Objective 5b assistance. This enables bids for EC resources to assist projects that promote development and address problems facing the rural economy. Marches bids are targeting economic and business development and diversification, tourism, farm-related development, local communities and the environment. An objective of the programme is to ensure all measures assisted respect the principles of sustainable development.

Table 8 Population and current Development Plan status in the Severn Uplands area

Local Planning Authority	%age of Plan Area	Population in Plan Area 1991	Development Plan and Current Status
Powys County Council	**84.9%**	**49260**	Powys County Structure Plan (Replacement) 1991-2006 -Adopted February 1996. Minerals Local Plan - Adopted March 1995. (For ex Clwyd/Glyndwr area see Montgomeryshire below)
-Montgomeryshire Area	84.0%	49170	Montgomeryshire Local Plan (including waste policies) - Deposit draft October 1995. Public Inquiry September 1996 - proposed modifications, following Inspector's report, June 1997. Adoption awaiting Secretary of State decision. **- ex Clwyd/ Glyndwr Area** Clwyd County Council Structure Plan (1986 -2006). Amended Deposit Glyndwr District Local Plan - adopted February 1994. Strategic Interim Planning Guidance and propsosed 'Interim Planning Planing Policies' for the Communities of Llangedwyn, Llanrhaeadr Ym Mochnat Mochnant and Llansilin – Deposit Drafts June 1997
-Radnorshire Area	0.9%	90	Radnorshire Local Plan, Deposit Draft April 1997 - proposed changes December 1997. Public Inquiry March 1998. Modifications following Inspector's Report due October 1998.
Shropshire County Council	**14.5%**	**25520**	Shropshire County Structure Plan 1989 - 2006 - operative January 1993. Structure Plan Review 1996-2011 Consultation -Options and Directions- April 1997, Deposit Draft due Spring 1999. Shropshire Minerals Local Plan - Deposit Draft April 1996. Public Inquiry June 1997, Inspector's Report January 1998. Shropshire Waste Local Plan - Consultation Draft in preparation
Oswestry Borough Council	7.4%	21790	Oswestry Rural Area Local Plan - adopted 1991. Oswestry Borough Local Plan (District Wide) - Deposit Draft May 1996. Public Inquiry April 1997, Inspector's report April 1998.
Shrewsbury & Atcham Borough Council	4.1%	2810	Shrewsbury & Atcham Rural Area Local Plan - adopted June 1992. Shrewsbury Urban Area Local Plan - adopted 1985. Shrewsbury & Atcham Local Plan (District Wide) - Deposit Draft November 1997. Public Inquiry due January 1999.
South Shropshire District Council	3.0%	920	South Shropshire Local Plan - Adopted October 1994. Proposed Alterations 1996-2006 - Deposit Draft July 1998. Public inquiry due Summer 1999.
Wrexham County Borough	**0.2%**	**20**	Clwyd County Council Structure Plan (1986-2006) Amended Deposit Draft January 1996. Glyndwr District Local Plan-adopted February 1994. Work commenced on unitary plan, Consultation Draft Autumn 1998.
Ceredigion County Council	**<0.1%**	**ns**	Dyfed County Structure Plan - Alteration No.1 adopted October 1989. Ceredigion District Local Plan Deposit Draft January 1998. Public inquiry due July 1999.
Snowdonia National Park (Gwynedd Council)	**0.4%**	**ns**	Gwynedd County Structure Plan (1991-2006) - adopted October 1993. Eryri Local Plan - Deposit Draft September 1997, Public Inquiry July 1998. Inspector's Report due early 1999.

5.3 Transport

General

Transport exerts pressure on the environment in many ways, particularly road transport, which accounts for over 90% of passenger travel within the UK, and over 80% of the freight moved in tonnes. Vehicles emit a variety of gases, particulate materials and other substances into the atmosphere. Road construction places pressure on the countryside. Traffic noise is a major nuisance in some areas. None of these is the direct responsibility of the Agency, but it is important for the Agency to have an overall understanding of the different sources and relative quantities of different chemicals in the environment in order for it to derive an overall opinion on the general state of pollution.

Air pollution in the UK has traditionally been associated with industrial activity and the domestic burning of coal. However, industrial emissions are declining and transport pollution is emerging as the key issue. In recent decades traffic emissions have grown to match or exceed other sources of many of the important pollutants. In many areas, particularly urban, they have now become the largest cause of air pollution. This is due to the large increase in road traffic over the period. The table below summarises the contribution that road transport makes to UK pollutant emissions.

Table 9 Emissions from Road Transport

Pollutant	1995 Total Emissions (kilotonnes)	1995 Emissions from Road Transport (kilotonnes)	% of National Emissions from Road Transport
Benzene	34.840	23.440	67
1,3 Butadiene	9.570	9.490	78
Carbon monoxide	5478	4112	75
Lead	1.492	1.068	72
Nitrogen oxides (NO_x)	2293	1062	46
Particulates (PM_{10})	232	59	25
Sulphur dioxide	2365	51	2
Volatile organic carbons	2257	690	31

Source: National Air Quality Strategy, March 1997

Poor air quality from traffic can affect human health by increasing the risk of cancer and causing respiratory problems. All motor vehicles produce carbon dioxide, a major cause of global warming. Such pollution can also contribute to acid rain production.

The government has set out a strategy for achieving reductions in air pollution from road transport by tackling vehicle and fuel technology, better emission controls on existing vehicles, development of environmental responsibilities by fleet operators and the public and changes to planning and transport policies to reduce the need to travel and rely on the car.

The Environment Agency has no direct role to play in monitoring or controlling pollution from road traffic. Monitoring for air quality is primarily the responsibility of Local Authorities. The Agency will, however, ensure that its own transport policies are in line with the government's approach.

Local Perspective

In line with trends elsewhere in the UK road traffic levels are increasing in the Severn Uplands LEAP area.

There are no motorways within the plan area, the nearest ones being the M54 at Telford and the M53 and M56 north of Chester, linking the area with the West Midlands and Merseyside and Greater Manchester respectively. A network of trunk and minor roads serves the plan area itself. This road network has improved slightly in recent years, but some areas remain remote.

Recent road schemes and improvements (including the A5 Shrewsbury bypass linking with the M54/M6) have made the area more accessible to the West Midlands, Merseyside and Greater Manchester. Strategic road links tend to be either east-west (A458, A470), or north-south (A483). Several road schemes, improvements and bypasses have been completed in recent years, including the Welshpool Relief Road. Refer to Section 5.2, page 85, for major road schemes that are being considered.

Public transport is relatively limited in the plan area; therefore car ownership rates are high, although, the reliance of rural communities on private car use needs to be recognised. The rail route from Shrewsbury to Aberystwyth serves Welshpool, Newtown and Caersws. Access to the Chester and Birmingham line is available at Gobowen, just outside the area, near Oswestry. A disused minerals branch from Gobowen to Llynclys passes through Oswestry.

Montgomeryshire Airport, near Welshpool, is licensed for small and medium sized aircraft and is allowing for improved communications with the rest of the UK and Europe.

The Environment Agency has set targets to improve overall fuel efficiency for fleet vehicles and for all staff to reduce mileage on Agency business. At the local Agency office car sharing for work purposes e.g. meetings and between offices is practised wherever possible.

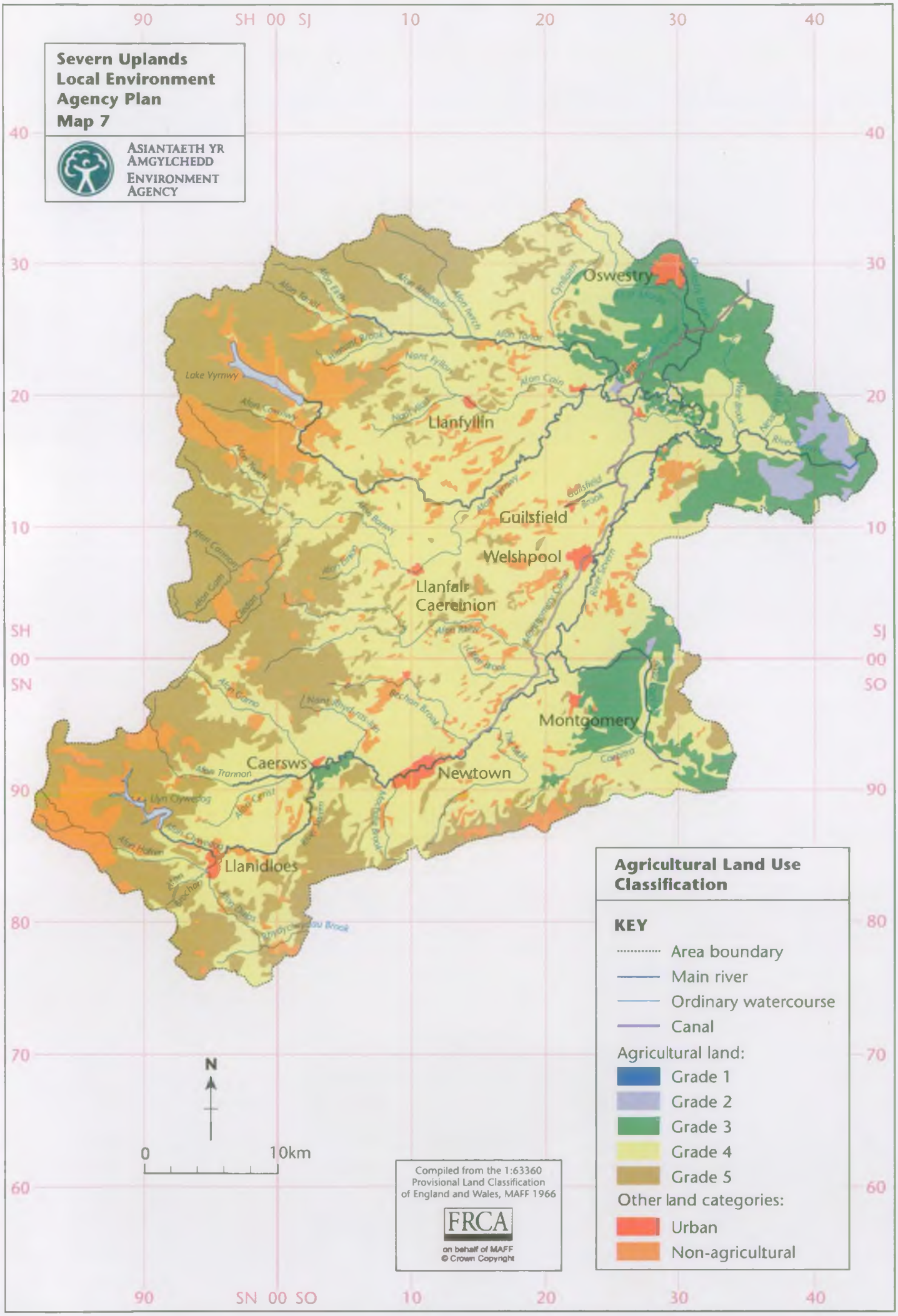
5.4 Agriculture

General

During recent decades agricultural practices in the United Kingdom have changed markedly in comparison with the early and middle parts of the century. New technologies and greater consumer demand has lead to the industry becoming increasingly mechanised and intensified which in turn has resulted in increasing pressures on the environment.

In the dairy industry traditional cattle housing has given way to cubicle housing, producing animal slurry, while silage, with its highly polluting liquor, has replaced hay as the major cattle fodder. Both cattle slurry and silage effluent is spread on the land to replenish nutrients and fertilise the next season's crop. For arable crops winter varieties have replaced spring cereals, and traditional pest control methods have been succeeded by the widespread use of pesticides and herbicides, presenting new risks to the environment. Agricultural land improvement schemes carried out in the 1970s and 1980s in upland areas mainly on beef and sheep farms has permitted increased stocking rates and productivity. This has maintained both employment and profitability on these farms, but there has been an impact on the landscape, and land drainage schemes have altered the drainage characteristics of the land.

Given the above, and the fact that over 80% of the land in England and Wales is used for agriculture, it is of little surprise that the industry can have a major impact on the environment. However, increased environmental awareness, both by government bodies and the farming community, has led to better pollution prevention practices and to significant improvements in river quality in many areas.


Severn Uplands
Local Environment
Agency Plan
Map 7
Asiantaeth yr Amgylchedd
Environment Agency
Oswestry
Llanfyllin
Guilsfield
Welshpool
Llanfair
Caereinion
Montgomery
Newtown
Caersws
Llanidloes
Lake Vyrnwy
Agricultural Land Use Classification
KEY
Area boundary
Main river
Ordinary watercourse
Canal
Agricultural land:
Grade 1
Grade 2
Grade 3
Grade 4
Grade 5
Other land categories:
Urban
Non-agricultural
N
0
10km
Compiled from the 1:63360 Provisional Land Classification of England and Wales, MAFF 1966
FRCA
on behalf of MAFF
© Crown Copyright

Legislation, grants and the increased availability of specialist advice have all been important factors in reducing the impact of farming on the environment and the Environment Agency, in conjunction with MAFF, will continue to play a central role in this process. Examples of the work of the Agency include:

* Responsibility for enforcing the Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) Regulations 1991, which set down minimum standards for the design and construction of agricultural storage systems.

* Regulating the abstraction of water for agricultural use.

* Carrying out a programme of farm visits both to identify sources of pollution and to offer advice to farmers, and work closely with farming groups and organisations.

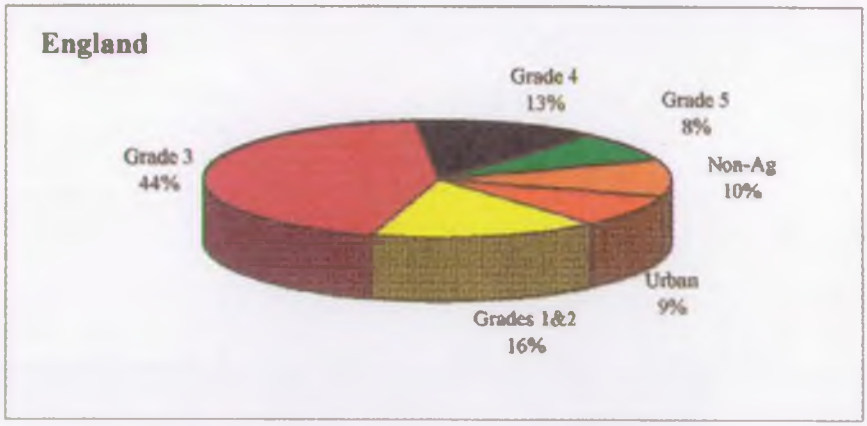
* Promotion of initiatives such as MAFF's Codes of Good Agricultural Practice for the Protection of Water, Soil and Air and also Farm Waste Management Plans.

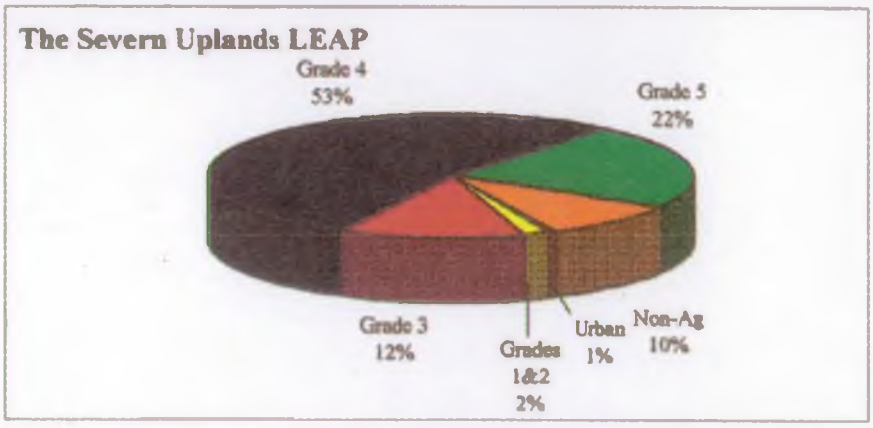
MAFF/WOAD themselves have various incentive schemes to encourage environmental improvement, for example, the Countryside Stewardship Scheme, Habitat Scheme, Countryside Access and Farm Woodland Premium.

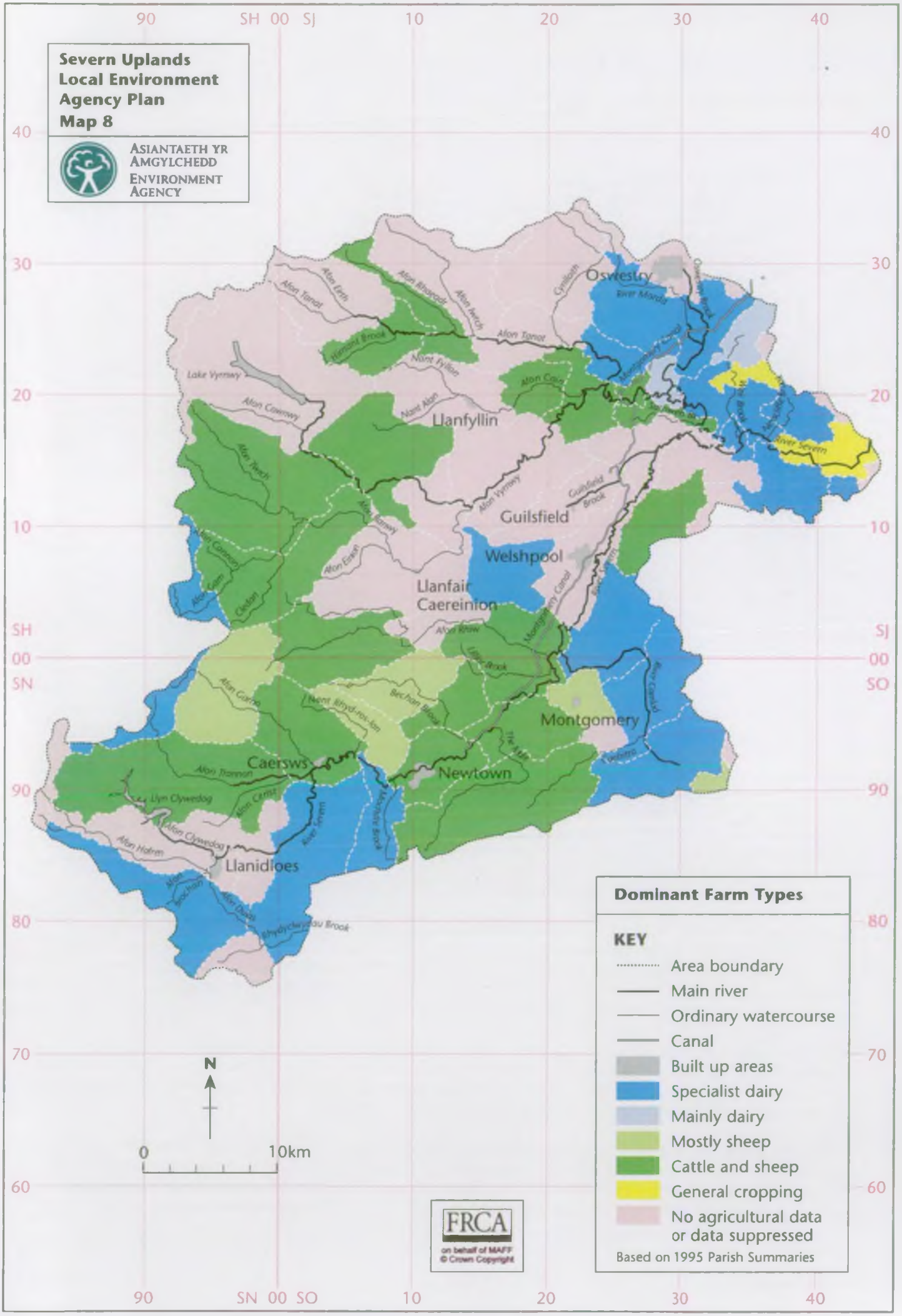
Local perspective

Large parts of the Severn LEAP area are rural in nature and upland agriculture forms the major economic base. The area receives higher than average rainfall and has a climate favourable to grass production. Much of the land in the catchment is low to moderate quality and supports predominantly livestock rearing enterprises. The Agricultural Land Classification map (Map 7) shows the MAFF Agricultural Land Classification (ALC) for the area. Over 75% of the agricultural land are ALC Grade 4 and 5, and is dependent mainly on sheep farming with virtually no agricultural alternative.

Figure 5 Agricultural Land Use Classification (1986-1996)






Severn Uplands
Local Environment
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Map 8
Asiantaeth yr Amgylchedd
Environment Agency
Oswestry
Llanfyllin
Guilsfield
Welshpool
Llanfair
Caereinion
Montgomery
Newtown
Caersws
Llanidloes
N
0
10km
FRCA
on behalf of MAFF
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Dominant Farm Types
KEY
Area boundary
Main river
Ordinary watercourse
Canal
Built up areas
Specialist dairy
Mainly dairy
Mostly sheep
Cattle and sheep
General cropping
No agricultural data
or data suppressed
Based on 1995 Parish Summaries

Table 10 Holdings by EC Farm Type (MAFF data 1996)

Dairy	466
Cattle & Sheep (LFA)	1,581
Cattle & Sheep (Lowland)	268
Pigs & Poultry	43
Cereals	36
General Cropping	32
Horticulture	24
Mixed	82
Others (Part-time)	348
Total	2,880

The total number of holdings in the Severn LEAP area has shown a steady decrease since 1986, when the total was 3,077 holdings. During this period agricultural holdings have decreased by 6.4% to 2,880, a trend which is likely to continue, as a result of changed marketing conditions, severe pressures on farm incomes at the present time, and future reform of the Common Agricultural Policy (CAP). Dominant farm types by parish in the Severn Uplands area are shown in Map 8.

Cattle and sheep in the MAFF Less Favoured AREA (LFA) represent the single largest section of the industry within the Severn Uplands area, although MAFF data shows a decline of 6.6% in the number of cattle and sheep (LFA) holdings between 1986 and 1996. Many of these farms rely on CAP subsidies and agri -environment payments, to support their income. During the period 1986 to 1996, beef cattle herd numbers have risen by over 29% to 32,861. Overall total cattle numbers i.e. dairy, beef, breeding herd, calves etc. have remained steady at around 170,000 head. Dairy farms in the hills are declining and most dairy farms are now concentrated in the river valleys and especially in the east and north east of the area.

While total cattle numbers in the area have remained steady in recent years, other sections of the livestock industry have expanded. The total number of sheep and lambs farmed has risen by almost 12% between 1986 and 1996 to a total of 1,417,254. Dipping of sheep to control fly strike and sheep scab is a requirement on both animal welfare and health grounds. The use of organophosphate (OP) sheep dips has declined due to concerns over risks to human health, coupled with the need to obtain a certificate of competence before being able to purchase these dips. This has led to an increase in the use of synthetic pyrethroid (SP) sheep dips that are believed to be safer for humans but more toxic to aquatic invertebrate life. The dangers of pollution from sheep dips are becoming better recognised by sheep farmers, but there are constraints on safe disposal of sheep dips in the uplands that must be addressed, such as impermeable soils, high rainfall, sloping land and the impracticality of tankering off remote hill farms to licensed disposal sites.

The pig section of the industry has declined significantly by 39% from 1986-1996 to a total of 9,765 pigs.

Crop production, concentrated in the river valleys and especially in the east and north east of the area, has decreased slightly during the period 1986-1996, and now represents nearly 8% of the total agricultural land use in the area, with 13,543 ha devoted to this section of the industry. Cereal production accounts for 10,322 ha of the land in crop production, and wheat and barley predominant. Other crops are grown on 3,221 ha and include potatoes, sugar beet, and maize but this represents less than 2% of the land use in the area.

The production of crops or high stocking levels of cattle or sheep in the catchment of a river used to supply large amounts of drinking water could potentially cause water quality problems. The Agency monitors the River Severn and its tributaries regularly for the presence of herbicides and pesticides used in crop and livestock production and maintain regular contact with farming groups to advise on pollution prevention matters.

In the 1980s many of the streams and rivers draining land dedicated to intensive dairy and beef production were affected by discharges of organic wastes from farms. Work carried out by the former National Rivers Authority, coupled with financial incentives under the MAFF Farm and Conservation Grant Scheme, resulted in many farmers carrying out improvement work to prevent the polluting discharges. A large number of new waste collection systems were

constructed to comply with the Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) Regulations 1991. These Regulations should ensure the quality of such structures.

As a consequence of this work the quality of many small watercourses has improved during the early 1990s and the number of agricultural pollution incidents in the catchment, particularly those of a serious nature, has fallen. Some problem areas still remain and as the grant scheme has now ended (apart from within Nitrate Vulnerable Zones) little effluent system improvement work is now undertaken on farms. The risk of farm pollution is now perhaps greatest in areas prone to flooding.

Grants provided by the Government through MAFF farm diversification schemes has helped many farmers to diversify into non-farming activities and the farm woodland in the catchment has increased by 28.5% to 3,676 ha in 1996. Almost 850 ha were devoted to set aside in 1996 - this is out of a total agricultural area of nearly 174,000 ha. The agricultural employment census for the area shows a reduction in the workforce since 1986. The full time workforce has declined by 13.5% to 4,308, following the national trend, which is likely to continue.

There is almost certainly considerable hidden unemployment on many farms where family members stay at home even though there is insufficient employment or profitability to justify them doing so. These changes support the need for diversification into new opportunities such as tourism, market gardening and alternative livestock or crop production systems, to maintain levels of employment on farms and within the wider rural economy although the opportunities for doing so should not be over-estimated in the remote rural areas.

5.5 Forestry

General

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 include acidification, soil erosion, and pollution, reduced water yield, and increased flooding risk and damage to wildlife habitats.

While the Agency has duties to regulate some forestry works; overall regulation of forestry is the responsibility of the Forestry Authority. 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.

To ensure that the environment is properly considered the Agency aims to:

* Continue to liase with Local Authorities about the production of Indicative Forest Strategies.
* Liase with the Forestry Authority and local forest managers about the production of Forest Design Plans and general forest management issues.
* Ensure that forest activities do not cause pollution of surface and groundwater, increase acidification or affect existing users and uses of water below forested areas.
* Secure improved Agency links with Local Authorities on Structure and Local Plans, particularly in relation to Indicative Forest Strategies.
* Secure improved links with the Forestry Authority and forest owners and managers to recommend that forest management complies with Forestry Authority Guidelines and that liaison with the Agency takes place where ever necessary.
* Protect and enhance the conservation value of the water environment and associated land in connection with all forestry developments.
* Ensure that forest activities does not create or exacerbate flooding problems.
* Train its own staff to understand forestry issues and their potential impact.
* Assist the forestry industry to increase awareness of the potential aquatic impacts of its activities.

The Agency recognises that well managed forestry in appropriate areas can have minimal impacts on water and can benefit the overall environment.

Local Perspective

The forests most likely to have significant effects on the water environment are those on the Western headwater catchments, particularly those on base poor bedrock and soil. Streams here are highly important as salmonid nursery habitat and for a range of other fauna and flora. Potable water supply is important at Lake Vyrnwy and hydropower generation at Llyn Clywedog.

Sensitive catchments with existing plantations include:

(1) River Severn upstream of Llanidloes.

(2) Afon Clywedog, Llyn Clywedog and feeders.

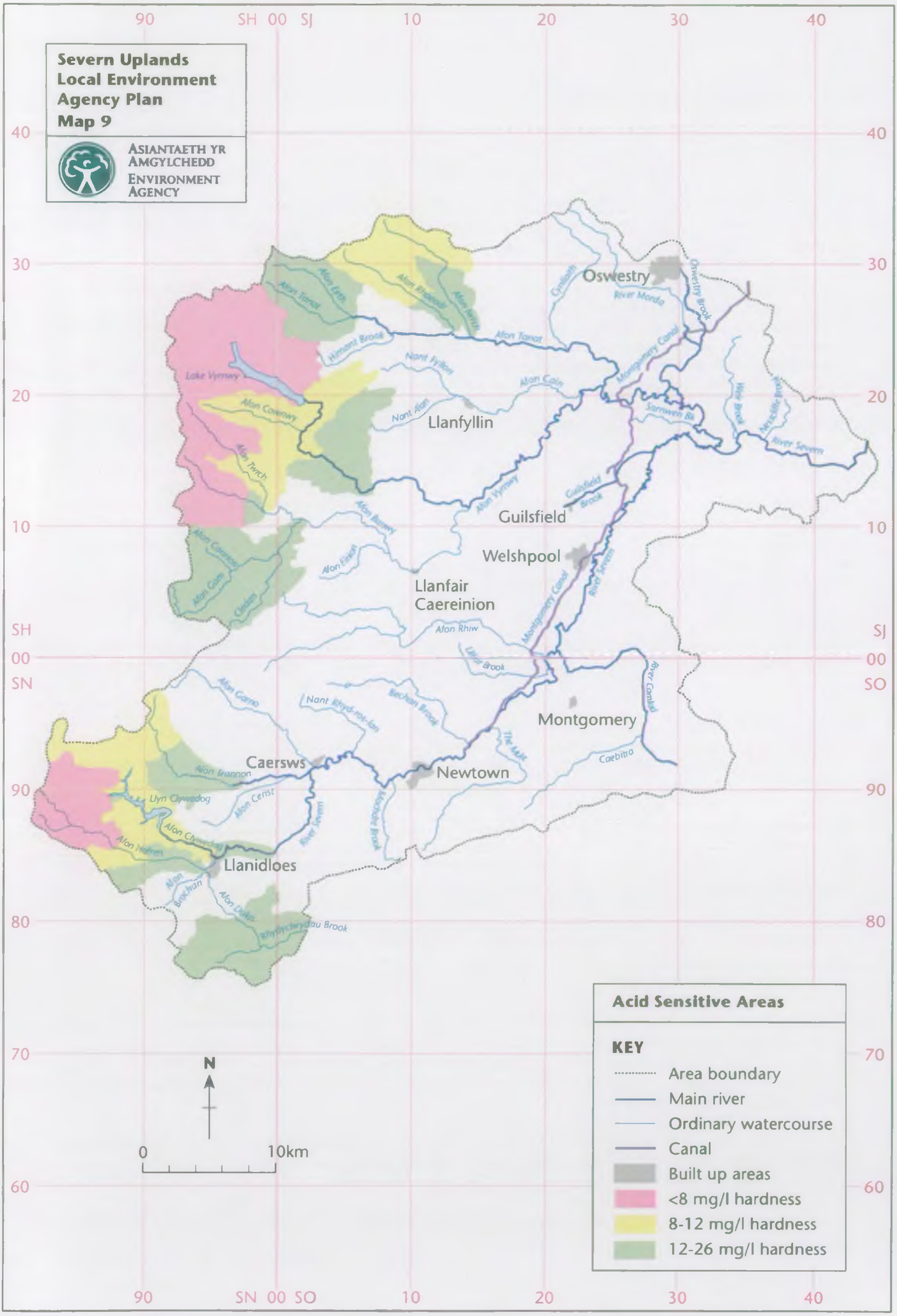
(3) Afon Banwy upstream of Llangadfan.

(4) Afon Vyrnwy upstream of Dolanog, Lake Vyrnwy and feeders.

(5) Afon Trannon upstream of Llawryglyn.

Fieldwork associated with National research and development projects concerning forestry is being undertaken in the Severn Uplands area. Map 9 shows Acid sensitive areas in the area, which is based on total water hardness. In future this will be based on an assessment of Acid Neutralising Capacity (refer issue 9 and Glossary).

Future new planting is expected to be on a small scale, often with farm diversification. Felling of mature stock and replanting is anticipated to substantially increase year on year in future. It is important to encourage replacement of old plantations of conifers by more environmentally friendly mixed woodland.


Severn Uplands
Local Environment
Agency Plan
Map 9
Asiantaeth yr Amgylchedd
Environment Agency
Oswestry
Llanfyllin
Guilsfield
Welshpool
Llanfair
Caereinion
Montgomery
Caersws
Newtown
Llanidloes
Lake Vyrnwy
Llyn Clywedog
Afon Tanat
Afon Cain
Afon Vyrnwy
River Severn
Montgomery Canal
Afon Rhiw
Afon Garno
Afon Trannon
Afon Clywedog
Afon Cerist
Bechan Brook
Mochdre Brook
River Camlad
Caebitra
Acid Sensitive Areas
KEY
Area boundary
Main river
Ordinary watercourse
Canal
Built up areas
<8 mg/l hardness
8-12 mg/l hardness
12-26 mg/l hardness
N
0
10km

5.6 Mineral Extraction/Working

General

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

The exploitation of minerals can impact on water resources by altering groundwater flows and hence streamflows. Groundwater quality may be affected by reducing the amount of material available above the water table that would act as a natural filter to pollutants. Summer and spring flows can be reduced as a result of the loss of water storage capacity of the mineral that has been removed. Restoration with impermeable material will increase run-off and reduce the recharge of groundwaters, whilst the use of mineral extraction sites for landfill waste disposal uses can also pose a significant threat to groundwater quality.

Gravel extraction may take place from the river channel or flood plain and is controlled by planning law. It may also require land drainage consent from the Agency. If extraction works are not properly managed, the river channel can be seriously damaged.

All mineral workings are subject to general planning controls. The Agency is a consultee on such applications, and seeks to have planning consent conditions imposed which control operations. Operators have a duty to serve notice on the Agency detailing any dewatering activities proposed. We can issue a Conservation Notice under Section 30 (i) of the Water Resources Act 1991, if it is felt any dewatering activity associated with the winning of the mineral is causing derogation to a protected source and/or the aquatic environment.

Local perspective

A considerable amount of mining has occurred through the western uplands of the catchment, although concentrated to the south and north with limited activity in between. This took place predominantly between 1850 and 1900 in the search for lead copper and zinc. There are no active mines at present, with the last operations being in the early 1920s.

The legacy of this mining activity is numerous sites of varying sizes covered with mine spoil and underground mineral veins that have been subjected to weathering processes. Surface run off and discharges from shafts and adits of water containing metals can affect many local streams, which by accumulation in a relatively confined area of a catchment can affect the ability of some rivers to achieve EC directive requirements.

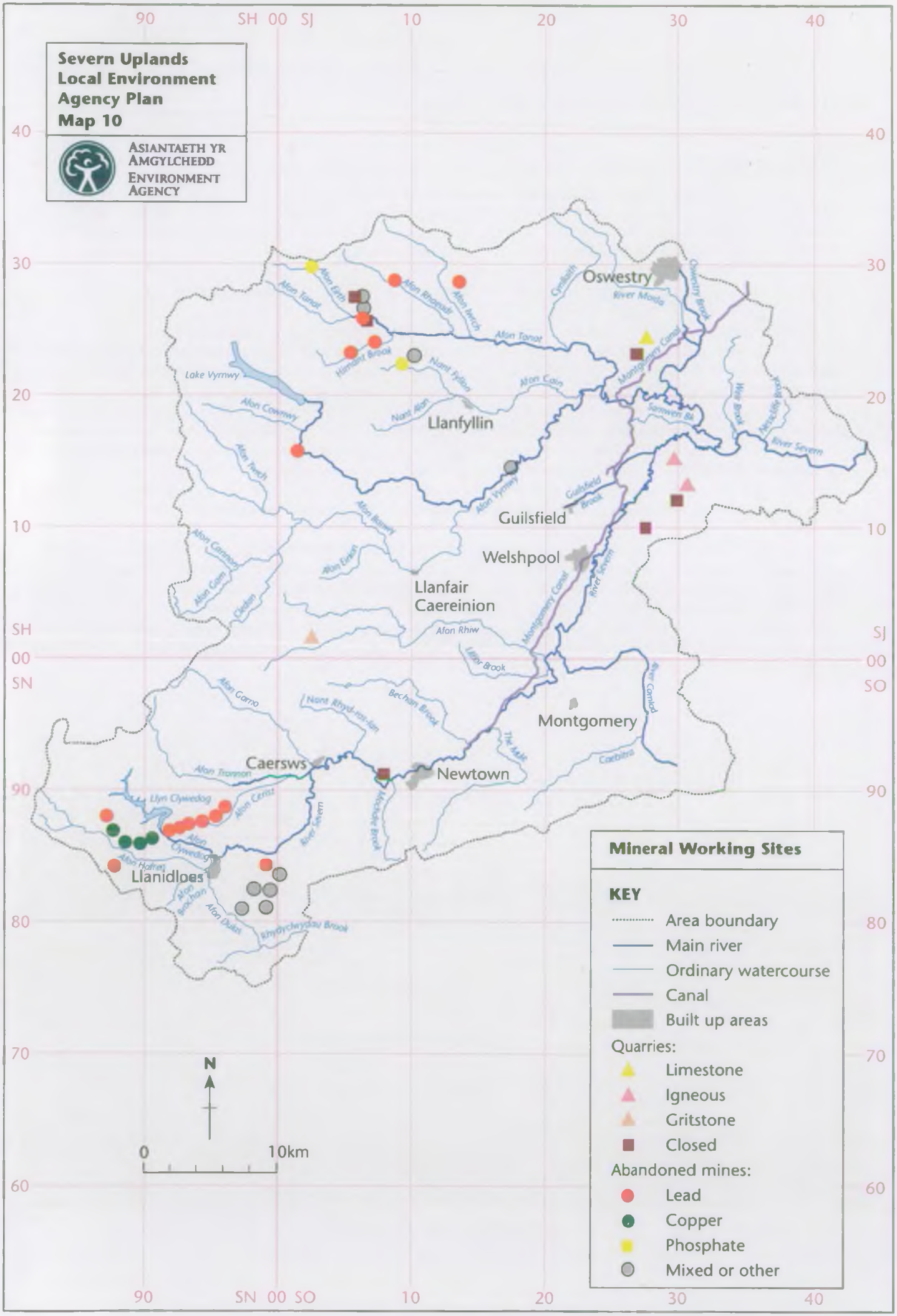
The largest abandoned mine is the Van Mine near Llanidloes; this was the most productive metal mine in Wales in the 1870s and the largest lead mine in Europe. The legacy of the mine resulted in large, uncovered, contaminated spoil heaps which had been eroded by surface water run-off causing high concentrations of metals in the Afon Cerist that flows through the site.

Water quality, biology and fisheries interests in the Afon Cerist have historically been affected by these high concentrations of metals. A land reclamation scheme was started in mid 1993 and completed in early 1995. This work included covering the spoil heaps with an impermeable layer, diverting the watercourse around the contaminated area and installing a wetland treatment system for emerging contaminated ground water.

An overall decline in the total zinc concentration can be seen since work commenced on the scheme in 1993. In addition to the water quality monitoring, biology and fisheries surveys have also been carried out with encouraging results. Although there was an overall decline in metals, the Agency considers the efficiency of the wetland system could have been improved. Through joint funding with Powys County Council, improvements have been completed. The Agency will continue to monitor the situation.

There are only 4 known active quarries in the plan area, mainly for the extraction of stone for road construction and improvement; a brick works quarry is currently closed. Gravel extraction is undertaken intermittently on the River Severn upstream of Newtown.

Map 10 shows the locations of both active and closed quarries, and abandoned metalliferous mines within the catchment.


Severn Uplands
Local Environment
Agency Plan
Map 10
Asiantaeth yr Amgylchedd
Environment Agency
Oswestry
Llanfyllin
Guilsfield
Welshpool
Llanfair
Caereinion
Montgomery
Caersws
Newtown
Llanidloes
Lake Vyrnwy
River Severn
Montgomery Canal
Mineral Working Sites
KEY
Area boundary
Main river
Ordinary watercourse
Canal
Built up areas
Quarries:
Limestone
Igneous
Gritstone
Closed
Abandoned mines:
Lead
Copper
Phosphate
Mixed or other
N
0
10km

5.7 Power Generation and Renewable Energy

General

The United Kingdom uses the fossil fuels coal, oil and natural gas, as sources of energy for the production of power. The Environment Agency regulates those processes capable of achieving a rated thermal input of 50 mega watts (MW) or more. The principal environmental impact from the combustion of fossil fuels is that of releases of gases to the atmosphere. Such releases affect the quality of the air both locally and globally. The burning of coal is estimated to contribute about 34% of the carbon dioxide released into the atmosphere each year by the U.K., the vast majority via power stations. The burning of gas is estimated to account for some 24%. Burning fossil fuels also releases other gases into the atmosphere, particularly sulphur dioxide and oxides of nitrogen; dust can also be released.

An essential part of the Government's environmental strategy is the reduction of emissions produced as a result of burning fossil fuels. The Government's policy is to encourage the exploitation and development of renewable energy sources wherever they have prospects of being economically attractive and environmentally acceptable. The Agency is keen to support this policy through the application of its powers and duties.

Renewable energy sources include water (hydropower, wave and tidal), wind, solar and geothermal power and energy derived from waste treatment. Some renewable energy sources, such as hydropower have been commercially exploited for some time, and others such as wind power and energy from waste are becoming more widespread. Information about planning aspects of renewable energy is available in the *Planning Policy Guidance Note on Renewable Energy* (PPG 22) issued by the Department of the Environment (now the DETR) and the Welsh Office.

Any application for HEP or wind power schemes would require an Environmental Impact assessment to be completed. Hydropower developments involving the abstraction of water via headraces, leats, feeder pipes etc. will require an abstraction licence from the Environment Agency. Developments sited within or on"in-river" structures such as weirs or dams, where an abstraction of water is not involved do not require a licence. Any development, which involves the construction or alteration of a dam or weir to accommodate it or to provide a flow of water, is likely to require an impounding licence. There would also be requirements for land drainage consent and facilities to allow for the migration of fish.

Wind farm near Llandinam.

Local Perspective

There are no fossil fuel power stations in the Severn Uplands area.

Waterpower is used to generate electricity at Llyn Clywedog when releasing water for river regulation purposes and when water levels permit. When the power plant at Clywedog is operating, approximately 65 megawatts of electricity per day is produced. There is also a hydropower scheme at Dolanog. Hydropower is also used as a back up at a flourmill at Bacheldre. No other sites using hydroelectric power (HEP) are recorded, but interest has recently been expressed in developing a further site in the area, on the Afon Iwrch. Although hydropower is not a major use in the plan area, with the move towards more environmentally friendly power sources, as a result of the Government's Alternative Energy Strategy, and the Non Fossil Fuel Obligation, there may be scope for additional small HEP schemes to be developed during the lifetime of the plan, subject to there being no adverse environmental impact.

In recent years there has been pressure for the development of wind farm electricity generating schemes in the plan area and surrounding uplands. Wind farms may well become an increasing feature, and a major use, of the area. The 103-turbine wind farm at Llandinam is one of the largest in Europe. Other sites include one at Carno, plus its extension, and a planning application been made for an 83 turbine wind farm near Adfa at Mynydd yr Hendre. An aim of the Montgomeryshire Local Plan is for the area to become self-sufficient in electricity and possibly become a net exporter.

There are no known waste disposals or landfill sites in the plan area used for renewable energy production such as landfill generated methane gas.

5.8 Air Quality

General

Air Quality is an important indicator of environmental quality. Air pollution can damage flora, fauna and buildings and have significant effects on soils and water. It can also cause serious problems for those with asthma, bronchitis and other respiratory diseases.

Air pollution may be in the form of gas or particulate matter. Its dispersion and dilution depend on meteorological conditions. Its impact may be local, especially particulate matter, which will often settle on nearby land or water or may be global, for example affecting the ozone layer or the concentration of greenhouse gases such as carbon dioxide.

Nationally there has been significant improvement in air quality since the famous London smogs of 1952, which caused over 4000 premature deaths. Levels of sulphur dioxide and smoke have fallen considerably. Other pollutants, however, have increased in significance as road traffic has increased, particularly in urban areas. High levels of oxides of nitrogen (NO_2), fine particulates (PM_{10}) and volatile organic compounds (VOCs) can be present at times of high traffic flows.

The Role of the Agency

The lead role in air quality management rests with Local Authorities. The Environment Agency plays its part through the regulation and control of emissions from Integrated Pollution Control (IPC) processes and liaison with Local Authorities.

The Environment Agency has powers to regulate air quality principally by operating a system called Integrated Pollution Control (IPC) for certain industrial processes which stems from Part 1 of the Environmental Protection Act 1990 (EPA 1990). The processes regulated are the potentially most polluting industrial processes including large combustion plant, iron and steel making, the chemical industry, solvent recovery and incineration plants. In the Severn Uplands area there are currently no such authorised processes.

National Air Quality Strategy

The Government, recognising that the quality of air that we breathe is crucial to us all, established a new framework for improving air quality and set this out in the Environment Act 1995. This resulted in the *United Kingdom National Air Quality Strategy* published in March 1997. The strategy explains the roles of Local Authorities, industry and the Agency in achieving the Government's air quality targets. These targets are set out in Table 11 below.

Table 11 The Proposed Objectives of the Air Quality Strategy

Pollutant	Standard		Objective
	Concentration	Measured As	
Benzene	5 ppb	running annual mean	100% compliance to be achieved by 2005
1,3 Butadiene	1 ppb	running annual mean	100% compliance to be achieved by 2005
Carbon Monoxide	10 ppm	running 8-hour mean	100% compliance to be achieved by 2005
Lead	0.5 $\mu g/m^3$	annual mean	100% compliance to be achieved by 2005
Nitrogen Dioxide	150 ppb 21 ppb	1 hour mean annual mean	100% compliance to be achieved by 2005
Ozone	50 ppb	running 8-hour mean	50 ppb, measured as 97% to be achieved by 2005
Particulates	50 $\mu g/m^3$	running 24-hour mean	50$\mu g/m^3$, measured as 99% to be achieved by 2005
Sulphur Dioxide	100 ppb	15 minute mean	100ppb, measured as 99.9% to be achieved by 2005

As part of the above strategy Local Authorities will have to review air quality within their districts and compare them with the standards and objectives laid out in the strategy, the objectives are set out in the table above. Detailed studies of air quality in the area will have to be carried out before results of compliance with these objectives can be discussed in detail.

Local Perspective

The Severn Uplands LEAP area is predominantly rural in character and the pollutants mentioned above are likely to be relatively low throughout the area and hence the air quality is generally good. The air pollutant of significance in this area is ozone that is found in higher concentrations than in urban areas (see page 102).

Levels of nitrogen dioxide and sulphur dioxide and other air pollutants associated with industrial and vehicle pollution are likely to be very low throughout the area and there is no current requirement to carry out any monitoring for these chemicals.

Central government and local authorities undertake the monitoring of air quality. The levels of monitoring currently taking place in the LEAP area are very low.

Nitrogen dioxide monitoring is undertaken at 4 sites in Oswestry by Oswestry Borough Council and the estimated 98th percentile concentrations (ug/m^3) for 1995/96 were 101, 53, 59 and 39 which is comparable in the West Midlands to Bromsgrove DC with 4 sites at 111, 79, 67 and 66 but significantly less than Wolverhampton MBC with a range of values at 26 sites from 62 to 163. The existing European Union Air Quality Standard for nitrogen dioxide is 200ug/m^3 (expressed as the 98th percentile of hourly means) and it can be seen that all the Oswestry sites are well within this level.

Table 12 overleaf shows details of Welsh Office air pollution monitoring in the LEAP area.

Table 12- Local Air Quality Monitoring for Nitrogen Dioxide (Welsh Office) Jan 1994 - Dec 1995

Site and national grid reference		NO_2 $\mu g/m^3$ mean value
Penybont Fawr	SJ 089 241	13.50
Dyfnant	SH 943 172	11.47
Hafren	SN 850 900	7.66
Llandinam	SO 015 893	12.41

The existing European Union Air Quality Standard for nitrogen dioxide is 200$\mu g/m^3$ (expressed as the 98th percentile of hourly means) and for sulphur dioxide it is 120$\mu g/m^3$ (expressed as the median daily value).

Ozone

Air quality is measured at automatic monitoring stations at a number of locations throughout the United Kingdom by the Department of Environment, Transport and the Regions (DETR). There is one such automatic site within this plan area at Aston Hill (SO298901) which is for ozone measurement.

The Air Quality Regulations 1997 set down a standard of 50 ppb as a running 8-hour mean for ozone. The 1995 results for Aston Hill showed excesses on 541 hours on 46 days. Levels ranged from a maximum hourly average in August of 100ppb to a maximum hourly average in December of 32ppb. The annual means value was 32ppb (CF Birmingham East 18ppb and Bristol 19ppb). Although the levels of ozone are relatively high there is no local action that can be taken to ameliorate the situation as action at a national level is necessary to reduce this type of air pollution.

Indications have shown that instances of high ozone concentrations at ground level can occur, particularly in the rural areas. These are caused by complex interaction between organic compounds and nitrogen dioxide in the presence of ultra violet light. As these pollutants typically arise many miles from the site of the ozone event, action on a national level is necessary to reduce their occurrence.

5.9 Waste Management

General

Every household, business and industry produces waste and there are a variety of facilities, which perform the necessary function of processing, recycling and disposing of it. Prior to 1974 there were few controls over the deposit of waste and much industrial waste was deposited on land adjacent to the producer. Today, the Local Planning Authorities under the Town and Country Planning Act 1990 decide the location of waste management facilities through the land use planning system. The Agency's principal role in directly protecting the environment from waste is through the regulation of such sites via the waste management licensing and exemption system introduced in the Environmental Protection Act 1990. With the exception of certain exempt facilities, which must be registered with the Agency, sites keeping, treating, disposing or depositing controlled wastes must be licensed. Controlled waste is household, industrial and commercial waste. Waste not classed as controlled waste and therefore not subject to the licensing regime includes waste from mining, quarrying and agricultural, as well as radioactive wastes and decommissioned explosives.

The Agency's control over waste is achieved in a number of ways:

* Licensing waste management facilities including landfill sites, transfer stations, treatment plants, scrapyards and storage facilities
* Inspecting and monitoring these facilities to ensure that they arecomplying with the conditions attached to the licence (refer to Appendix 1, page 149).
* Investigating the unauthorised deposit of waste including fly tipping
* Registering persons who carry or manage waste
* Visiting local industry and giving advice regarding waste management
* Checking that exempt activities are carried out in accordance with the exemption
* Taking enforcement action where necessary and responding to emergencies

The Agency's aims and objectives for waste management

Principal aim - ***To achieve a continuing and overall reduction in the impact of wastes on the environment.***

There are a number of issues associated with the production of waste and its management. In particular, waste represents a loss of natural resources and there are a limited number of sites, which are suitable for landfilling with wastes. We therefore need to:

* Reduce the amount of waste that society produces,
* Make best use of the waste that is produced and,
* Choose waste management practices which minimise the risks of immediate and future environmental pollution and harm to human health.

To assist in the achievement on these objectives waste management options have been ranked into a hierarchy, which gives a broad indication of their relative benefits and disbenefits (with the most desirable at the top)

WASTE REDUCTION
RE-USE OF WASTE

RECOVERY

Recycling (e.g. incineration)
Energy
Composting

DISPOSAL

The aim is to move our waste management practices up the hierarchy i.e. to reduce waste wherever possible and where this is not possible to make the best use of the waste produced. The strategy is now due to be revised and a consultation paper entitled 'Less Waste, More Value' has just been released by Government for comment with regards to producing a statutory waste strategy. Within this document the Government has produced seven key commitments:

* Substantial increases in recycling and energy recovery
* Engagement of the Public in increased re-use and recycling of household waste
* A long -term framework with challenging targets underpinned by realistic programmes
* A strong emphasis on waste minimisation
* Using the waste hierarchy as a guide, not a prescriptive set of rules
* Creative use of economic incentives, such as, the landfill tax
* Increased public involvement in decision making

The Environment Agency's objectives for waste management in the Severn Uplands area, are based on its Environmental Strategy which draws out a number of issues which need to be addressed, either by the Agency itself or in collaboration with others. As regards waste these are:

* If appropriate ensure achievement of national targets for the reduction of waste disposed of to landfill
* Develop an overall database of waste production and disposal
* Measure the effectiveness of taxation to reduce waste and to encourage its re-use and recycling
* Ensure achievement of national targets for the recovery, recycling and composting of municipal waste
* Encourage and inspire industry to develop new improved techniques for the management of special and other industrial wastes
* Implement the producer responsibility regulations
* To provide a high quality waste regulation service
* Obtain information on fly tipping and devise means of combating it

Household waste

It is the duty of each waste collection authority to arrange for the collection of household waste in its area. Most of the waste within each of the districts in the Plan is currently being disposed of to landfill. Local authorities are also required to provide civic amenity sites where members of the public can deposit waste free of charge. The potential for increasing the amount of household waste recycled by the Districts will depend on a number of factors including finding suitable sites for collection banks, finding suitable outlets (markets) for the materials collected and public participation.

As the major component of household waste is putrescible matter there is considerable scope for composting. Many local authorities have therefore considered ways of increasing the level of this activity in their recycling plans, usually through the promotion of home composting to householders.

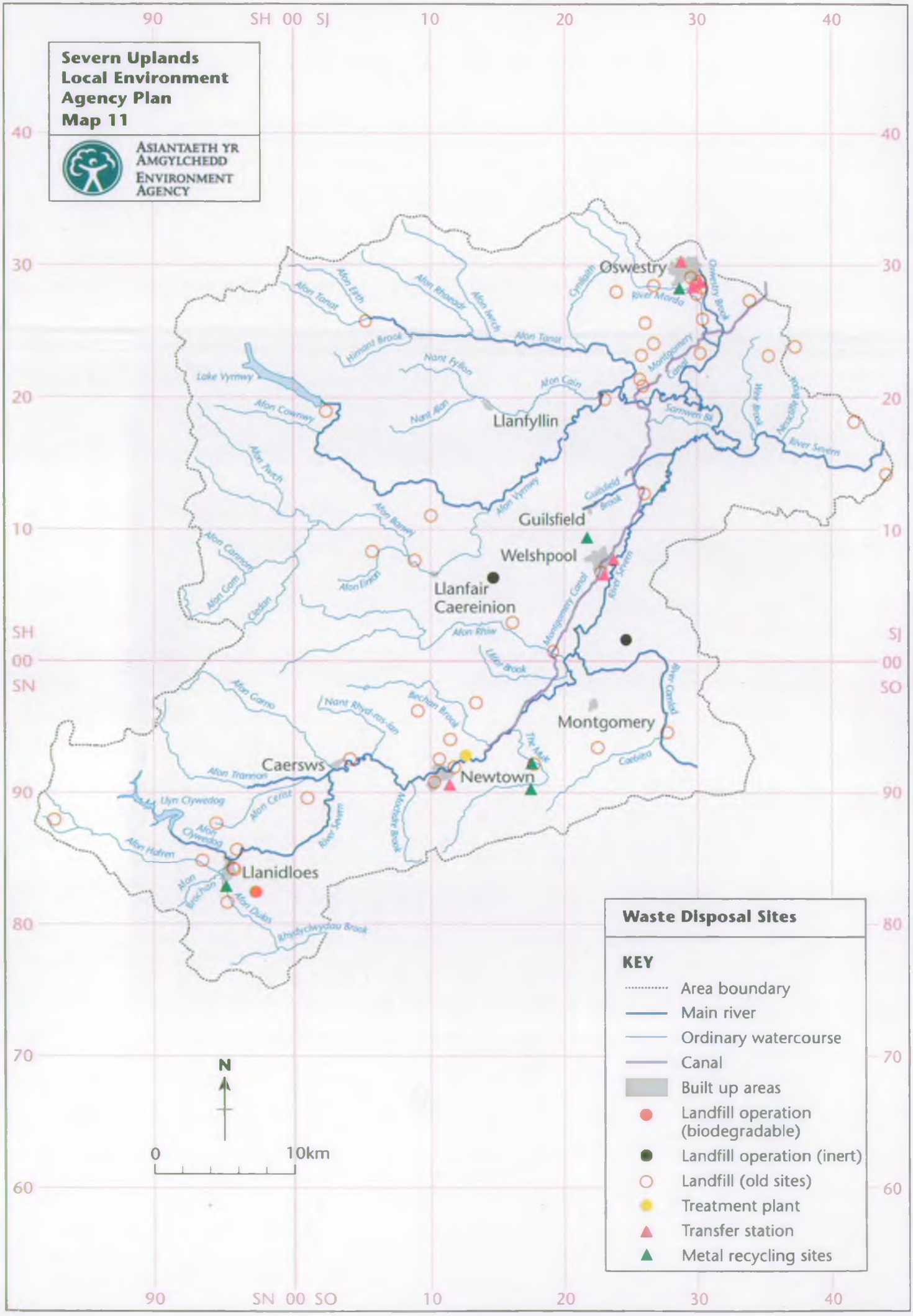
Newtown landfill site.

Other Wastes

The types of waste and the quantity produced by any one district or area is a function of both the type of industry and commerce carried out in that district and the degree of industrialisation. It is hoped that the increase in waste disposal costs as a result of the introduction of the landfill tax on 1 October 1996 will encourage industry to reduce waste production and where waste is produced consider alternative waste management routes e.g. reuse/recycling. Figures are not yet readily available on the amount of these wastes arising in the plan area.

The Producer Responsibility Obligations (Packaging Waste) Regulations 1997 place an obligation on certain businesses to recover and recycle a certain proportion of packaging waste. The amount they must recover and recycle depends in part on how much packaging they use for their products. It is hoped these Regulations will encourage manufacturers to redesign their packaging to include less materials, thereby minimising household waste.

There is a need to obtain reliable data on waste arisings and movements within the catchment and beyond to enable planning authorities and the collection authorities to assess the future needs in relation to the disposal of controlled waste. The Agency has a national programme to compile data on wastes received at landfills and other licensed sites into a central database. Such information will allow, in future, trends to be shown of changes which occur in relation to waste disposal patterns. Part of this is a pilot study currently being undertaken in the Midlands Region to assess the number and types of unlicensed 'exempt' activities that are active, and the levels of wastes that are being deposited. In addition the Agency is undertaking a National Waste Survey to obtain up-to-date information on the amount of waste being produced both at a local and national level; the survey being structured in such a way that data can be readily aggregated and disaggregated. The outcome of this work will be published separately to the Local Environment Agency Plans.


Severn Uplands
Local Environment
Agency Plan
Map 11
Asiantaeth yr Amgylchedd
Environment Agency
90 SH 00 SJ 10 20 30 40
90 SN 00 SO 10 20 30 40
Oswestry
Llanfyllin
Guilsfield
Welshpool
Llanfair
Caereinion
Montgomery
Caersws
Newtown
Llanidloes
Lake Vyrnwy
River Severn
Montgomery Canal
N
0
10km
Waste Disposal Sites
KEY
Area boundary
Main river
Ordinary watercourse
Canal
Built up areas
Landfill operation (biodegradable)
Landfill operation (inert)
Landfill (old sites)
Treatment plant
Transfer station
Metal recycling sites

Local Perspective

5.9.1 Waste Management Facilities

There are 18 licensed waste management facilities within the LEAP area, which are largely a mixture of current landfill sites, transfer stations, and metal recycling sites. The number of each type is shown in Table 13, which also includes 46 closed landfill sites. Map 11 shows the location of former and currently active landfill sites and other waste management facilities.

Table 13 Waste Management Facilities

Type of Facility	No. of Sites
Operational Landfill Sites	3
Former Landfill Sites	46
Transfer stations	7
Treatment Plants	1
Metal Recycling Sites	6
Household Waste Reclamation Sites	1

5.9.2 Landfill Sites

The majority of landfill sites in this area are a consequence of past road building schemes and urban development programmes, and are infills of inert soil and building wastes which should not be expected to give rise to any problems if operated correctly. However as this is generally not the case, unauthorised deposits of biodegradable wastes can often occur, giving rise to the potential of landfill gas and leachate production. Many of the former landfill sites were also operated prior to the introduction of the waste management licensing regime in 1974 and little is known about what was deposited. Many of these are small sites and it is likely that there are further sites in the Area, which have not yet been identified.

Currently, landfill capacity in the plan area is limited to one co-disposal site licensed to accept household, commercial and industrial wastes, and two other sites which are only licensed to accept soil or other inert wastes. The co-disposal site is currently operated by Sundorne Products (Llanidloes) Ltd at Bryn Posteg, 3 km south east of Llanidloes. It covers some 16 hectares of a disused lead mine, and is situated approximately 350 metres above sea level. Because of its elevation it receives a relatively high annual rainfall of 1300mm, and leachate production is high. This latter fact has meant that leachate collection, on site treatment (by extended aeration), and disposal to foul sewer was an integral part of the site's design.

The Bryan Postage site is currently expected to have about 5-6 years of remaining life at current levels of input, which includes waste received from neighbouring catchments. Unless a local site can be identified to replace Bryan Postage, wastes will have to be transported greater distances to the next available facility. The issue of alternative facilities and where they should be located is one for the local waste planning authorities to address in their development planning processes.

It is anticipated that there may be an increased demands for waste disposal sites to accept canal dredging produced as a result of the continuing restoration of the Montgomery Canal. However, the latest phase of this restoration has yet to be developed.

5.9.3 Other Waste Management Facilities

There are seven transfer stations, six metal recycling sites, and one treatment facility within the LEAP area. One of the transfer stations collects waste from the Welshpool area for transport to a disposal site within Shropshire. The treatment plant accepts a wide range of wastes including sewage sludge and other liquid biodegradable wastes from a number of industrial sources.

All special wastes are at present exported out of the catchment to other disposal authority areas as is clinical waste for incineration and the local authorities within the LEAP area have proposed that this should continue. The amounts of such waste that are produced in Montgomeryshire are relatively small and because of the area's importance as a source of potable and amenity waters, the provision of disposal facilities to cater for such waste would be prohibitively expensive given the current methods of treatment.

Leachate and contaminated surface water from abandoned landfill sites and long standing metal recycling sites has been identified as being a problem in some. Pollution prevention measures to contain and control such substances include bunding and drainage to be fully implemented at waste transfer sites and metal recycling sites.

5.9.4 Exempt Activities

Certain activities are exempt from the requirement for a waste management licence. The exemptions mainly cover reuse and recovery operations with the aim of encouraging such operations by reducing the legislative burden on them. Between 1996 and 1997 approximately 60 exempt sites were registered within the plan area. These exemptions include activities such as the temporary storage of wastes which are to be recycled (e.g. paper, cardboard, glass), the recycling of bottles, cans etc, the use of waste soil for land reclamation or construction purposes and the land application of certain organic industrial wastes.

Under this category are included the many materials recycling centres found at public locations (such as supermarket car parks) within the Severn Uplands area, which provide deposit type facilities for the recycling of bottles, cans, clothes and paper. These are generally wholly run by the local authority or in conjunction with other organisations. There are currently around 25 such centres within the LEAP plan area.

Montgomeryshire also has an option from its adopted recycling plan of providing a series of mini-recycling centres in several of the villages as well as the main towns. With sufficient funding this would eventually cover some 54 settlements, with a facility for every 400 households.

5.9.5 Unauthorised Deposits

Unless exempt as a waste management facility, it is an offence to keep, treat or deposit controlled waste without a waste management licence. Licensed facilities must also operate in accordance with their licence conditions. However, illegal activities such as flytipping are not uncommon and where they occur the Agency relies to a large extent on members of the public to report them.

Within the LEAP area there are a number of flytipping hot spots (see Issue 24, page 58).

5.10 Contaminated Land

General

The Environment Act 1995 sets out the responsibilities and powers the various authorities will have in dealing with contaminated land. Local Authorities are empowered to draw up formal strategies for identifying contaminated land in their areas under the new Contaminated Land regime that came into force in July 1998. Having identified such areas of land, councils will be able to serve "Remediation Notices" on the current owners requiring further investigation, monitoring and clean up measures, if there is a risk to public health or the environment.

The Agency's powers will relate to "special sites" which will have the greatest potential to cause harm. These powers will enable the Agency to serve notices requiring landowners to prevent (and mitigate) the pollution of both surface and groundwater and harm to human health. This will allow a proactive approach to be adopted in preventing further pollution.

Planning legislation also provides a route for addressing contaminated land issues. As part of the Environment Agency's response to planning applications on potentially contaminated sites, we request that a site investigation is undertaken prior to re-development and that remedial works are carried out if required. Once suitably remediated, existing contaminated land sites offer an opportunity for re-development. The Agency would, however, wish to comment on every proposal on a site by site basis.

Various techniques are available for the clean up of contaminated land. Traditionally, excavation of contaminated material and disposal to a licensed landfill site has been the most commonly chosen method of remediation. The

removal of any contaminated materials from a site should only be undertaken by a registered waste carrier and in accordance with the requirements of the 'Duty of Care' under the Environmental Protection Act (EPA) 1990.

Where land is not subject to a planning proposal, but is known to be contaminated and is having an impact on the quality of controlled waters, the Agency will encourage the polluter/owner to undertake remedial works. Where pollution has occurred, operators are encouraged to inform the Agency so that agreed remedial action can be taken based on the environmental risk at the site. Where operators do not inform the Agency and pollution of controlled water is detected, prosecution under Section 85 of the Water Resources Act 1991 will be considered.

Contaminated land reclamation schemes for mineral working sites may exacerbate existing problems or lead to renewed problems, as unweathered toxic materials are exposed or fine solids run off into watercourses. Such schemes require consultation with the Agency and any discharges may need to be consented and monitored.

The Agency's aims and objectives for land quality

Our principal aim for land quality is *to secure, with others, the remediation of contaminated land.*

Main Objectives

To achieve our aims, we will:

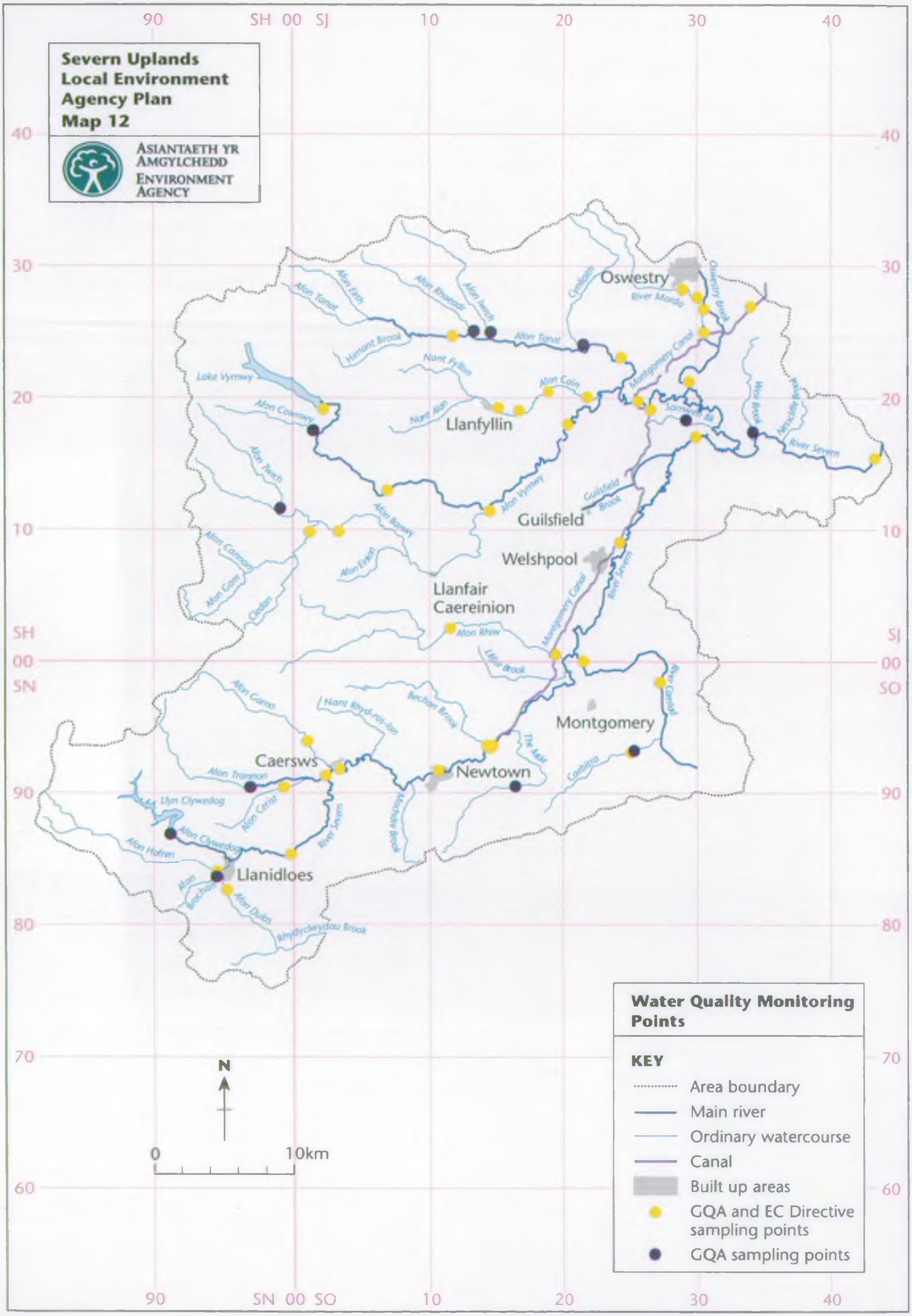
* Influence and inform policy and practice for dealing with land contamination and build partnership approaches, both nationally and internationally;
* Encourage or enforce remediation of priority sites;
* Agree protocols with local authorities to ensure that effective arrangements are in place for the provision of appropriate advice where there are joint activities;
* Develop our management policy for dealing with land contamination to ensure the co-ordination and integration of the Agency's various regulatory and other responsibilities;
* Develop a quality management system and procedures for effective delivery of the regulatory and advisory land contamination responsibilities;
* Provide high quality and appropriate technical advice on land contamination, based on sound science, to encourage best practice and sustainable solutions;
* Deliver a research programme to support our aims and objectives;
* Establish an information strategy, which ensures effective data management as a basis for efficient information exchange, dissemination and analysis. In particular, the information strategy will support our regulatory and advisory functions and the preparation of a national report on contaminated land.

Local perspective

The Severn Uplands area has a history of mine workings that have left a legacy of contaminated land. This is predominantly the case around the western uplands, where lead, copper and zinc where searched for during the second half of the 19th century, and have left numerous abandoned sites covered with mine spoil. In addition, more recent land use developments have resulted in fresh areas of land being contaminated. For example, contaminated land sites in the area also include closed landfills (see Map 11, page 105). Many contaminated land sites are located in environmentally sensitive locations such as near rivers or above aquifers.

Addressing the problem of contaminated land is made difficult by the fact that detailed information on the location of contaminated sites is scarce. Records of where materials were deposited were seldom kept and it is often necessary to carry out a thorough site investigation in an attempt to reveal the location and nature of contamination. This can be a costly exercise for potential developers, especially if investigation reveals that remediation works are necessary.

Examples of contaminated sites that have been remediated include parts of the Van Mines near Newtown. We are currently investigating a programme of impact assessment at all the abandoned metalliferous mines (see Issues 10 and 11).


Severn Uplands Local Environment Agency Plan
Map 12
Asiantaeth yr Amgylchedd
Environment Agency
Oswestry
Llanfyllin
Guilsfield
Welshpool
Llanfair Caereinion
Montgomery
Newtown
Caersws
Llanidloes
Lake Vyrnwy
Llyn Clywedog
Afon Tanat
Afon Vyrnwy
River Severn
Montgomery Canal
River Morda
Oswestry Brook
Afon Cain
Afon Banwy
Afon Rhiw
Afon Clywedog
Afon Trannon
Afon Cerist
Afon Dulas
Afon Hafren
Afon Brochan
Afon Carno
Bechan Brook
Mochdre Brook
Camlad
Guilsfield Brook
Luggy Brook
Water Quality Monitoring Points
KEY
Area boundary
Main river
Ordinary watercourse
Canal
Built up areas
GQA and EC Directive sampling points
GQA sampling points
N
0
10km
90
SH 00 SJ
10
20
30
40
SN 00 SO
SH
SJ
SN
SO
80
70
60

5.11 Water Quality

General

Water is a fundamental requirement for all forms of life. It is a vital component of our environment and essential to society. The management of water quality for sustained use can only be achieved by effective policies to influence and regulate those activities that impact on it.

The water environment includes rivers, lakes and canals, groundwaters, estuaries and coastal waters. As well as ensuring the suitability of waters as natural habitats for animals and plants, society makes many varied, and sometimes conflicting, uses of the water environment. Our role is to resolve these conflicting uses and ensure that water is of suitable quality to support them and maintain diverse aquatic ecosystems. We will protect, manage and where possible enhance the quality of all of these controlled waters and thereby contribute to sustainable development.

The Agency's principal aim for water quality

The Agency's principal aim for water quality is *to achieve a continuing and overall improvement in the quality of controlled waters through the prevention and control of pollution.*

Surface water quality in the Severn Uplands catchment

The management of surface water quality is complex and many of the activities described in this report contribute to it. However, there are five principal activities:

* Water quality monitoring
* Water quality planning
* Managing sewage and industrial waste water
* Managing diffuse contamination
* Managing pollution incidents.

5.11.1 Water quality monitoring

The Environment Agency monitors the quality of rivers, canals, and discharges within the Severn Uplands catchment to determine whether:

* Water quality is getting better or worse,
* Water quality meets the Agency's targets for that river, (see 5.11.2)
* The quality complies with relevant European Community Directives, and
* Discharges are meeting the standards in their consents to discharge.

The Agency carries out regular routine monitoring of rivers and canals to determine if water quality is getting better or worse. This data is assessed using a classification system known as the General Quality Assessment. The General Quality Assessment system looks at four aspects of river quality: chemical, biological, nutrients and aesthetics (appearance and smell). This allows the Agency to build up an overall picture of the different aspects of the river quality. At present the Agency only reports on the chemical and biological quality of rivers and canals. The nutrient and aesthetic aspects are still being developed. A classification scheme for lakes is under development.

Each year the Agency reviews water quality data using the General Quality Assessment Scheme. The rivers are split into stretches and each stretch has a sample point associated with it. The river is then classified into one of six bands, A-F. This banding is based on data collected over a three-year period, in the case of the Severn Uplands catchment from 1995–1997.

In the Severn Uplands catchment the chemical and biological General Quality Assessment is generally good. No river lengths have been recorded as having poor chemical quality or poor biological quality.

The Agency has statutory responsibilities to report on the compliance with the standards set in European Community Directives. In the Severn Uplands the Agency reports against the following Directives: the Surface Water Abstraction Directive, the Fisheries Directive, the Nitrate Directive, and the Dangerous Substances Directive, and the Urban Waste Water Treatment Directive.

5.11.2 Water quality planning

River Quality Objectives

The Environment Agency sets water quality targets for rivers and canals. These targets are known as River Quality Objectives. These objectives allow the Agency to plan the maintenance and improvement of river quality. They are based on a classification scheme that describes the chemical quality required to support different river ecosystems. This is known as the River Ecosystem Classification Scheme (the RE scheme). The five classes of the scheme are summarised in Table 14.

Table 14- River Ecosystem Classification Scheme classes

	Description
RE1	Water of very good quality suitable for all fish species.
RE2	Water of good quality suitable for all fish species.
RE3	Water of fair quality suitable for high-class coarse fish populations.
RE4	Water of fair quality suitable for coarse fish populations.
RE5	Water of poor quality that is likely to limit coarse fish populations.

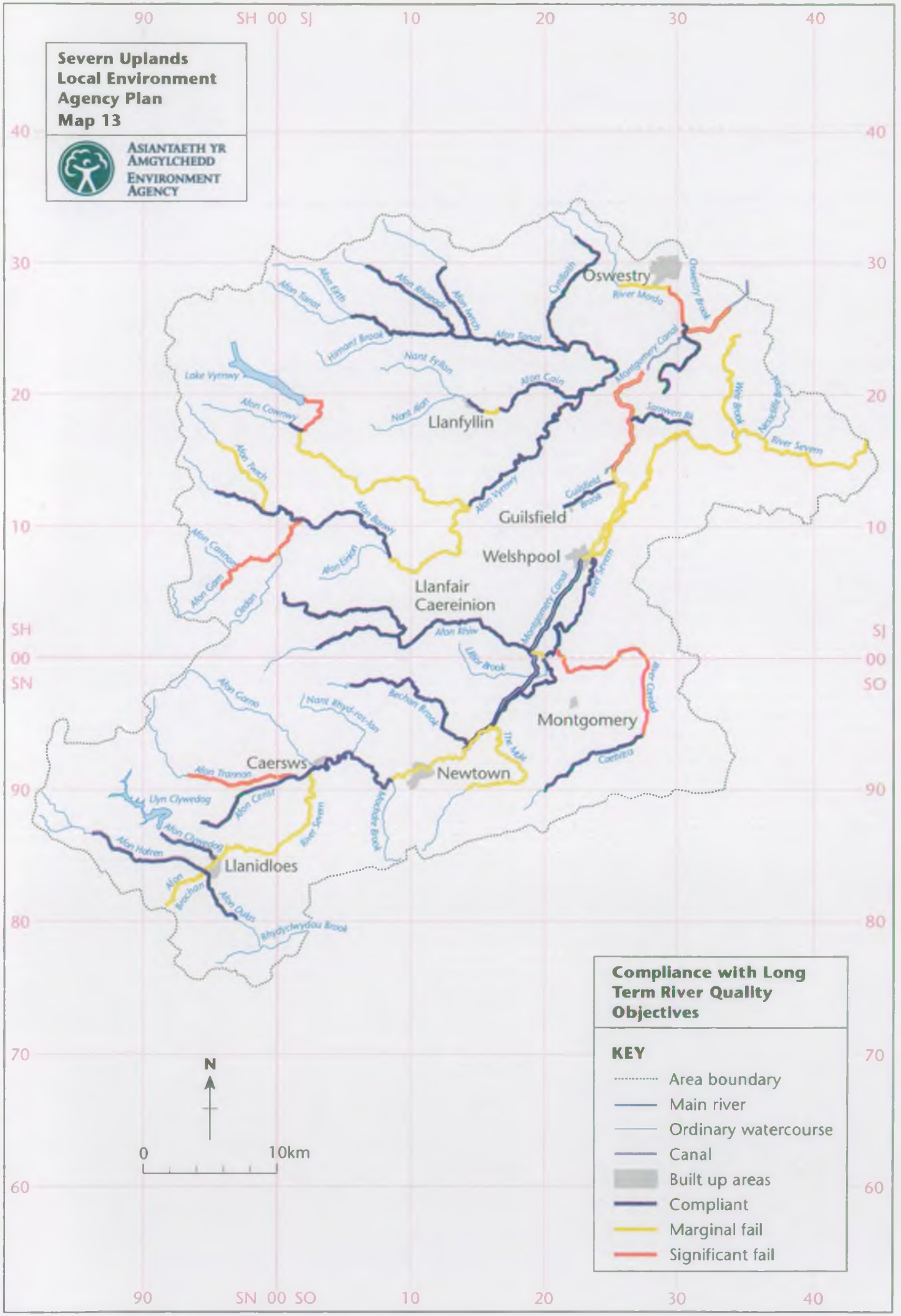
The rivers within the Severn Uplands catchment are split into stretches. Each stretch has a sample point associated with it that is used to monitor the water quality of that stretch. Each stretch has a Long Term River Quality Objective expressed in terms of the Rivers Ecosystem Classification Scheme, and these are shown on Map 13. Table 14 shows a summary of the total length of river with each objective.

Table 15- Long Term River Quality Objectives in the Severn Uplands catchment

Class	Description	Length (km) with that objective	Percentage meeting objective
RE1	Very good quality	381.4	77%
RE2	Good quality	105.4	77%
RE3	Fair quality	7.5	0%
RE4	Fair quality	0.0	-
RE5	Poor quality	0.0	-
Total		494.3	

The Agency uses the objectives for guiding decisions about other statutory controls such as discharge consents and for target work to improve water quality (see Issue 10).

At present these objectives are not statutory. However, the Government may ultimately designate these objectives on a statutory basis by setting Statutory Water Quality Objectives. If this is done the Agency will be responsible for ensuring that these objectives are met.


Severn Uplands
Local Environment
Agency Plan
Map 13
Asiantaeth yr Amgylchedd
Environment Agency
90 SH 00 SJ 10 20 30 40
90 SN 00 SO 10 20 30 40
Oswestry
Llanfyllin
Guilsfield
Welshpool
Llanfair
Caereinion
Montgomery
Caersws
Newtown
Llanidloes
Lake Vyrnwy
River Severn
Montgomery Canal
N
0
10km
Compliance with Long Term River Quality Objectives
KEY
Area boundary
Main river
Ordinary watercourse
Canal
Built up areas
Compliant
Marginal fail
Significant fail

The Agency assesses compliance with River Quality Objectives every year by using a three-year dataset. If stretches are failing their objective the Agency will seek improvements in water quality where practicable. (See Issue 10). Map 13 and Table 15 shows compliance with objectives for each stretch and Table 15 gives a summary of this for the whole catchment.

Table 16- River Ecosystem (RE) Water Quality Objectives for the Severn Uplands catchment

In the last column, Compliance, the letters indicate that the quality was compliant (C) with the objective, marginally failed the objective (M), or significantly failed it (S).

Highlighted lines indicate significant failure of the RE Class limits for that stretch of watercourse.

Name of Watercourse	Start of Stretch	End of Stretch	Length of Stretch (km)	Long Term Objective	Compliance
River Severn	Cwm Ricket Ford	Conf. with Afon Clywedog	11.5	RE1	C
River Severn	Afon Clywedog	Conf. Afon Cerist	14.5	RE1	M
River Severn	Conf. Afon.Cerist	Conf. Mochdre Bk	12.3	RE1	C
River Severn	Conf. Mochdre Bk	Newtown STW	7.4	RE1	M
River Severn	Newtown STW	Conf. Afon Miwl	3.5	RE1	M
River Severn	Conf. The Mule	Welshpool STW	20.3	RE1	C
River Severn	Welshpool STW	Conf. Afon Vyrnwy	25	RE1	M
River Severn	Conf. A Vyrnwy	Conf. River Perry	18.5	RE1	M
Afon Clywedog	Llyn Clywedog Dam	River Severn	5.3	RE1	C
Afon Dulas	Tylwch	Conf. River Severn	5.0	RE1	C
Afon Brochan	Glyn Brochan	Afon Dulas	2.3	RE2	C
Afon Cerist	Van	Conf. Trannon	7.5	RE3	C
Afon Cerist	Conf. Trannon	Conf. River Severn	1.5	RE1	C
Afon Trannon	Llawryglen Ford	Conf. Afon Cerist	8.5	RE2	S
Afon Garno	Afon Cledan Conf.	Conf. River Severn	10.0	RE1	S
Bechan Brook	Gwgia Pool Outlet	Conf. River Severn	10.5	RE2	C
Afon Miwl	A489 Gilfach Br, Kerry	River Severn	11.0	RE1	M
Afon Rhiw	South Nant-Y-Llyn	Conf. North Arm	7.4	RE1	C
Afon Rhiw	North Lletty - Gwilym	Berriew STW	20.0	RE1	C
Afon Rhiw	Berriew STW	Conf. River Severn	1.0	RE1	M
R Camlad	Caebitra Brook	Whitterage Br Chirbury	6.2	RE1	S
R Camlad	Whitterage Br Chirbury	River Severn	17.0	RE1	S
Caebrita Bk	Old Hall	Camlad	10.0	RE2	C
Guilsfield Bk (New Cut)	Guilsfield Mill Ford	River Severn	9.8	RE2	C

Afon Vyrnwy	Lake Vyrnwy Dam spill	Conf. Cownwy	4.5	RE1	S
Afon Vyrnwy	Conf. Cownwy	Conf. Banwy	18.9	RE1	M
Afon Vyrnwy	Conf. Banwy	Conf. Tanat	20.3	RE1	C
Afon Vyrnwy	Conf. Tanat	Conf. River Severn	21.9	RE1	C
Afon Cownwy	Bryn Cownwy	Conf. Afon Vyrnwy	1.5	RE1	C
Afon Banwy	Nant Ysguthan Conf.	Conf. Afon Einion	17.0	RE1	C
Afon Banwy	Conf. Afon Einion	Conf. Afon Vyrnwy	12.5	RE1	M
Afon Twrch	Nant-yr-Helyg Bridge	Conf. Afon Vyrnwy	7.5	RE1	M
Afon Gam	Cwm Derwyn Ford	Conf.. Afon Banwy	9.0	RE1	S
Afon Cain	Road Bridge Llanfyllin	Llanfyllin STW	1.2	RE1	C
Afon Cain	Llanfyllin STW	Green Hall	1.4	RE1	M
Afon Cain	Green Hall	Conf. Brogan	4.4	RE1	C
Afon Cain	Conf. Brogan	Conf. Afon Vyrnwy	4.0	RE1	C
Afon Tanat	Conf. Afon Eirth	Conf. Iwrch	11.1	RE1	C
Afon Tanat	Conf. Iwrch	Conf. Afon Vyrnwy	16.3	RE1	C
Afon Rhaeadr	Pistyll Rhaeadr	Conf. Afon Vyrnwy	8.0	RE1	C
Afon Iwrch	Pont Maen Gwynedd	Conf. Tanat	7.0	RE1	C
Afon Cynllaith	Pen-y-Gwelly Res	Conf. Tanat	12.0	RE1	C
River Morda	Tyn-y-Coed Bridge	NWW WTW Discharge	4.0	RE1	M
River Morda	NWW WTW Overflow	Oswestry Mile Oak WRW	1.5	RE1	S
River Morda	Oswestry Mile Oak WRW	Newbridge	1.6	RE2	S
River Morda	Newbridge	Conf. Oswestry Bk	2.9	RE2	C
River Morda	Conf. Oswestry Bk	Conf. Afon Vyrnwy	6.1	RE2	C
Sarn Wen Bk	Source	Conf. Afon Vyrnwy	5.5	RE2	M
Weir Bk	Footbridge at Weir Bk	Conf. River Severn	9.2	RE2	M
Montgomery Canal	A5 Rd Bridge	Morton Farm, Morton	4.5	RE2	S
Montgomery Canal	Pant-Plas Cerrig	Wern Outfall.	10.0	RE2	S
Montgomery Canal	Wern Outfall	Welshpool Marina	9	RE2	M
Montgomery Canal	Welshpool Marina	Aberbechan	15.5	RE2	C

When the Agency issues new consents to discharge the limits are set to ensure that the River Quality Objective in the receiving watercourse will be met. However there are already over 400 consents in the catchment and many of the older consents, especially for sewage works, were set some years ago when it was not necessary to meet the objective in the receiving watercourse. Where a consented discharge is causing a failure of the River Quality Objective the Agency seek to improve the quality of the discharge and modify the consent accordingly. The Agency is involved in negotiations with Severn Trent Water and the Office of Water Services to prioritise future investment by Severn Trent Water. The Agency will seek to ensure that the sewage works' discharges will ultimately not cause any failures of the River Quality Objectives.

Asset Management Plans

These are part of the Water Companies' Strategic Business Plans drawn up following negotiation between the Agency, the DETR (Department of the Environment, Transport and the Regions (formerly the DoE)), OFWAT (Director of Water Services) and the Water Service Companies. These Asset Management Plans (AMPs) specify the improvement work programmed for a five-year period. The second stage of these plans (AMP2) was agreed in 1994 and governs the priorities for investment by the water companies until the year 2000. AMP3, the third stage of this periodic review process, is currently being drawn up and the investment programme for this will run from 2000 to 2005.

EC Directive Reporting

EC Directives apply to the quality of surface water to support fish life, the control of discharges of dangerous substances and the levels of treatment performed at Sewage Treatment Works. The relevant directives are given in Appendix 4 (page 156).

5.11.3 Sewage and industrial waste water

All discharges of sewage and trade effluent require a Consent from the Environment Agency. The Consent specifies the volume that can be discharged and what it may contain. These conditions are calculated i) by taking into account the water quality and the amount of water available to dilute the effluent at the point of discharge and ii) to ensure that downstream water quality remains acceptable for all its many uses and meets the relevant water quality standards.

Local Perspective

There are a total of 213 consented discharges within the catchment. 95 are sewage effluent or sewerage system overflows owned and controlled by Severn Trent Water Ltd, 109 are sewage effluents in other private control, individual or groups of house-owners, local councils and other Authorities. The remaining 9 discharges are industrial/trade effluent.

The Environment Agency monitors all discharges. The results of this monitoring are held on a register open to public inspection at the Environment Agency Area Office at Shrewsbury.

The principal sewage discharges are from works serving Oswestry (which has a consented discharge in dry weather of 4.9 Ml/d (to be confirmed), Newtown (3.6 Ml/d), Llanidloes (2.2 Ml/d) and Welshpool (2.2 Ml/d). The total sewage effluent discharge is approximately 20 Ml/d which is just less than 3% of the 700 Ml/d dry weather flow of the River Severn as measured at Montford Bridge.

Many sewerage systems have storm water overflows operating within the system or at the sewage treatment works. Most operate without causing nuisance, however overflows at Newtown and Llanidloes located in areas of high public amenity can give rise to complaint.

Only 2 of the trade effluent discharges are of sufficient significance to present a potential impact on receiving river water quality. North West Water's Oswestry Water Treatment Works process waste water (7Ml/d) discharges to the Morda, and Edward Hamer's Abattoir at Llanidloes which discharges 150m3/d of treated effluent to the River Severn.

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

Due to the rural nature of the area a large proportion of properties are not connected to public or private sewage treatment works but dispose of foul sewage by means of soakage of septic tank effluent into the ground. Volumes of discharge are generally very small, invariably below 5m3/d. Such discharges are not normally formally controlled by the Environment Agency. Larger discharges and those in particularly sensitive locations in relation to groundwater quality may be controlled by use of a Prohibition Notice under the Water Resources Act 1991. Such discharges are only permitted where Mains drainage is not available, where ground conditions do not permit septic tank drainage and where a suitable watercourse is available to receive the effluent.

Map 14 indicates the location of the significant effluent discharges.

5.11.4 Diffuse contamination

As rainwater runs across land or through soils it absorbs minerals and collects material from the surface, e.g. oil, sediment and chemicals. The land use affects the characteristics of the run-off and can contaminate the water, which in turn affects the quality of rivers and streams. This is termed diffuse contamination. In this catchment there are three main sources of diffuse contamination:

* Agriculture, which can lead to contamination with sediment, fertilisers and pesticides;
* Historical mines
* Acidification (refer to Section 5.5 on Forestry and Issue 9).

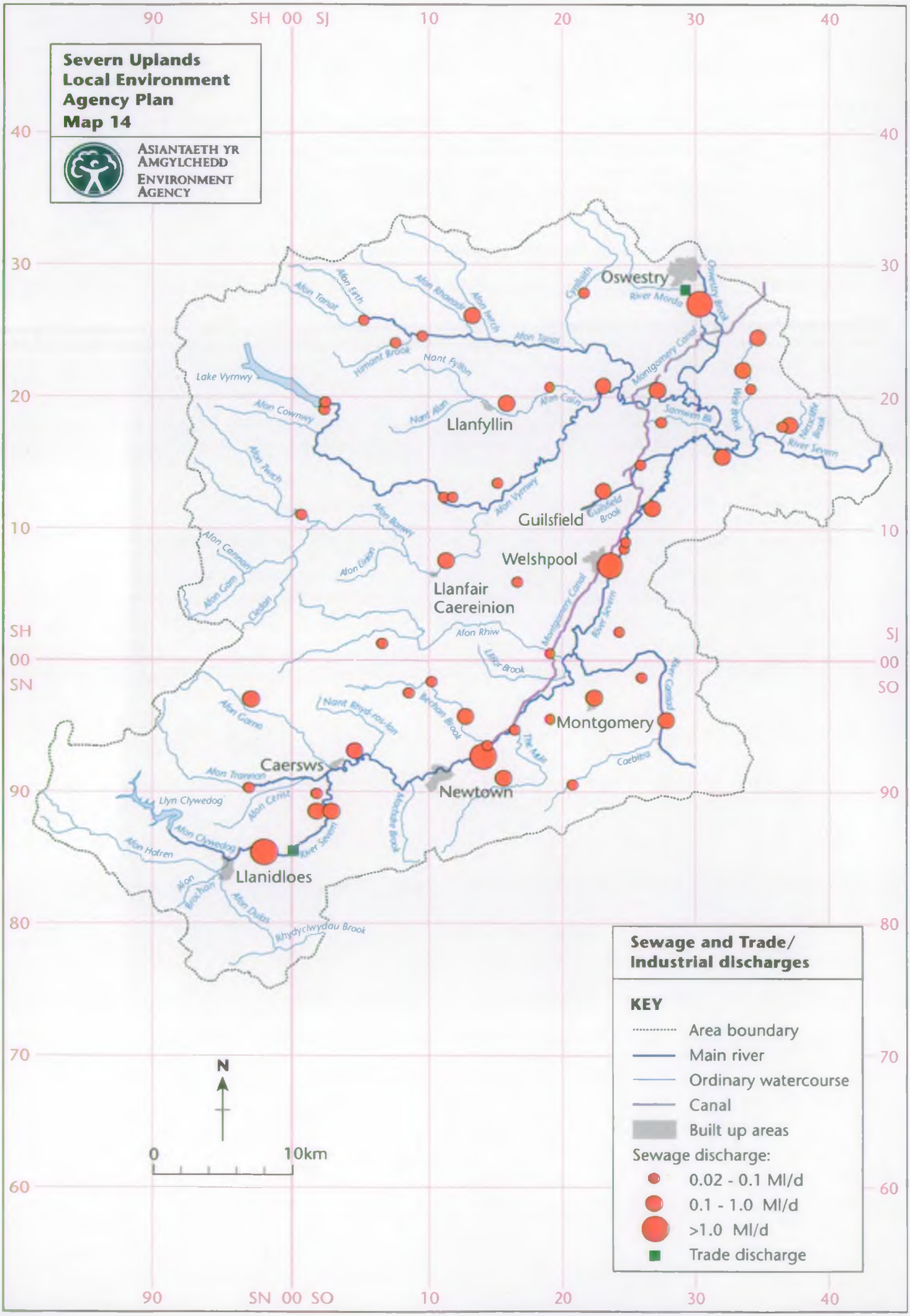
Diffuse contamination from agriculture

Agriculture and changes in agricultural practices lead to change in the characteristics of land and can lead to three main diffuse contaminants: sediment, fertilisers and pesticides.

Disturbing the soil to plant crops significantly increases sediment losses to watercourses, as a result of soil erosion. This can cause contamination of rivers and siltation of the gravels used by salmon and trout for spawning.

Since the 1950s farming has increasingly used chemical fertilisers to increase plant yields and pesticides for insect and weed control. Increased use of chemicals results in more loss to the water environment - both surface waters and groundwaters, and can increase nitrate levels in surface water and groundwater.

Pesticides can also contaminate groundwater and surface waters. The loss of pesticide to the water environment is on average 5% of the application. If rainfall occurs shortly after application losses can be significantly higher and can result in fish kills in water bodies receiving run-off. There may also be long term effects on the biological quality of the water body. A particular concern in this catchment is the use of synthetic pyrethroid sheep dip, which is discussed in Issue 18.


Severn Uplands
Local Environment
Agency Plan
Map 14
Asiantaeth yr Amgylchedd
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SN 00 SO
Oswestry
River Morda
Llanfyllin
Lake Vyrnwy
Guilsfield
Welshpool
Llanfair
Caereinion
Montgomery
Caersws
Newtown
Llanidloes
Llyn Clywedog
Afon Hafren
Afon Severn
Rhydyclwydau Brook
N
0
10km
Sewage and Trade/
Industrial discharges
KEY
Area boundary
Main river
Ordinary watercourse
Canal
Built up areas
Sewage discharge:
0.02 - 0.1 Ml/d
0.1 - 1.0 Ml/d
>1.0 Ml/d
Trade discharge

Diffuse contamination from abandoned historical mines

Run-off and discharges from mine workings can introduce potentially toxic substances to the natural environment. Active sites are subject to discharge consent procedures. However, problems arise with abandoned mines, which are not adequately controlled by law.

The legacy of mining activity in this area is sites covered with mine spoil along with shafts that can contaminate local streams with metals. See Issue 11 and section 5.6 for more information.

Diffuse contamination from acidification

Industrial activity, transport, and poorly managed forests combined with high rainfall and soils with a low buffering capacity all contribute to creating an acidic environment. This can have a serious effect upon insect, fish and bird life (see Issue 9).

5.11.5 Pollution incidents

The Agency responds to incidents of pollution 24 hours a day, 365 days a year. Pollution of the environment is a criminal offence and the Agency will prosecute whenever necessary.

The Agency responds to reports of pollution incidents at all times and has a 24-hour emergency hotline for members of the public to report any water, air or land related incidents:

Emergency Hotline: 0800 80 70 60 (Open 24hrs a day)

To ensure all reported incidents of pollution are treated consistently, a national classification system has been devised. This splits pollution incidents into four categories depending on their severity: major, significant, minor and unsubstantiated. A summary of the 128 substantiated pollution incidents reported for the Severn Uplands catchment in 1997 is given in Table 16. There were also a total of 34 unsubstantiated pollution incidents to which Agency staff responded.

These incidents have also been split into types of pollutant and these are shown in Table 17.

Slurry Pollution, Nawt Llwydiarth/ Afon Vyrnwy Confluence.

Table 17 Pollution Incidents by Type and Cause for 1997

		Class 1	Class 2	Class 3	Cumulative Total
TYPE	Agriculture	0	6	30	36
	Oil	0	2	29	31
	Chemical	0	6	7	13
	Sewage	0	0	19	19
	Other	0	2	27	29
	TOTAL	0	16	112	128
SOURCE	Industry & Commercial	0	0	23	23
	Agriculture	0	12	36	48
	Water Utility Company	0	1	18	19
	Other	0	3	35	38
	TOTAL	0	16	112	128

Class 1- Major incident Class 2- significant incident Class 3-Minor incident PRIVATE

The Agency takes emergency action to reduce the impact of pollution incidents, for example putting out booms to collect oil or pumping oxygen into the water to help the fish. The Agency also takes remedial action, for example, by restocking with fish. The Agency works to identify the polluter and takes necessary action, including legal action. In addition to penalties imposed by the courts the Agency uses legal powers to recover the costs of tackling the pollution from the polluter. This is referred to as the 'Polluter Pays Principle'.

5.11.6 Groundwater Quality

The Agency's *'Policy and Practice for the Protection of Groundwater'* (PPPG) provides advice on the management and protection of groundwater on a sustainable basis. Details on this policy are given in Appendix 3, page 153. The national framework policy for the protection of groundwater will manage groundwater protection effectively in this catchment. Groundwater resources are generally very limited throughout the catchment, with the Permo-Triassic Sandstones in the north east being the primary aquifer. The Groundwater Vulnerability map shows how vulnerable groundwater is to pollution, based on the nature of the strata and type of soil and drift cover (refer Map 16). The Agency has only limited groundwater quality information for the catchment.

Nitrate Vulnerable Zones (NVZs) and Nitrate Sensitive Areas (NSAs)

In response to the EC Nitrate Directive, the Agency has defined Nitrate Vulnerable Zones around public water supply abstractions where nitrate concentrations in groundwater have been found to exceed a certain level. NVZs are statutory areas and when the scheme is implemented prior to December 1999, adherence to the action plan will be compulsory. These programmes will replace the current NSA voluntary scheme. The Agency will continue to monitor nitrate levels in groundwater and will redefine Nitrate Vulnerable Zones as appropriate. There are no NVZs or NSAs in the plan area.

5.12 Complex industrial processes and radioactivity

5.12.1 Complex industrial processes

General

Industrial processes which are included under the Environmental Protection Act 1990 (EPA) are regulated either by the Agency or by the relevant local authority. In general the Agency is responsible for regulating those processes having the greatest potential to cause harm. These are the processes prescribed as 'Part A' processes under the EPA. Local authorities regulate emissions to air from less potentially polluting industries ('Part B' processes).

Integrated Pollution Control (IPC) is an approach to industrial pollution control in the UK that recognises the need to look at the environment as a whole, so that solutions to particular pollution problems take account of potential effects upon all environmental media. The Best Practicable Environmental Option (BPEO) should be used to minimise overall environmental impact.

The Agency has a duty in authorising and regulating a process to ensure that the Best Available Techniques Not Entailing Excessive Cost (BATNEEC) are used to prevent, minimise and render harmless the releases of polluting substances to land, air and water.

Local Perspective

There are no sites within the Severn Uplands LEAP area for which there have been authorisations issued by the Environment Agency under Part 1 of the EPA 1990. Information on local industry and on air quality is given in Section 5.2 and 5.1 respectively.

5.12.2 Storage Use and Disposal of Radioactive Substances

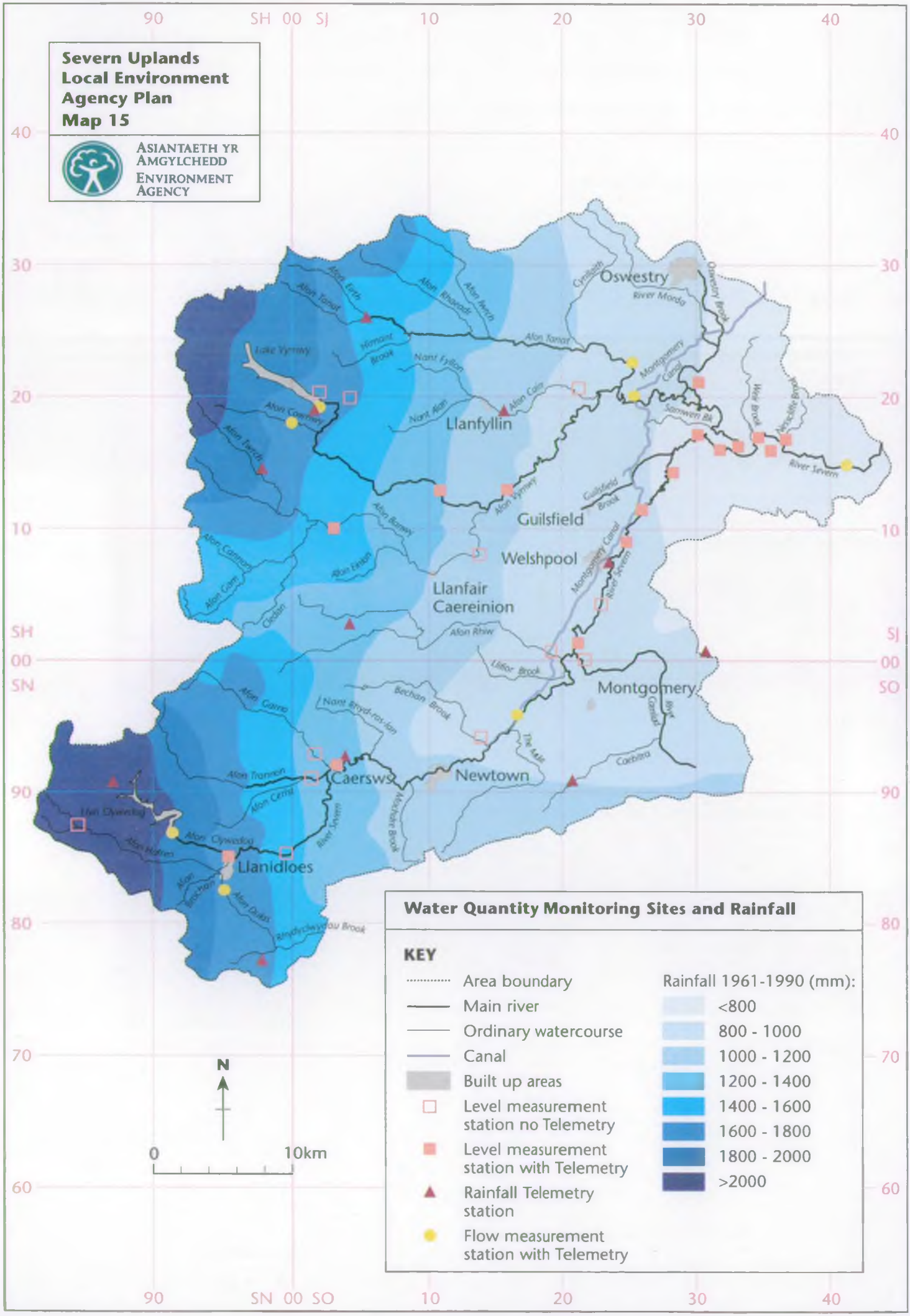
General

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 wastes. The Environment Agency is responsible for administration and enforcement of the Act in England and Wales. This takes the form of registrations and authorisations. The former being required for keeping radioactive material and the latter for accumulating and disposing of radioactive waste.

The types of devices employing radioactive materials and, therefore, requiring a registration include density gauges, thickness gauges, level detectors etc. Also, hospitals require registrations for the use of some radionuclides in treatments such as radiotherapy. If at any stage a radioactive material becomes waste then an authorisation is needed for disposal of the material. Nuclear sites are also regulated by the Environment Agency and require authorisations to dispose of radioactive waste.

Local perspective

There are no sites in the Severn Uplands LEAP area authorised under the Radioactive Substances Act 1993, and only two registrations. The use of radioactive substances in the area comprise a couple of industrial / commercial businesses. These users are registered by the Agency and there have been no incidents or breaches of their conditions.


Severn Uplands
Local Environment
Agency Plan
Map 15
Asiantaeth yr Amgylchedd
Environment Agency
Oswestry
Llanfyllin
Guilsfield
Welshpool
Llanfair
Caereinion
Montgomery
Newtown
Caersws
Llanidloes
Water Quantity Monitoring Sites and Rainfall
KEY
Area boundary
Main river
Ordinary watercourse
Canal
Built up areas
Level measurement station no Telemetry
Level measurement station with Telemetry
Rainfall Telemetry station
Flow measurement station with Telemetry
Rainfall 1961-1990 (mm):
<800
800 - 1000
1000 - 1200
1200 - 1400
1400 - 1600
1600 - 1800
1800 - 2000
>2000
N
0
10km

5.13 Water Resources and Abstraction

General

The removal of water from streams, rivers or groundwater by man is termed abstraction. Licences granted under the Water Resources Act 1991 control abstractions. The abstraction licensing process enables the Agency to manage water resources so as to ensure that the right balance is struck between the needs of abstractors and the environment. Exemptions from the requirement for a licence include most types of water supplies to a single household, and small (less than 20 cubic metres a day) general agricultural uses from surface water (excluding spray irrigation). There are a number of other specific types of abstraction (e.g. fire-fighting) which are exempt from the need for a licence.

All abstraction licences specify maximum volumes that the licence holder may take. Many contain conditions to protect the environment and other abstractors; the exceptions are licences granted as "Licences of Right" in 1965 and "Licences of Entitlement" in 1990 legislation, where the legislation did not permit the Agency's predecessors to restrict pre-existing abstractions. In considering applications for new licences, the Agency must ensure that there is no derogation of existing abstractions without the agreement of the abstractors, and that the aquatic environment and associated habitats are properly safeguarded. The Agency does not guarantee that the authorised volume will be available, nor that water will be fit for the intended use.

These uses include the supply of water from groundwater for public supply, and from groundwater and surface water for industrial, agricultural, amenity and domestic purposes. Over 90% of abstraction are from groundwater. The larger surface and groundwater abstractions in the area are shown in the Maps 17 and 18 (pages 126 and 127). Private supplies are generally derived from springs, wells and boreholes and the Environmental Health department of the Local Authority monitors their quality. The Agency does have a duty to protect water quality and specifies protection zones around groundwater sources to seek control over potentially polluting activities. *The Policy and Practice for the Protection of Groundwater* (NRA 1992) forms the basis for the Agency's policies on controlling these activities (Appendix 2, page 152).

Problems can occur when surface water is abstracted for spray irrigation, as there is a large percentage loss through evaporation. This problem is compounded in the summer months when spray irrigation demands are at their highest, as flows are generally at their lowest at this time of year. To minimise the impact on water resources and to protect existing rights, abstraction restrictions are put into operation when natural river flow falls below a certain threshold (see page 25). Winter storage reservoirs are encouraged where practical and are the only option to obtain reliable supplies of water for irrigation. Fish farming can severely affect a watercourse by diverting a large proportion of the flow through the farm, leaving the natural river reduced in flow (albeit, often for only a short stretch), while any discharge from the farm is enriched and could affect the ecology of habitats below it. The requirement for an adequate residual flow can restrict the viability of a fish farm.

At the time of writing the Department of the Environment, Transport and the Regions (DETR) are reviewing the existing Water Resources legislation and a consultation paper has been published for discussion on potential changes to the law.

The Agency's aim and objectives for water resources

Our principal aim is *to ensure that the existing management and future development of our water resources is carried out in an environmentally sustainable manner through balancing the needs of abstractors with those of the environment.*

Main objectives

In seeking to achieve our principal aim, we will develop integrated policies, guidelines, standards and procedures which:

* Ensure adequate water for the environment
* Seek a sustainable balance between users' needs and those of the environment
* Ensure efficient use of water resources by promoting demand management
* Apply a precautionary approach where appropriate
* Take a long term view
* Take account of the need to maximise economic efficiency

Local perspective

Introduction

The plentiful surface water resources in the catchment are reflected in the volume of surface water licensed abstractions, which are ten times by annual volume those issued for groundwater. The total licensed volume of over 113 thousand megalitres per year is distributed over 348 licences within which those for groundwater outnumber surface water licences by over 2 to 1 (See Table 17).

The overwhelming majority of water (over 90%) is licensed for abstraction for public water supply. This largely reflects the strategic importance of the catchment for water resources that are considered further on page 25.

Within the catchment the major abstracted water use is for public water supply which, for groundwater, is more or less equally shared by 3 groundwater sources at Kinnerley, Ford and Eyton which abstract, respectively, from the Knockin and Alberbury (2) Groundwater units in the north east of the catchment. Their total licensed abstraction at 16 Ml/d (4,643 Ml/a) is similar to the other main public water supply source at Llandinam at 13.7 Ml/d (4,999 Ml/a). This is an abstraction from the river gravels adjacent to the River Severn between Llanidloes and Newtown.

Table 18 - A Summary of Abstraction Licences in the Severn Uplands Area

Type of Abstraction	Surface Water Abstraction			Groundwater Abstraction		
	No. of Licences	Abstraction Ml/annum	Percent by Volume	No. of Licences	Abstraction Ml/annum	Percent by Volume
Public Water Supply	4	95,977.88	92.03	3	7,586.10	80.72
Agriculture (other than spray irrigation)	10	38.96	0.04	186	459.56	4.89
Spray Irrigation	33	600.22	0.63	11	1,193.08	12.7
Private Water Supply	35	66.19	0.06	14	77.08	0.82
Cooling Water Circulated	1	457.9	0.44	1	0.20	<0.01
Industrial	6	219.8	0.21	2	41.10	0.44
Fish Farm	3	844.2	0.81		0	0
Circulation through amenity pond	3	1,801.1	1.73		0	0
Mineral Washing	1	272.73	0.26		0	0
Power Production	3	205.86	0.20		0	0
Transfer	2	3,704.0	3.55	1	0	0
Top up water levels	2	16.4	0.02		0	0
Domestic and agriculture	5	23.1	0.02	7	36.2	0.39
Augmentation of river flows (SGS)	0	0	0	1	4.6	0.05
TOTALS	108	104,228.34		240	9,397.92	

Abstractions for other uses are relatively small with total usage in the range 1000 Ml/a to 2000 Ml/a for amenity pond circulation, for industry and for agricultural spray irrigation. Of the 33 spray irrigation licences from surface water nearly a half are subject to restriction depending on prescribed flow thresholds at Agency gauging stations. Details of restricted licences are given in Table 18.

A large proportion of the catchment is exempt from licensing for groundwater abstraction. Much of the area concerned has only shallow and unreliable groundwater from which, nonetheless, locally important private water supplies are drawn.

In addition to the above limited quantities are abstracted for fish farming, for mineral washing and for power

production. Nearly two thirds of all licences relate to groundwater abstractions for use in agriculture other than spray irrigation.

Within the catchment there are five boreholes in the Ensdon Unit which form part of the Shropshire Groundwater Scheme - a strategic facility described more fully in the section on strategic water resources on page 25.

Maps 17 and 18 respectively show licensed groundwater and surface water abstractions greater than 1 Megalitre/day.

Table 19 - Abstraction Restrictions Dependent on Prescribed Flows in Surface Watercourses at Agency Gauging Stations.

Source of Abstracted Water and Use	No of Licences	Watercourse used for PF	Agency Gauging Station	Flow Threshold Ml/d	Type of Restriction
R Morda (West SI	1	River Severn	Bewdley	770	Cease
R Morda (East) SI	1	River Severn	Bewdley	770	Cease
R Vyrnwy SI	1	River Severn	Bewdley	770	Cease
R Vyrnwy SI	1	River Severn	Bewdley	770	Cease
R Tanat SI	1	River Tanat	Llanyblodwel	55	Cease
Afon Cain SI	1	River Tanat	Llanyblodwel	55	Cease
Caebitra SI	1	Rea Brook	Hookagate	18	Cease
Cynllaith SI	2	River Tanat	Llanyblodwel	55	Cease
Afon Rhiw Top-up	1	River Tanat	Llanyblodwel	55	Cease
R Morda SI	1	River Perry	Yeaton	40	Cease
R Vyrnwy SI	1	River Tanat	Llanyblodwel	55	Cease
Weir Brook SI	1	River Severn	Bewdley	773	Cease

SI = Spray Irrigation PF = Prescribed Flow

Surface Water

The River Severn is regulated in accordance with the Clywedog Reservoir Joint Authority Act 1963 as amended 1979. Releases are required to supplement low flows and hence to safeguard large abstractions in the middle and lower reach of the river and to maintain an adequate flow to the estuary at Gloucester.

When flow in the Severn at Bewdley is above the statutory threshold these releases are not required and water is conserved in the reservoirs, except for water released in connection with the generation of hydroelectric power and/or for environmental purposes.

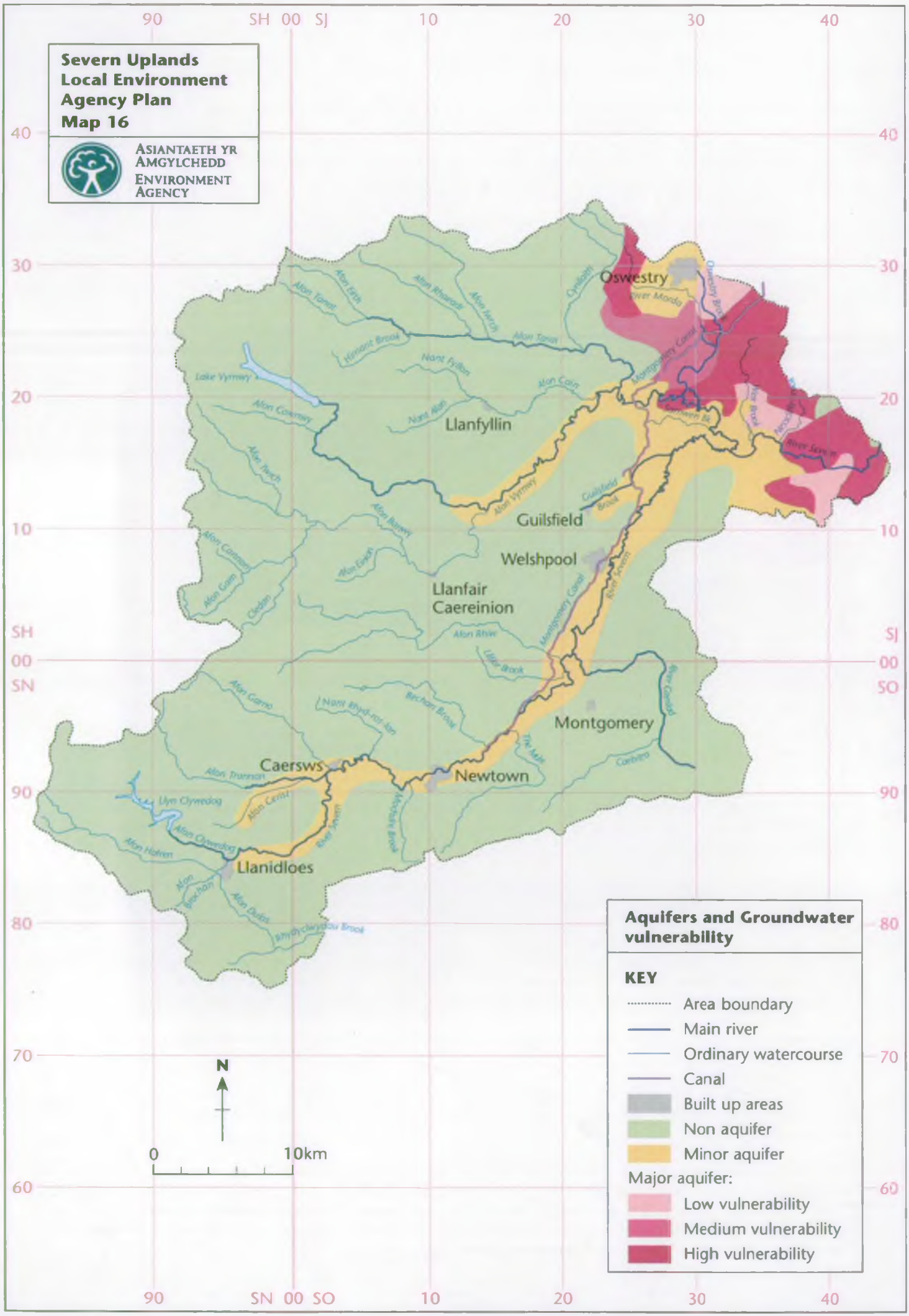
In addition to the regulation of flows in the river during low flow periods, the Agency also exercises control over the discharges from Llyn Clywedog and Lake Vyrnwy in order to provide limited mitigation of flooding in the rivers downstream.

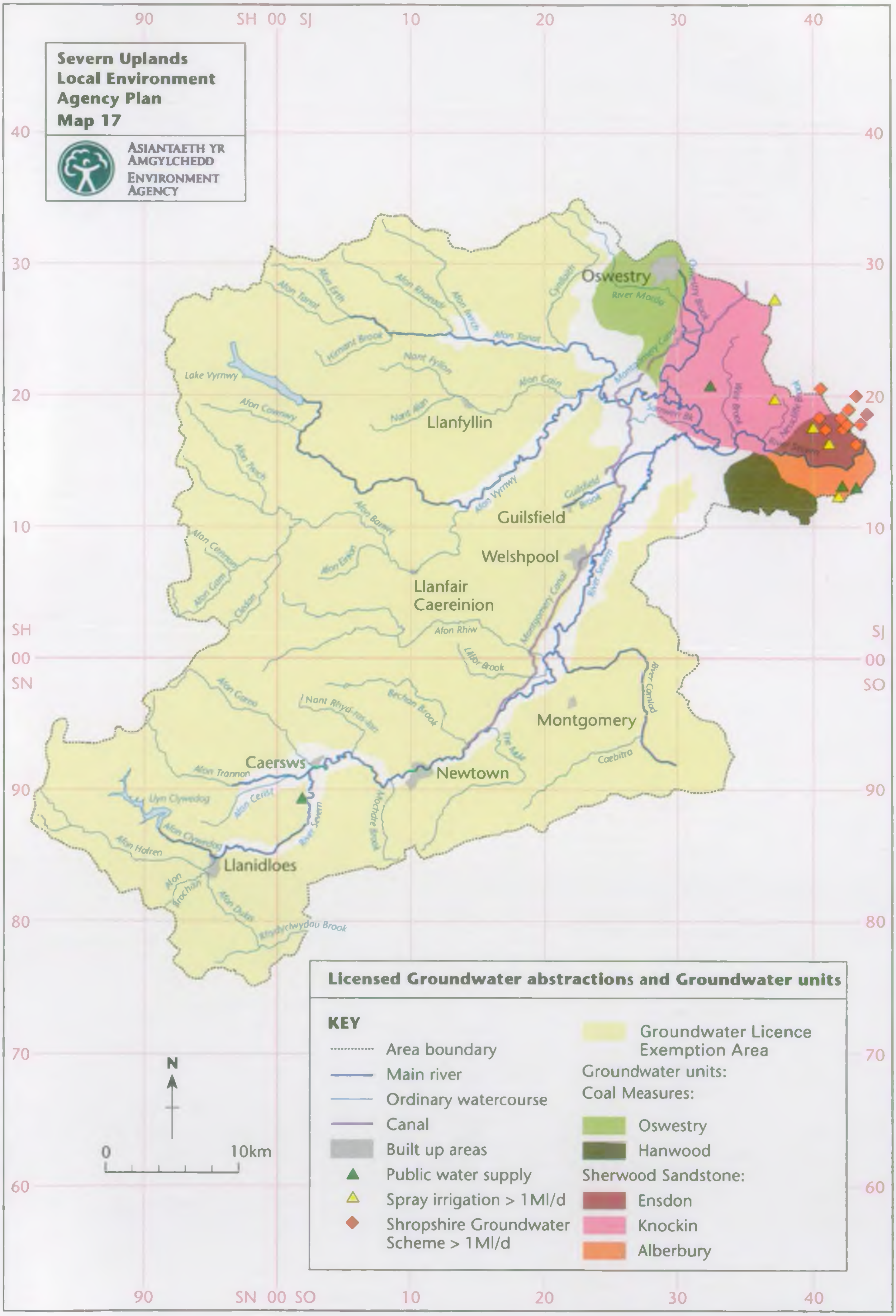
Operating control rules have been drawn up which specify how the reservoirs will be operated, both singly and jointly in conjunction with the Shropshire Groundwater Scheme. These rules are in course of review during which the changing needs of the environment, river abstractors and other river users are being taken into account.

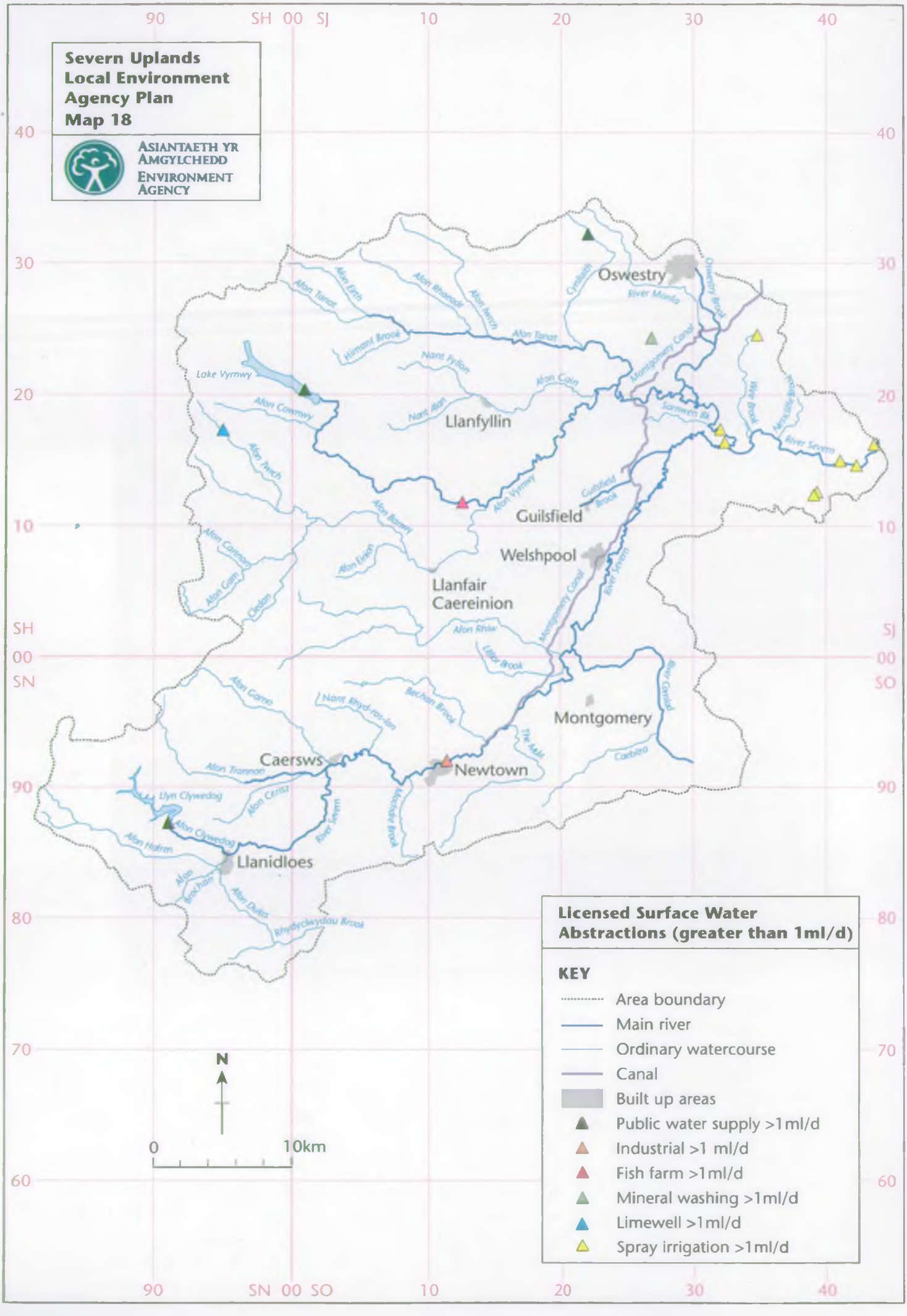
Reservoir release changes are carried out progressively to minimise inconvenience to downstream recreational river users.

Prescribed flows exist on many rivers to protect the aquatic environment against excessive abstractions. The Agency is in the course of formulating an improved rationale to relate restrictions to use-related flow needs in the aquatic environment.

Prescribed flows affecting surface water abstraction in the catchment are listed in Table 18. Early issued licences were related to River Severn flows at Bewdley at a flow in excess of the then regulated minimum maintained flow (MMF). These flows now only occur during droughts when the continued support of the present 850 Ml/d Bewdley maintained flow is not sustainable. The remaining prescribed flows used to control abstractions in the catchment have generally been based on 95% flow exceedance at gauges on similar nearby sub-catchments.


Severn Uplands
Local Environment
Agency Plan
Map 16
Asiantaeth yr Amgylchedd
Environment Agency
Oswestry
Llanfyllin
Guilsfield
Welshpool
Llanfair
Caereinion
Montgomery
Caersws
Newtown
Llanidloes
N
0
10km
Aquifers and Groundwater vulnerability
KEY
Area boundary
Main river
Ordinary watercourse
Canal
Built up areas
Non aquifer
Minor aquifer
Major aquifer:
Low vulnerability
Medium vulnerability
High vulnerability


Severn Uplands
Local Environment
Agency Plan
Map 17
Asiantaeth yr Amgylchedd
Environment Agency
Licensed Groundwater abstractions and Groundwater units
KEY
Area boundary
Main river
Ordinary watercourse
Canal
Built up areas
Public water supply
Spray irrigation > 1Ml/d
Shropshire Groundwater Scheme > 1Ml/d
Groundwater Licence Exemption Area
Groundwater units:
Coal Measures:
Oswestry
Hanwood
Sherwood Sandstone:
Ensdon
Knockin
Alberbury
N
0
10km
Oswestry
Llanfyllin
Guilsfield
Welshpool
Llanfair Caereinion
Montgomery
Newtown
Caersws
Llanidloes
Lake Vyrnwy
Llyn Clywedog
River Morda
Afon Tanat
Afon Cain
Afon Vyrnwy
Afon Cownwy
Afon Rhaeadr
Afon Iwrch
Afon Eirth
Afon Tanat
Hirnant Brook
Nant Fyllon
Nant Alan
Afon Banwy
Afon Einion
Afon Gam
Afon Rhiw
Lledan Brook
Bechan Brook
Afon Garno
Nant Rhyd-ros-lan
Afon Trannon
Afon Cerist
Afon Clywedog
Afon Hafren
Afon Dulas
River Severn
Mochdre Brook
River Camlad
Caebitra
Montgomery Canal
Guilsfield Brook
SH
SJ
SN
SO
90
00
10
20
30
40
80
70
60


Severn Uplands
Local Environment
Agency Plan
Map 18
Asiantaeth yr Amgylchedd
Environment Agency
90 SH 00 SJ 10 20 30 40
90 SN 00 SO 10 20 30 40
Oswestry
Llanfyllin
Guilsfield
Welshpool
Llanfair
Caereinion
Montgomery
Caersws
Newtown
Llanidloes
Lake Vyrnwy
River Severn
Montgomery Canal
Licensed Surface Water
Abstractions (greater than 1ml/d)
KEY
Area boundary
Main river
Ordinary watercourse
Canal
Built up areas
Public water supply >1ml/d
Industrial >1 ml/d
Fish farm >1ml/d
Mineral washing >1ml/d
Limewell >1ml/d
Spray irrigation >1ml/d
N
0
10km

Groundwater

Parts of five groundwater management units fall within the plan area, together with river gravels. The remainder of the catchment is currently exempt from groundwater licensing abstraction.

The long-term objective is to reduce abstractions in any overpumped groundwater unit to a level which is sustainable whilst also reserving sufficient groundwater for environmental needs. In groundwater units where resources are available further licensing of new abstractions is possible, but the objective is to ensure this is not beyond the sustainable limit.

Water levels are monitored at 12 observation boreholes. These give an indication of unacceptable falls in groundwater level, and are used in conjunction with resources data and abstraction records to determine whether the aquifer units are being over-abstracted. The three sandstone Groundwater units in the catchment are managed according to their intensity of use. The monitoring sites in the Ensdon Unit also ensure that any effects arising from pumping of Phase II of the Shropshire Groundwater Scheme are well documented in accordance with the needs of the Shropshire Groundwater Order, 1981.

The KNOCKIN Groundwater Unit (see Map 17), although supporting over 70 licences in the plan area, is licensed for less than 50% of the assessed recharge so resources remain available for further small licence applications. The unit is currently in category D. Baseflows near to the large Kinnerley abstraction have reduced so further large licences are unlikely.

The ALBERBURY Groundwater Unit (see Map 17) is over-abstracted. It contains less than 10 licences in the plan area, but two of these are large, time-limited public water supply licences at Eyton and Ford that are licensed for 8.4 Ml/d in total. The time limits are to enable appraisal of the extent to which River Severn water is available to the unit. Levels are being monitored to assist in the determination of these licences when the time limit is reached. Groundwater levels are falling steadily over most of the unit. The unit is in Category A, which means no further licences can be issued for this unit.

The ENSDON Groundwater Unit (See Map 17), contains 13 licences in the plan area, one of which refers to the four Shropshire Groundwater Scheme sites described above. The other licences are small so total licensed quantity is less than 50% of the assessed recharge, leaving some resource available for further licensing. The unit is currently in category D. The Shropshire Groundwater Scheme licence is restricted over a five-year period to ensure that only intermittent pumping is allowed.

The river gravels are dominated by abstractions at Llandinam (13Ml/d), from gravels which are in hydraulic continuity with the River Severn. A large number of other, smaller, abstractions are also licensed from the superficial deposits. The Water Company is investigating proposals to drill a further borehole at Llandinam to be able to secure and augment supplies.

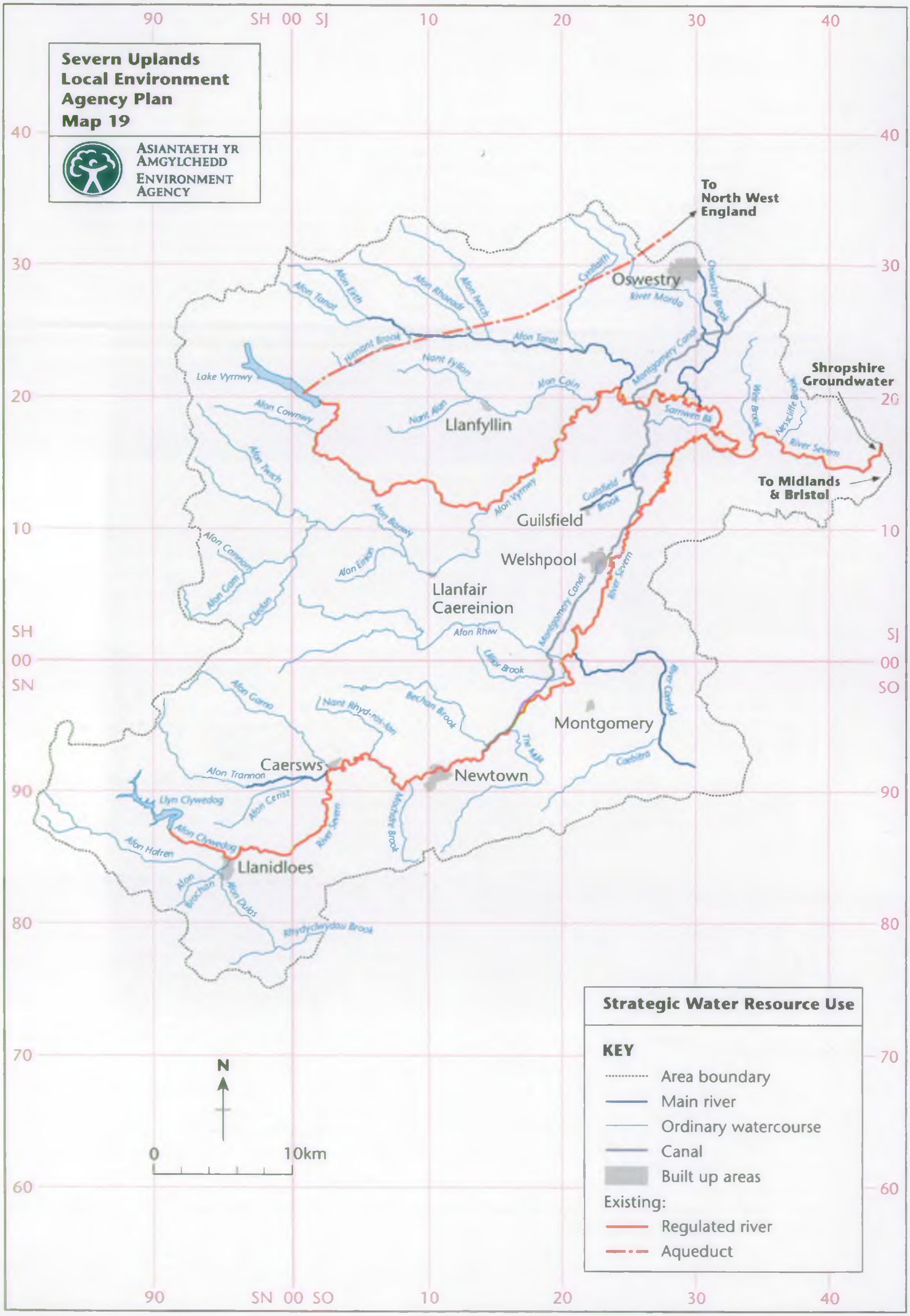
There are other minor aquifers throughout the area and abstraction from these is permitted subject to there being no local derogation or unacceptable environmental impact.

A large part of the area is covered by the Severn River Authority (Exemptions from Control) Order 1967, the effect of which is to exempt the area from the need for groundwater abstraction licences. The current review of the abstraction licence legislation has overtaken the Agency's proposals to review the need or not of continuing to retain the Exempt Area. The government has issued a consultation paper covering the review of abstraction licensing. This paper discusses the possibility of granting the Agency powers to vary licences that are causing environmental degradation.

New Abstractions

The Agency determines new abstraction licence applications within the framework of the Water Resources Act 1991. The impacts of new abstractions will be carefully considered on their own merits and viewed in the light of problems specific to the catchment. The Agency will only grant new licences if it is confident that the available resources are able to sustain the proposed abstraction in the long term without harm to the environment or existing abstractors, and the needs of the applicant are justified.

The Agency's policy is to encourage winter abstraction for storage and subsequent summer irrigation wherever possible, indeed, this is the only option in some areas.


Severn Uplands
Local Environment
Agency Plan
Map 19
Asiantaeth yr
Amgylchedd
Environment
Agency
To
North West
England
Shropshire
Groundwater
To Midlands
& Bristol
Oswestry
Llanfyllin
Guilsfield
Welshpool
Llanfair
Caereinion
Montgomery
Newtown
Caersws
Llanidloes
Lake Vyrnwy
Llyn Clywedog
Afon Tanat
Afon Eirth
Afon Rhaeadr
Afon Iwrch
Cynllaith
River Morda
Oswestry Brook
Montgomery Canal
Hirnant Brook
Nant Fyllon
Afon Cain
Nant Alan
Afon Cownwy
Afon Twrch
Afon Vyrnwy
Afon Banwy
Afon Cannon
Afon Gam
Cledan
Afon Einion
Afon Rhiw
Luggy Brook
Guilsfield Brook
Sarnwen Bk
Wyn Brook
Mesecliffe Brook
River Severn
River Camlad
Afon Carno
Nant Rhyd-ros-lan
Bechan Brook
The Mule
Caebitra
Afon Trannon
Afon Cerist
Afon Clywedog
Afon Hafren
Mochdre Brook
Afon Brochan
Afon Dulas
Rhydyclwydau Brook
N
0
10km
Strategic Water Resource Use
KEY
Area boundary
Main river
Ordinary watercourse
Canal
Built up areas
Existing:
Regulated river
Aqueduct

Strategic Water Resource Use

The catchment is strategically important as both an existing and potential provider of water resources for a large part of central, north west and south west England. There is, however, a strong possibility that demands can be managed to minimise the need for large-scale water resources developments over the next 20 years or so.

On the River Severn the flow is regulated to ensure minimum flow needs are met. The sources of water used for flow regulation are mostly located in the plan area but use of this water is largely 'strategic' i.e. occurs outside the plan area further down the River Severn. Details of supported abstractions and residual flows of the River Severn outside this catchment are published in the Middle Severn LEAP and the Severn Vale LEAP.

Llyn Clywedog, Lake Vyrnwy and the westernmost part of the Shropshire Groundwater Scheme fall within the plan area. They are all used to regulate the flow of the River Severn, but in the case of Lake Vyrnwy resources are also deployed to north west England.

Phase 2 of the Shropshire Groundwater Scheme includes 10 boreholes in all, of which 4 sites (5 boreholes) lie within the plan area and the other 5 just outside the boundary. The boreholes within the plan area are located at Rodefern (SJ 4046 1820), Ensdon (SJ 4092 1731), Forton (SJ 4313 1751) and Knolls (No 1 SJ 4226 1741, No 2 SJ 4231 1751). Of the 5 external sites, 3 sites contribute groundwater discharge to the River Severn within the plan area, via a pipeline. The remaining 2 sites discharge directly to the River Perry which is just outside the plan area.

Map 19 summarises strategic water resource use, and map 17 shows the location of the Shropshire Groundwater Scheme Boreholes.

5.14 Flood Risks

General

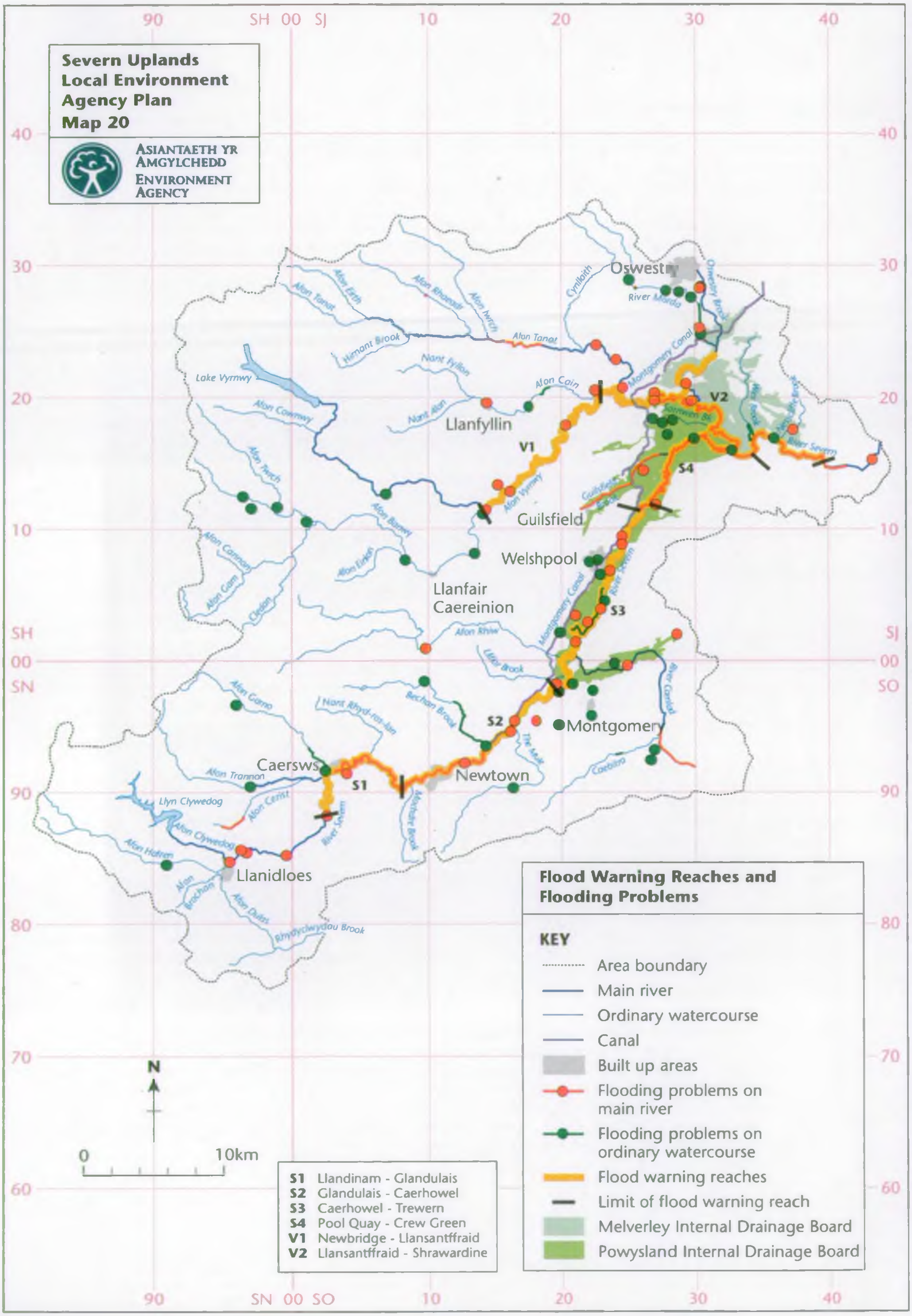
The Nature of Flooding

The river network carries surplus water from land to the sea as part of the natural water cycle. Rivers and watercourses can only cope with a certain maximum flow and when this is exceeded flooding occurs. Prolonged rainfall, thunderstorms or rapid snowmelt can cause flooding. The peak flow of a flood is measured and expressed in terms of the frequency at which that flow is statistically likely to recur, for example 1 in 10 years or 10% chance in any one year.

Individual watercourses will respond differently to the same rainfall conditions due to variations in catchment areas and land use. For example, an urbanised catchment with a high proportion of paved surfaces and drains will have rivers whose levels respond relatively quickly to rainfall. The more open countryside of a rural catchment will often allow more of the rain to soak into the ground and thus slow down runoff, so river levels will rise less rapidly but remain at the higher level longer.

Localised flooding may also occur where watercourses become blocked at particular points such as under bridges or in culverts. Often debris gathering at these points includes garden waste and other rubbish, which has been deposited on riverbanks, and this can be a major problem in urban areas. Flooding can also occur where surface water drains are unable to discharge into swollen watercourses, or further back in the surface water drainage system where their capacity is exceeded.

When watercourses flood water flows into the floodplain (see Map 20, page 129 and Table 20 page 135, for flooding problem areas). These natural floodplains (which are as much a part of the river system as the channel which carries normal flows) provide extra capacity for the storage and passing downstream of floodwater. This capacity is reduced if significant areas of floodplain have been raised, embanked, or built upon. This loss of storage volume can lead to higher river levels elsewhere and for this reason it is not possible (or desirable) to alleviate flooding in all areas. The priority for flood alleviation lies in urban areas as undeveloped floodplains should be allowed to play their natural role as the continuity between the river and its floodplain is an essential part of the water cycle.


Severn Uplands
Local Environment
Agency Plan
Map 20
ASIANTAETH YR AMGYLCHEDD
ENVIRONMENT AGENCY
Flood Warning Reaches and Flooding Problems
KEY
Area boundary
Main river
Ordinary watercourse
Canal
Built up areas
Flooding problems on main river
Flooding problems on ordinary watercourse
Flood warning reaches
Limit of flood warning reach
Melverley Internal Drainage Board
Powysland Internal Drainage Board
S1 Llandinam - Glandulais
S2 Glandulais - Caerhowel
S3 Caerhowel - Trewern
S4 Pool Quay - Crew Green
V1 Newbridge - Llansantffraid
V2 Llansantffraid - Shrawardine
N
0
10km
Oswestry
Llanfyllin
Guilsfield
Welshpool
Llanfair Caereinion
Montgomery
Caersws
Newtown
Llanidloes
Lake Vyrnwy
Llyn Clywedog
Afon Tanat
Afon Eirth
Afon Rhaeadr
Afon Iwrch
Hirnant Brook
Nant Fyllon
Nant Alan
Afon Cain
Afon Cownwy
Afon Twrch
Afon Banwy
Afon Einion
Afon Cannon
Afon Gam
Cledan
Afon Rhiw
Lledan Brook
Bechan Brook
Afon Carno
Nant Rhyd-ros-lan
Afon Trannon
Afon Cerist
Afon Clywedog
Afon Hafren
Afon Brochan
Afon Dulas
Rhydyclwydau Brook
River Severn
Mochdre Brook
The Mule
Caebitra
River Camlad
Montgomery Canal
Guilsfield Brook
Cynllaith
River Morda
Oswestry Brook
Afon Vyrnwy
V1
V2
S1
S2
S3
S4
SH 00 SJ
SN 00 SO
90
10
20
30
40

The Agency's aims and objectives for flood risks

The Agency's principal aim is to 'provide effective defence and warning systems to protect people and property against flooding from rivers and the sea.'

This aim can only be met when activities meet specific technical, environmental and economic criteria. Whatever is done a residual risk of flooding always remains.

Main objectives

To achieve our aim we have set the following objectives:

* **Provide an effective flood warning service**

The Agency is responsible for the issue and dissemination of flood warnings to the public, and continually monitors weather conditions, rainfall, and tidal and river levels to forecast where flooding may occur. Our target is to provide a minimum of two hours warning of the commencement of flooding where practicable.

* **Maintain, operate and improve rivers and flood defences where appropriate**

The Agency improves and maintains rivers and flood defences to ensure they will perform as planned under flood conditions. When floods or high tides are predicted, prompt and effective operation of the flood defence system is required to minimise the risk of flood damage. We have a skilled workforce, which is available to provide the emergency response required.

The Agency seeks to maintain and improve watercourses to ensure that the appropriate Standard of Service (SoS) is achieved (see Appendix 3 page 153). The following targets are used: -

* The actual SoS of rivers should meet their target SoS for the land use band (see Appendix 3, page 153).

* All Capital schemes must be technically, economically and environmentally sound.

* **Supervise, regulate and influence the action of others**

The Agency has its own limited powers to regulate development that may increase flood risk. In recognition of this, the government wishes the Agency to work in partnership with planning authorities and to ensure that flood risks are not created or exacerbated, by influencing the statutory town and country planning process. The government has indicated that the Agency's main input to development planning is through the provision of floodplain surveys and advice on development and flood risk in a consistent way.

These objectives form the basis for flood defence input to LEAPs and other planning initiatives, including Development Plans, Shoreline Management plans, Estuary Management Plans, Coastal Zone Management Plans and Water Level Management Plans.

The following targets are used: -

* No loss of flood plain flow or storage capacity.

* No increase in flood risk as a result of development.

* No new development in an area where the existing level of service is considered below the standard required for the type of development proposed.

* Provision of suitable access for maintenance of the river channel.

Local Perspective

The Severn and Vyrnwy valleys have extensive areas of flood plain, particularly in the vicinity of their confluence where approximately 50 square kilometres are used from time to time in this way.

This area provides natural storage for excess floodwaters and helps to limit the flows passed further downstream. This impact on flows has been increased by the construction in the 18th century of embankments (locally known as argaes). The argaes serve a dual purpose- providing limited protection for the land behind, and at times of higher flows retaining greater volumes of water in storage than would occur on a natural flood plain.

The extent of designated main river on which the Agency has powers to carry out work to maintain or improve rivers to achieve their designated standards of service is shown on all maps.

Flood defences have been constructed to provide protection to the communities at Caersws, Meifod and Newtown. Other watercourses that have benefited from engineering works in the past for defence and drainage purposes include the rivers Camlad, Cerist, Trannon and Morda.

Work to maintain bankside trees and limit the effects of them falling in and causing blockages are carried out on all main rivers as and when necessary. Regular annual bank brushing and waterweed clearance is carried out only on the rivers Camlad and Morda, which are in part lowland rivers. Similarly, desilting is only carried out as and when necessary on the lowland rivers.

In most locations flooding cannot be reduced and in others to do so would exacerbate problems elsewhere. Even where flood alleviation schemes exist, flooding is not prevented, only reduced. For these reasons a Flood Warning Scheme is in operation for parts of the rivers Severn and Vyrnwy to lessen the damage when floods occur.

Warnings are initiated and disseminated by the Environment Agency using automated telephone messaging, flood wardens, local radio, and a recorded messager system (Floodcall) and teletext service. Warnings are targeted at those directly at risk of flooding by using automated telephone messaging and flood wardens, but information on warnings issued is available to everyone via the other more widely broadcast routes.

The hilly characteristics of the area and rapid response of rives to rainfall limit the extent of rivers on which it is feasible to reliably warn of flooding. It is not normally possible to achieve the 2 hour warning time for the current limit of the flood warning service at Llandinam on the Severn and Newbridge (Meifod) on the Vyrnwy.

Because of the predominantly hilly characteristics of the area there is considerable pressure for development on the limited amount of flat land, which is usually in the valley bottoms and is also floodplain. Mapping and defining the extent of the floodplain to assist in achieving the targets referred to in Appendix 3 (page 154) is of high priority particularly in the Severn valley, with development focused at Welshpool and Newtown.

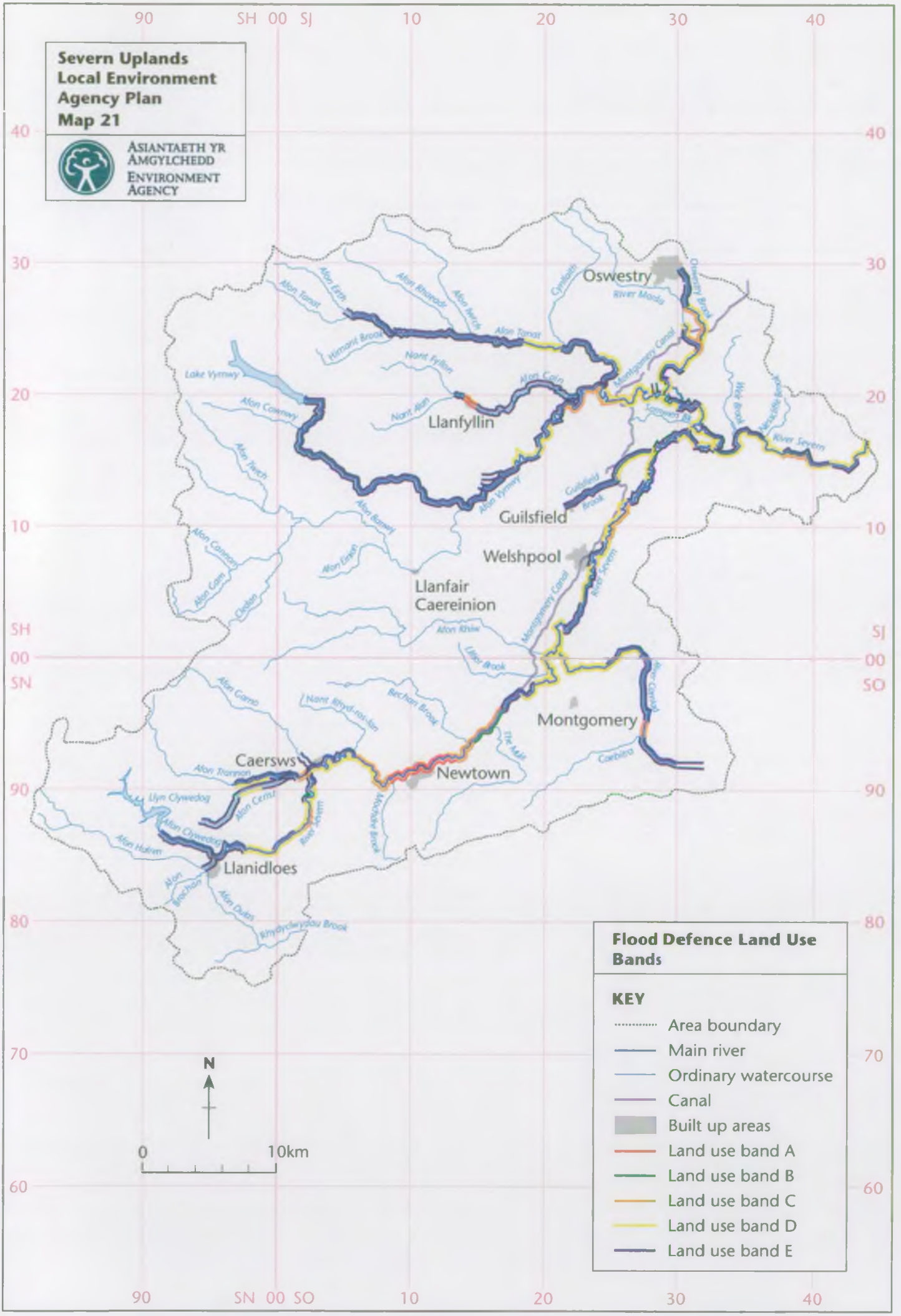

Severn Uplands
Local Environment
Agency Plan
Map 21
Asiantaeth yr Amgylchedd
Environment Agency
Oswestry
Llanfyllin
Guilsfield
Welshpool
Llanfair
Caereinion
Montgomery
Caersws
Newtown
Llanidloes
Lake Vyrnwy
River Severn
Montgomery Canal
N
0
10km
Flood Defence Land Use Bands
KEY
Area boundary
Main river
Ordinary watercourse
Canal
Built up areas
Land use band A
Land use band B
Land use band C
Land use band D
Land use band E

Table 20- Flooding Problems in the Severn Uplands area (1997 Survey)

Code No	Watercourse	Location	Code No	Watercourse	Location
POWYS COUNTY COUNCIL (FORMERLY MONTGOMERYSHIRE)					
1-86-210-1	Tributary of River Banwy	SH 965 125	1-86-210-52	Wern Brook	SJ 230 054 to
1-86-210-3	River Banwy	SJ 083 077			SJ 204 028
1-86-210-4	River Vyrnwy	SJ 069 127	1-86-210-53	*Guilsfield Brook	SJ 274 156 to
1-86-210-7	River Banwy	SJ 134 082			SJ 226 123
1-86-210-8	Luggy Brook	SJ 199 022	1-86-210-54	*River Severn	SO 180 955
1-86-210-9	*River Vyrnwy	SJ 142 115	1-86-210-55	Tributary of Sarn Wen Brook	SJ 283 183
1-86-210-11	*River Vyrnwy	SJ 160 129	1-86-210-56	Tributary of Gwyfer Brook	SJ 279 172
1-86-210-12	Afon Cain	SJ 175 193	1-86-210-58	Unnamed Ditch	SJ 327 160
1-86-210-13	Afon Cain	SJ 192 208 to	1-86-210-57	Sarn Wen Brook	SJ 268 184
		SJ 185 203	1-86-210-59	*River Vyrnwy	SJ 269 198
1-86-210-14	*River Severn	SJ 229 040 to	1-86-210-60	*River Severn	SO 040 915
		SJ 221 049	1-86-210-61	*Afon Cain	SJ 143 196
1-86-210-15	Coed-y-Dinas	SJ 229 066	1-86-210-62	*River Severn & Vyrnwy	SJ 280 160,
1-86-210-16	Tributary of River Severn	SJ 230 048 to			SJ 280 200,
		SJ 236 044			SJ 330 160
1-86-210-17	*River Severn	SJ 219 030	1-86-210-63	*River Severn	SJ 270 119
1-86-210-18	*River Severn	SJ 245 095	1-86-210-64	*River Severn	SO 126 923
1-86-210-19	*River Severn	SJ 245 089	1-86-210-65	*River Severn	SJ 210 015
1-86-210-20	*River Severn	SJ 236 069	1-86-210-66	River Banwy	SJ 140 112
1-86-210-21	Lledan Brook	SJ 225 076 to	1-86-210-67	*River Severn	SJ 210 035
		SJ 217 075	1-86-210-68	*River Severn	SO 163 955
1-86-210-22	Hem Brook	SO241 995 to	1-86-210-69	*River Severn	SO 160 947
		SJ 237 003	1-86-210-70	*River Severn	SO 025 883
1-86-210-23	Bull Dingle Brook	SJ 227 077	1-86-210-71	*River Severn	SO 196 983
1-86-210-25	*River Severn	SJ 261 145	1-86-210-72	*Afon Vyrnwy	SJ 269 204
1-86-210-26	River Severn	SJ 299 169	1-86-210-73	*Sarn Wen Brook	SJ 275 181
1-86-210-27	*Bele Brook	SJ 274 157 to	1-86-210-74 1-	Afon Miwl	SO 162 904
		SJ 254 137	86-210-75	Tributary of River Camlad	SJ 269 933
1-86-210-28	*River Vyrnwy	SJ 203 179	1-86-210-76	Bechan Brook	SO1 42 936
1-86-210-30	*River Vyrnwy	SJ 227 204 to	1-86-210-77	Bechan Brook	SO 097 985
		SJ 228 199	1-86-210-78	Dolgar Brook & River Rhiw	SJ 096 006 to
1-86-210-31	*Rivers Severn & Vyrnwy	SJ 411 145 to			SJ 098 011
		SJ 259 115	1-86-210-79	Afon Banwy	SJ 011 106
1-86-210-32	*Afon Cerist	SN 965 881 to	1-86-210-80	Afon Twrch	SH 990 117
		SN 951 874	1-86-210-81	Tributary of River Severn	SO 198 977 to
1-86-210-34	River Trannon & Gleiniant Brook	SN 970 905			SO 197 977
1-86-210-37	Manthrigg Brook	SO 037 922 to	1-86-210-82 1-	Afon Carno	SO 024 917
		SO 020 935	86-210-83	Nant yr Esgair	SH 971 116
1-86-210-39	Bechan Brook	SO 144 935 to	1-86-210-84	*River Severn	SN 996 853
		SO 121968	1-86-210-85 1-	*River Severn	SN 967 855
1-86-210-41	Llandyssil Brook	SO 198 952	86-210-86	*River Severn	SN 963 857
1-86-210-43	River Severn	SO 208 983	1-86-210-87	*River Severn	SN955 848
1-86-210-44	River Caebitra	SO 244 929 to	1-86-210-88	*River Tanat	SJ 246 208
		SO 242 928	1-86-210-89	Guilsfield Brook	SJ 180 105 to
1-86-210-45	Tributary of River Camlad	SO 273 937 to			SJ 211 113
		SO 265 923	1-86-210-90	Nant-y-Celyn Brook	SO 222959
1-86-210-47	*Afon Garno	SO 025 917 to	1-86-210-91	*River Severn	SO 035 914 to
		SO 009 938			SO 146 918
1-86-210-48	River Severn	SN 912 845 to	1-86-210-92	Tanllyn Brook	SN 960 967
		SN 908 845	1-86-210-93	*Pentre Brook	SJ 151 134
1-86-210-50	*River Camlad	SO 273 947 to			
		SO 320 928	1-84-110-1	*River Tanat	SJ 150 240 to
1-86-210-51	Acre Brook	SJ 315 160 to			SJ 185 240
		SJ 280 140			

Table 20 -Flooding Problems in the Severn Uplands area (1997 Survey) (Contd.)

Code No	Watercourse	Location	Code No	Watercourse	Location
SOUTH SHROPSHIRE DISTRICT COUNCIL			SHREWSBURY & ATCHAM BOROUGH COUNCIL		
1-83-410-5	*River Camlad	SO 249 997	1-83-510-23	*River Severn	SJ 370 177
1-83-410-10	Aylesford Brook & Rea Brook	SO 277 015 to SJ 293026	1-83-510-24	*River Severn	SJ 375 171 to SJ 384 156
1-83-410-59	Tributary of Crochen Brook	SO 223 978	1-83-510-35	*River Severn	SJ 432 153
OSWESTRY BOROUGH COUNCIL					
1-83-310-1	Woolston Brook	SJ 318 243	1-83-310-21	*Afon Tanat	SJ 226 240
1-83-310-2	*River Morda	SJ 305 245 to SJ 288 281	1-83-310-22	*Afon Tanat	SJ 241 229
			1-83-310-23	Tributary of Oswestry Brook	SJ 304 284
1-83-310-12	River Morda	SJ 251 289	1-83-310-24	*River Morda & Afon Vyrnwy	SJ 289 207
1-83-310-13	River Morda	SJ 256 282 to SJ 255 283		*River Morda	SJ 293 211
			1-83-310-25	*Afon Vymwy	SJ 297 198
1-83-310-14	River Morda	SJ 278 281	1-83-310-26	*Oswestry Brook (south)	SJ 303 283
1-83-310-15	River Morda	SJ 288 280	1-83-310-27	*River Vymwy	SJ 27 20 to
1-83-310-16	River Morda	SJ 297 276	1-83-310-28		SJ 30 20 to
1-83-310-17	River Morda	SJ 304 256 to SJ 303 270			SJ 33 16 to SJ 34 18
1-83-310-18	*River Morda	SJ 303 253	1-83-310-29	River Severn	SJ 36 17
1-83-310-19	River Morda	SJ 304 248			

* Main River

5.15 Conservation and Wildlife

General

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

This includes:

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

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

* The protection of sites which, although valuable in ecological terms, are not formally protected.

The pressures exerted on wildlife by urbanisation and agriculture have led to a greater emphasis being placed on the importance of conserving the commonplace. Protection of the most important sites alone will not ensure the survival of the present day diversity of wildlife habitats.

The Agency's aims and objectives for conservation

Our principal aim is to help protect special conservation assets and help to enhance and restore degraded areas, for the benefit of current and future generations.

Main objectives

Our main objectives are to:

* Take full account of conservation before taking policy and operational decisions
* Give priority to protecting statutory sites
* Ensure we take a full part in implementing the UK Biodiversity Action Plan by taking a lead in promoting the conservation of key water-related habitats and species
* Demonstrate, through our own work, the benefits of best environmental practice for conservation of the

wider countryside;
* Ensure we apply appropriate conservation criteria when considering activities we authorise
* Influence, at both national and local level plans for rural and urban development, to the benefit of conservation as a whole.

Local Perspective

Land Use

Although the ecological value of the water environment within the Severn Uplands area is relatively high, degradation has occurred through post war land drainage and agricultural improvements, over grazing and coniferous afforestation in the uplands. The recent developments of windfarms can also threatening remnant habitats in upland areas.

Agricultural improvements continue to threaten biodiversity, particularly breeding wading birds such as Curlew, Lapwing, Redshank and Snipe.

The Severn-Vyrnwy confluence is a high profile example where biodiversity has been lost through continued agricultural improvements.

Conservation Sites

Compared to other catchments there are a large number of conservation sites within this LEAP area. However, many are threatened by continued land use changes, pollution, both waterborne and atmospheric and from lack of conservation management.

The quality of habitat within the catchment is emphasised by the two European designated Special Areas of Conservation on Berwyn and the Tanat Valley bat sites- Of the 77 designated SSSIs 49 are associated with watercourses and wetlands and include blanket, basin and valley mires, wet woodland, carr woodland, lakes, damp pasture, open water grading into fen and lengths of the Montgomery Canal. There are also 43 water related special wildlife sites including nature reserves along the Severn Valley. The RSPB reserve at Lake Vyrnwy is a flagship reserve and a recent management agreement between Severn Trent Water, Countryside Council for Wales (CCW) and the RSPB will ensure long term improvements to the area's biodiversity.

Montgomery Canal

The Montgomery Canal exhibits an exceptionally rich aquatic flora, which includes floating water plantain, autumnal water starwort and 11 species of pondweed. The proposed restoration works will however greatly reduce the canal's biodiversity. It is essential therefore in order to safeguard some of this biodiversity that proposal for canal design; mitigation and long term management is improved significantly.

Wildlife

Mammals

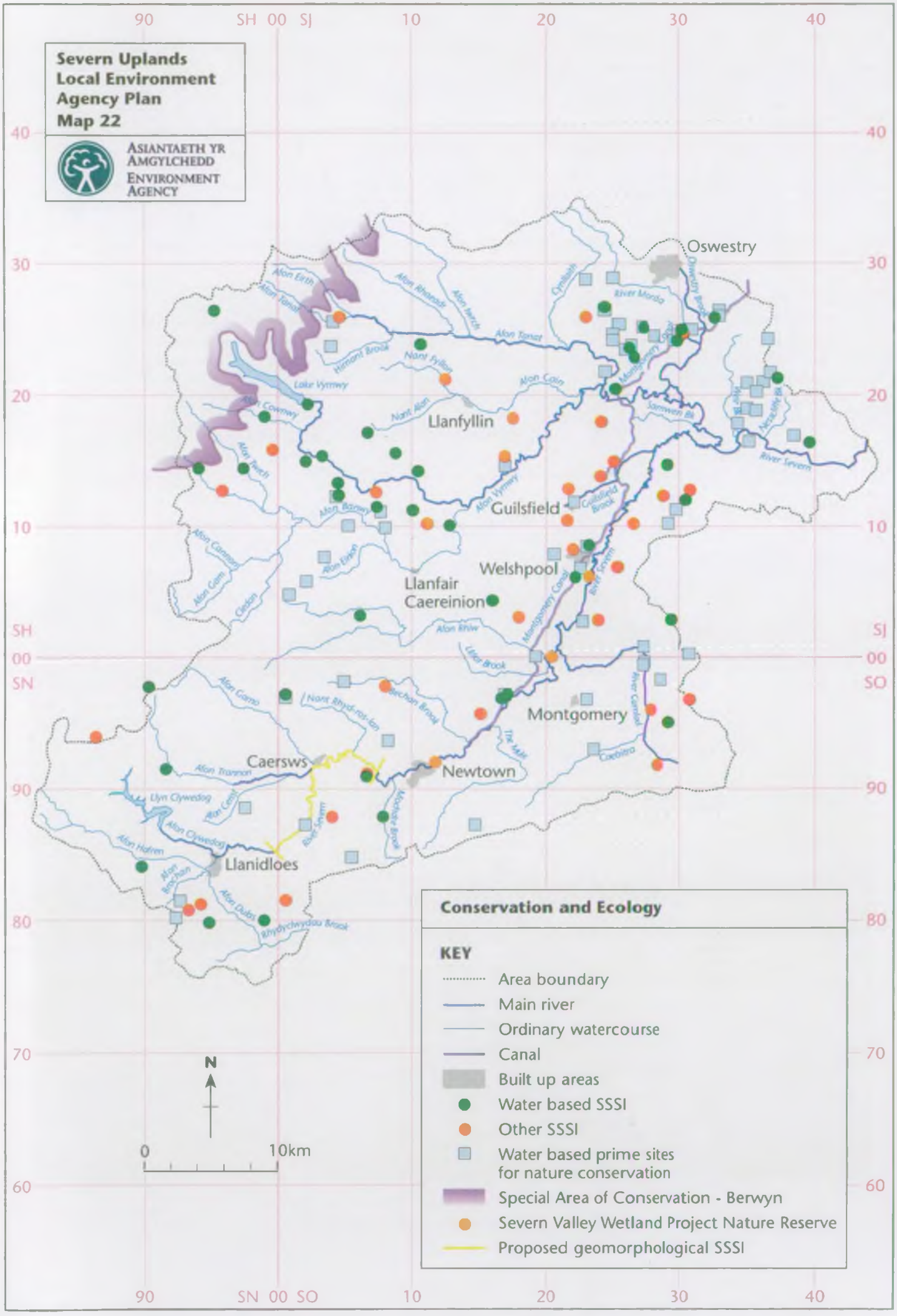
The catchment is a national stronghold for otters and in order to safeguard this population it is essential that water quality and habitat quality are safeguarded and improved. Although a Special Area for Conservation has been designated within the catchment to protect lesser horse shoe bats, other species of bat are likely to be under recorded but also under threat from habitat loss, pesticides and building renovations. Water voles, which were abundant on the River Camlad until the mid 1970s, are now rare within the catchment.

Birds

Although riverside birds such as Dipper and Grey Wagtail are widespread within the catchment, wading birds such as Lapwing, Curlew, Snipe and Redshank have declined at an alarming rate as breeding birds. This decline is highlighted by declines in breeding Curlew and Lapwing of 63% and 44% respectively in the Severn Vyrnwy confluence between 1987 and 1986.

Invertebrates

Most rivers in the catchment support a high quality and varied range of invertebrates, except in acidified streams such as the Afon Twrch and the top end of the Severn, which suffer problems associated with forestry and acidification. Crayfish plague that is introduced via farm reared alien crayfish species has occurred historically on the Camlad and threatens native crayfish in the catchment. A large population of signal crayfish was eradicated by the Agency from the Vyrnwy catchment in 1997.


Severn Uplands
Local Environment
Agency Plan
Map 22
Asiantaeth yr Amgylchedd
Environment Agency
SH 00 SJ
SN 00 SO
Oswestry
Llanfyllin
Guilsfield
Welshpool
Llanfair
Caereinion
Montgomery
Newtown
Caersws
Llanidloes
Lake Vyrnwy
River Severn
Montgomery Canal
Conservation and Ecology
KEY
Area boundary
Main river
Ordinary watercourse
Canal
Built up areas
Water based SSSI
Other SSSI
Water based prime sites for nature conservation
Special Area of Conservation - Berwyn
Severn Valley Wetland Project Nature Reserve
Proposed geomorphological SSSI
N
0
10km

Amphibians and Reptiles

Three species of newt exist within the catchment, along with toads and frogs. However, all species are threatened by infilling of ponds, pollution of ponds and inappropriate fish stocking.

The Great Crested Newt, protected under UK and European legislation, is likely to be under recorded within the catchment.

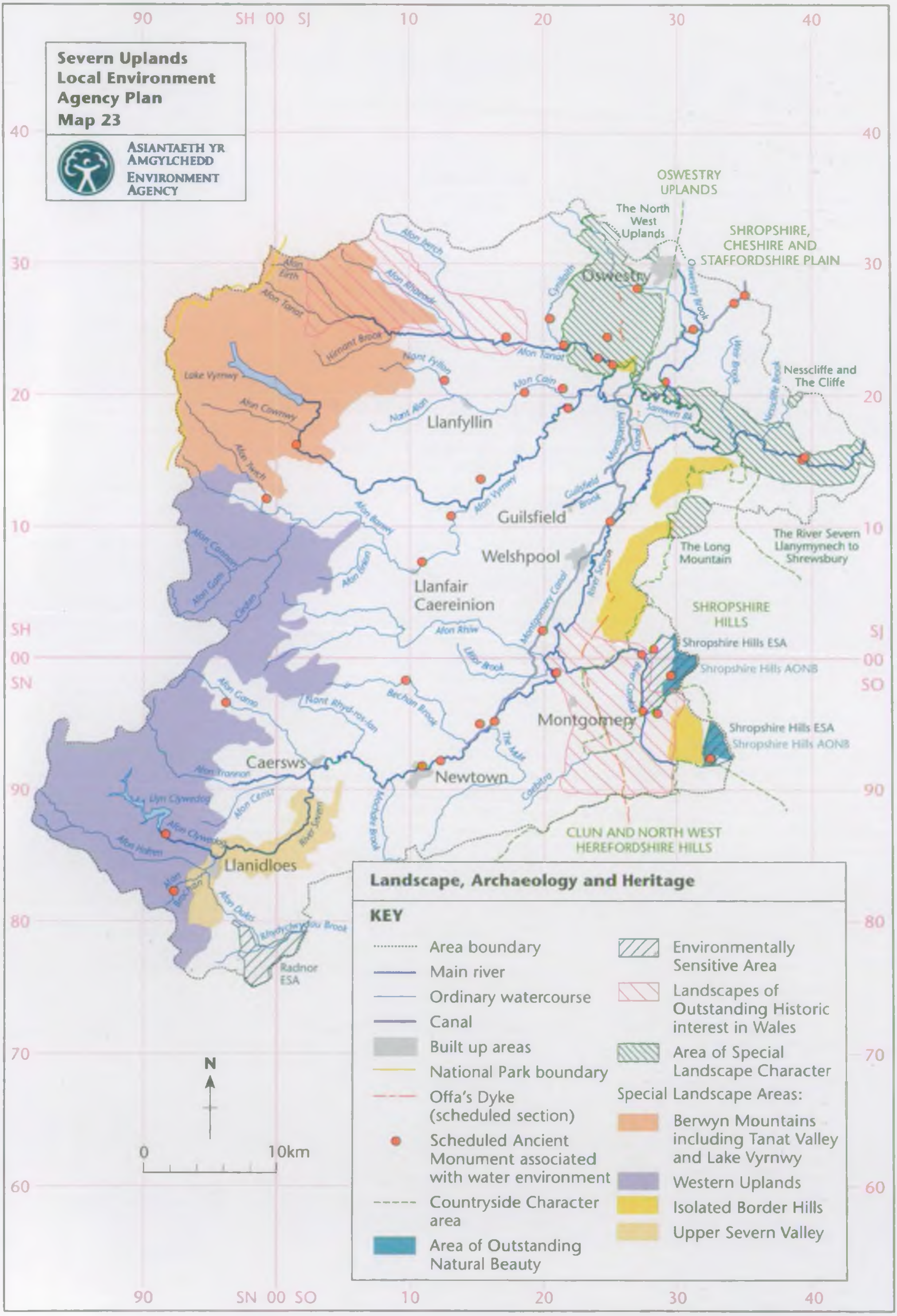
Grass snakes also exist, particularly along undisturbed sections of the Montgomeryshire canal. The redevelopment of the canal is likely to reduce the availability of suitable habitat for grass snakes.

Flora

Much of the important flora within the catchment is under threat. Riverside trees are being damaged by overgrazing, whilst the spread of phytophthora is attacking and killing alders, the dominant tree species along many watercourses. Non native species such as Japanese Knotweed and Himalayan Balsam continue to increase along watercourses which in turn leads to a reduction in riverside biodiversity. Giant Hogweed, despite significant efforts by the Agency, is increasing and in future years is likely to pose a risk to public health.

Floating water plantain, a biodiversity target species and protected by both UK and European legislation exists most notably on the Montgomery Canal. Again, the reopening of the canal threatens this population due to the increased turbidity likely to arise from high levels of motorised recreation traffic.

Montgomery Canal (Courtesy of E. Murray).


Severn Uplands
Local Environment
Agency Plan
Map 23
Asiantaeth yr Amgylchedd
Environment Agency
Landscape, Archaeology and Heritage
KEY
Area boundary
Main river
Ordinary watercourse
Canal
Built up areas
National Park boundary
Offa's Dyke (scheduled section)
Scheduled Ancient Monument associated with water environment
Countryside Character area
Area of Outstanding Natural Beauty
Environmentally Sensitive Area
Landscapes of Outstanding Historic interest in Wales
Area of Special Landscape Character
Special Landscape Areas:
Berwyn Mountains including Tanat Valley and Lake Vyrnwy
Western Uplands
Isolated Border Hills
Upper Severn Valley
OSWESTRY UPLANDS
The North West Uplands
SHROPSHIRE, CHESHIRE AND STAFFORDSHIRE PLAIN
Oswestry
Nesscliffe and The Cliffe
Llanfyllin
Guilsfield
Welshpool
Llanfair Caereinion
The Long Mountain
The River Severn Llanymynech to Shrewsbury
SHROPSHIRE HILLS
Shropshire Hills ESA
Shropshire Hills AONB
Montgomery
Newtown
Caersws
Llanidloes
CLUN AND NORTH WEST HEREFORDSHIRE HILLS
Radnor ESA
Lake Vyrnwy
Afon Tanat
Afon Cain
Afon Vyrnwy
Afon Rhiw
River Severn
Montgomery Canal
Llyn Clywedog
Afon Clywedog
N
0
10km
90
SH 00 SJ
SN 00 SO
10
20
30
40
SH
00
SN
SJ
SO
80
70
60

5.16 Landscape, Archaeology and Heritage

General

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

This includes the protection of areas:

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

Local Perspective

The catchment is not formally designated as being of landscape value, with the exception of a small area of the Berwyn Mountains which falls within the Snowdonia National Park. There is a variety of landscape types within the catchment, each of which contributes to its character and distinctiveness so that the landscape quality of the catchment is uniformly high. The upper Severn valley, the western uplands of Montgomeryshire, the Berwyn Mountains including the Tanat valley and Lake Vyrnwy, and the border hills to the east of the area have been designated as Special Landscape Areas in the Powys Structure Plan. Map 23 shows the landscape areas within the catchment.

Of the 263 Scheduled Ancient Monuments within the Severn Uplands area a few are situated close to watercourses or are conspicuously located on flood plains, e.g. Melverley Church and several bridges (see Map 23). Offa's Dyke is an important feature of the catchment area, which, in some locations runs along the tops of the argaes (flood protection banks) in the Severn/Vyrnwy confluence area. The argaes date back to the early 1700s and although not listed, are features of historical interest in there own right.

The confluence is designated as an Area of Special landscape Character (ASLC) in Shropshire County Council Structure Plan. This landscape designation is also reflected in the Shrewsbury and Atcham Borough local plan and the Borough of Oswestry local plan. The Montgomeryshire local plan also designates the area to the south of the study area as a Special Landscape Area.

The floodplain of the Severn Vyrnwy Confluence, with the dramatic backdrop of the Breidden, has a distinctive quality and is an area in which the Agency has a strong influence through its capital work programme. The earth flood embankments, locally known as argaes, are features of historical and landscape interest in their own right. The reconstruction of the argaes results in a change of the character of the argaes from an irregular construction to a smooth rather unobtrusive feature. The Severn Vyrnwy Strategic Environmental Statement, published by the Agency in 1998, sets out guidelines for minimising and mitigating this impact. This report has identified that a survey of the argaes from a historical and botanical point of view is required.

Countryside Character Maps and Landmap

The Countryside Council for Wales and the Countryside Commission has been charged with assessing landscape nationally and has taken two very different approaches to the task. The Countryside Commission has taken a descriptive solution and has produced a publication called "The Character of England; landscape, wildlife and natural features".

The catchment falls into four of the Countryside Commission's Countryside Character Areas. These are shown on Map 23 and are divided as follows:

63	Oswestry Uplands
61	Shropshire, Cheshire and Staffordshire Plains
64	Shropshire Uplands
98	Clun and North West Herefordshire Hills

The Countryside Council for Wales has concentrated on the development of LANDMAP, a consistent method in which to map the landscape of Wales. CCW have selected three demonstration areas in which to try out their new methodology and one of these covers the Berwyn and Llanbrynmair Moor area at the top of the catchment. It is aimed for implementation by the local authorities to help guide land-use resources and policies.

5.17 Fisheries

General

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

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

The Environment Agency Midland Region has documented its Fisheries Strategies for all appropriate river reaches. It will use its legislative powers, under the Water Resources Act 1991 and the Salmon and Freshwater Act 1975, to ensure that the objectives for individual river reaches are achieved.

The Agency's principal aim and objectives for fisheries

Our principal aim for a fishery is to maintain, improve and develop fish stocks, the basic fisheries resource, in order to optimise the social and economic benefits from their sustainable exploitation.

Main objectives

To achieve this aim, we have set the following objectives:

* Conserve and develop sustainable fisheries for salmon, trout, freshwater fish, eel and, where appropriate, sea fish;
* Regulate fisheries through the enforcement of a consistent series of licences, orders, byelaws and consents
* Monitor the performance of fisheries in our rivers and inland waters, estuaries and, where appropriate coastal waters, including the status of fish stocks; their habitat; fishing effort and catches;
* Communicate with our customers and understand their needs;
* Produce clear strategies for the long-term management of each of the main types of fishery, i.e. for salmon, trout, coarse fish and eels
* Secure a fair and robust funding base for necessary fisheries work incorporating full recovery of costs from those who damage the environment or whose activities directly cause fisheries work to be undertaken;
* Assist the recently announced governmental review of fisheries policy, funding and legislation to ensure a secure future for fisheries in England and Wales
* Develop our scientific and technical understanding of fisheries including the application of best practice to fisheries management and investment in our staff's skills and professional development. Focused R&D will aid in achieving all of our objectives.

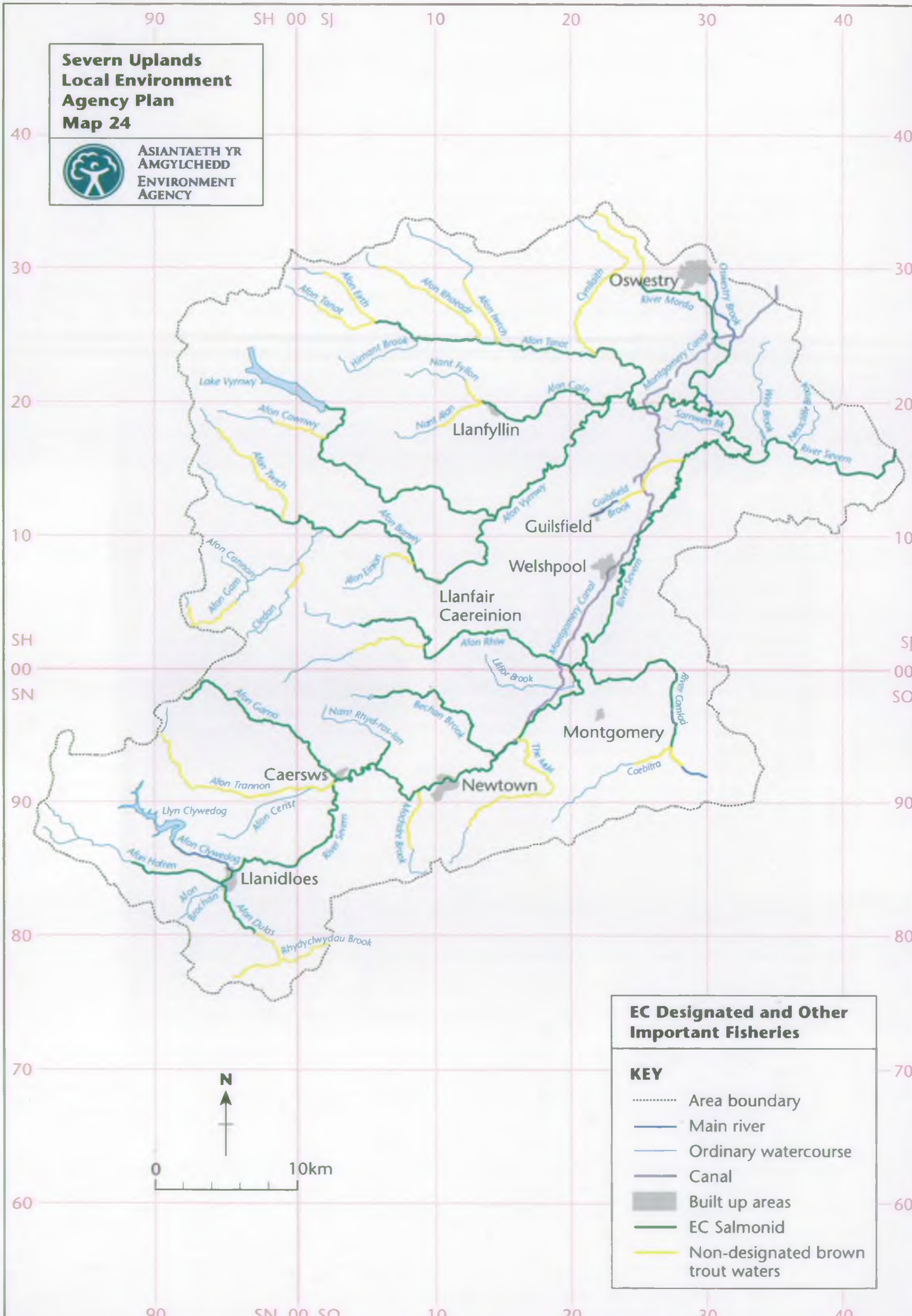
Local Perspective

Salmon

The Upper Severn and its tributaries are the principal salmon spawning and nursery areas for the Severn catchment. The main spawning grounds are in the River Severn from Welshpool to Llanidloes, River Vyrnwy from Llansantffraid to Dolanog, Afon Tanat, River Banwy, Afon Gam, Afon Rhiew, Afon Garno, Afon Trannon and Afon Dulas.

Map 25 shows the distribution and relative abundance of salmon stocks in the catchment from electric fishing surveys carried out in 199-. The low, moderate and high abundance ranges correspond to actual density ranges of <5.0, 5.0-15.0 and >15.0 fish per 100m2 respectively. Abundances for tributary rivers are the average of all sites sampled, whilst those on the larger rivers (Severn, Vymwy, Tanat) are individual site values. The distribution of salmon is limited by obstructions to migration of adult fish ascending the river to spawn and by acidification problems in certain tributary systems. Elsewhere, juvenile salmon abundances are generally high or moderate in tributary streams and low in the larger rivers, probably reflecting the more suitable habitat of the smaller watercourses and the higher proportion of spawning occurring in these areas.

Salmon fishing takes place principally at the Severn/Vyrnwy confluence, on the lower and middle reaches of the River Vyrnwy, and at Buttington, Welshpool and Abermule on the River Severn. Later in the season, catches are reported further upstream around Caersws on the Severn, Meifod on the Vyrnwy, and the lower reaches of the Rivers Banwy and Tanat.



Severn Uplands Local Environment Agency Plan
Map 24
Asiantaeth yr Amgylchedd
Environment Agency
EC Designated and Other Important Fisheries
KEY
Area boundary
Main river
Ordinary watercourse
Canal
Built up areas
EC Salmonid
Non-designated brown trout waters
N
0
10km
Oswestry
Llanfyllin
Guilsfield
Welshpool
Llanfair Caereinion
Montgomery
Newtown
Caersws
Llanidloes
Lake Vyrnwy
Llyn Clywedog
Afon Tanat
Afon Eirth
Afon Rhaeadr
Afon Iwrch
Cynllaith
River Morda
Oswestry Brook
Montgomery Canal
Hirnant Brook
Nant Fyllon
Nant Alan
Afon Cain
Afon Cownwy
Afon Twrch
Afon Vyrnwy
Afon Banwy
Guilsfield Brook
Sarnwen Bk
Wre Brook
Afon Cannon
Afon Gam
Cledan
Afon Einion
River Severn
Afon Rhiw
Lluffor Brook
River Camlad
Afon Carno
Nant Rhyd-ros-lan
Bechan Brook
The Mule
Caebitra
Afon Trannon
Afon Cerist
Afon Clywedog
Afon Hafren
Mochdre Brook
Afon Brochan
Afon Dulas
Rhydyclwydau Brook
90
SH 00 SJ
10
20
30
40
SH
00
SN
SJ
00
SO
80
70
60
SN 00 SO

Catches have generally declined in recent years, particularly of spring-run fish, with an increasing tendency for salmon to run in late summer and autumn, often after the end of the fishing season.

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

Future management of the River Severn's salmon resources is being addressed through the Salmon Action Plan, which is to be published before the end of 1998. The Environment Agency currently has a salmon hatchery facility at Llyn Clywedog, which has a rearing capacity of 300,000 fed fry.

Trout

Many of the rivers and lakes in the catchment contain thriving stocks of wild brown trout, particularly in the upper reaches of watercourses and in the small tributary streams such as the Afon Dulas, the Mule, Afon Garno and River Camlad. Declines of wild brown trout stocks have occurred in some rivers, however, such as the River Vyrnwy and the upper reaches of the River Severn.

Trout populations (Map 26) are similar to salmon in their distribution and patterns of abundance but are also found upstream of structures obstructing salmon migration. Density ranges equate to actual values of <5.0, 5.0-10.0 and >10.0 fish per 100m2, with higher numbers of fish most often found in tributary streams rather than the larger rivers.

The genetic integrity of native trout stocks has in some cases been diluted in rivers such as the Tanat and Severn by introductions of hatchery reared trout of diverse origin, and numbers of wild fish have decreased in some instances. Rainbow trout have in the past been introduced into the Tanat and Severn, and are known to breed in small numbers in the feeder streams of Llyn Clywedog and Lake Vyrnwy following many years of stocking in those waters. Both brown and rainbow trout are stocked into numerous other stillwaters in the catchment. Llyn Tarw near Newtown also contains a breeding population of American Brook Trout originally introduced into the lake in the early 1900s.

Good fishing for wild brown trout is still widely available, particularly in the smaller tributary streams. Methods used include fly, worm and natural minnows. Many anglers, however, have abandoned this traditional style of fishing in favour of stillwater fisheries such as Llyn Clywedog, Lake Vyrnwy and Fownog Pool, which are artificially stocked with brown and rainbow trout. Elsewhere, some high quality river fishing is also maintained by stocking with hatchery-reared brown trout, most notably the River Tanat and the River Severn at Caersws.

Management of the trout fisheries is principally through enforcement of the relative legislation, particularly that applying to the stocking of fish. To this end a protocol for best stocking practice has been produced and is being implemented. Protection of pristine stocks is of great importance and early establishment of the genetic status of stocks thought to be pristine is essential.

Coarse Fish

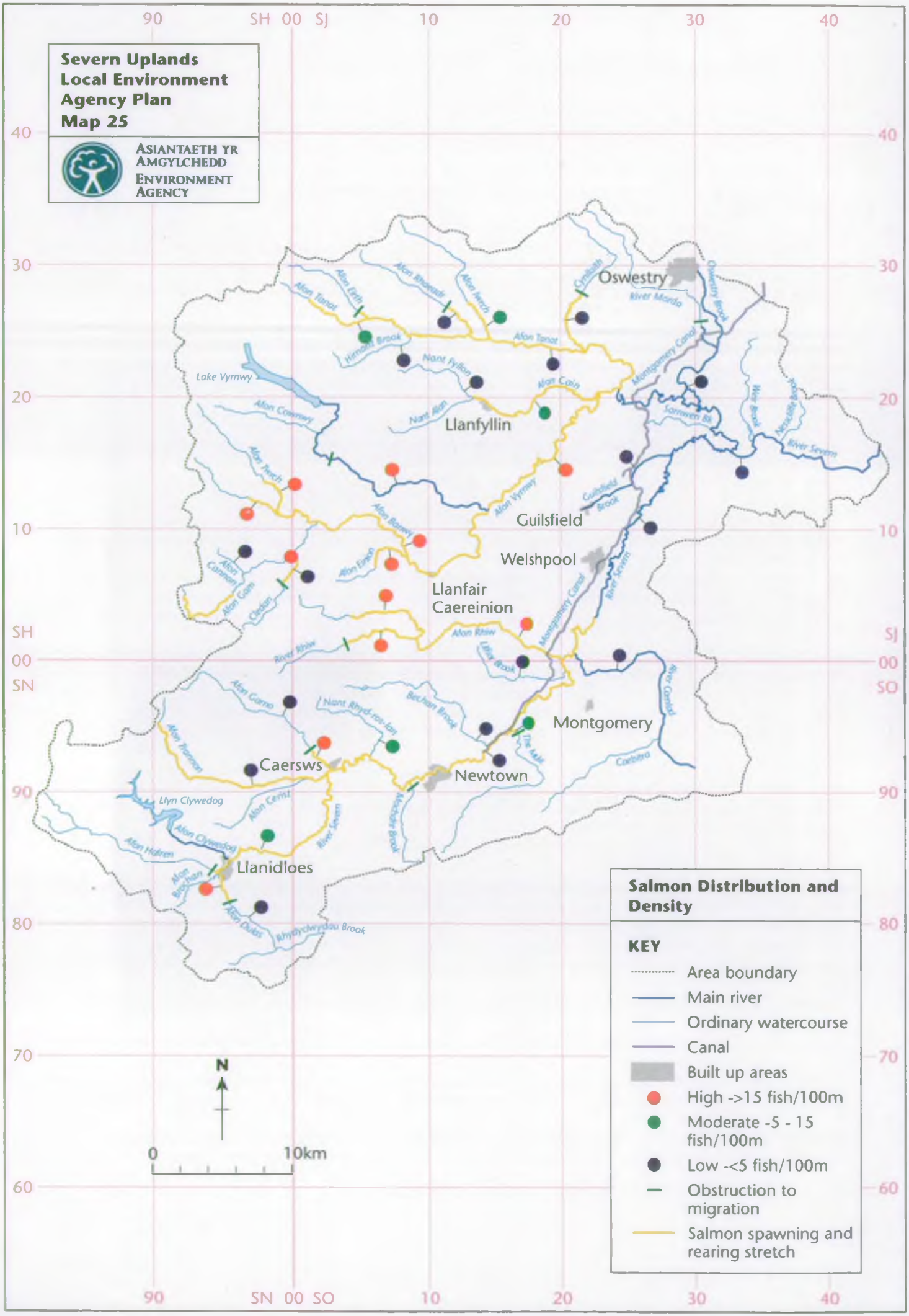
Coarse fish species including grayling, chub, dace and pike are common in the Severn as far upstream as Llanidloes and in the River Vyrnwy to Pont Robert. Barbel has spread up the River Severn to Penarth Weir near Newtown and is also present throughout the lower reaches of the Vyrnwy. The Montgomery Canal, an EC Designated Cyprinid fishery, contains populations of roach, tench, bream and pike together with some carp, perch and other coarse fish species. Coarse fish are present in a number of pools in the area, primarily in the lowland areas of the catchment.

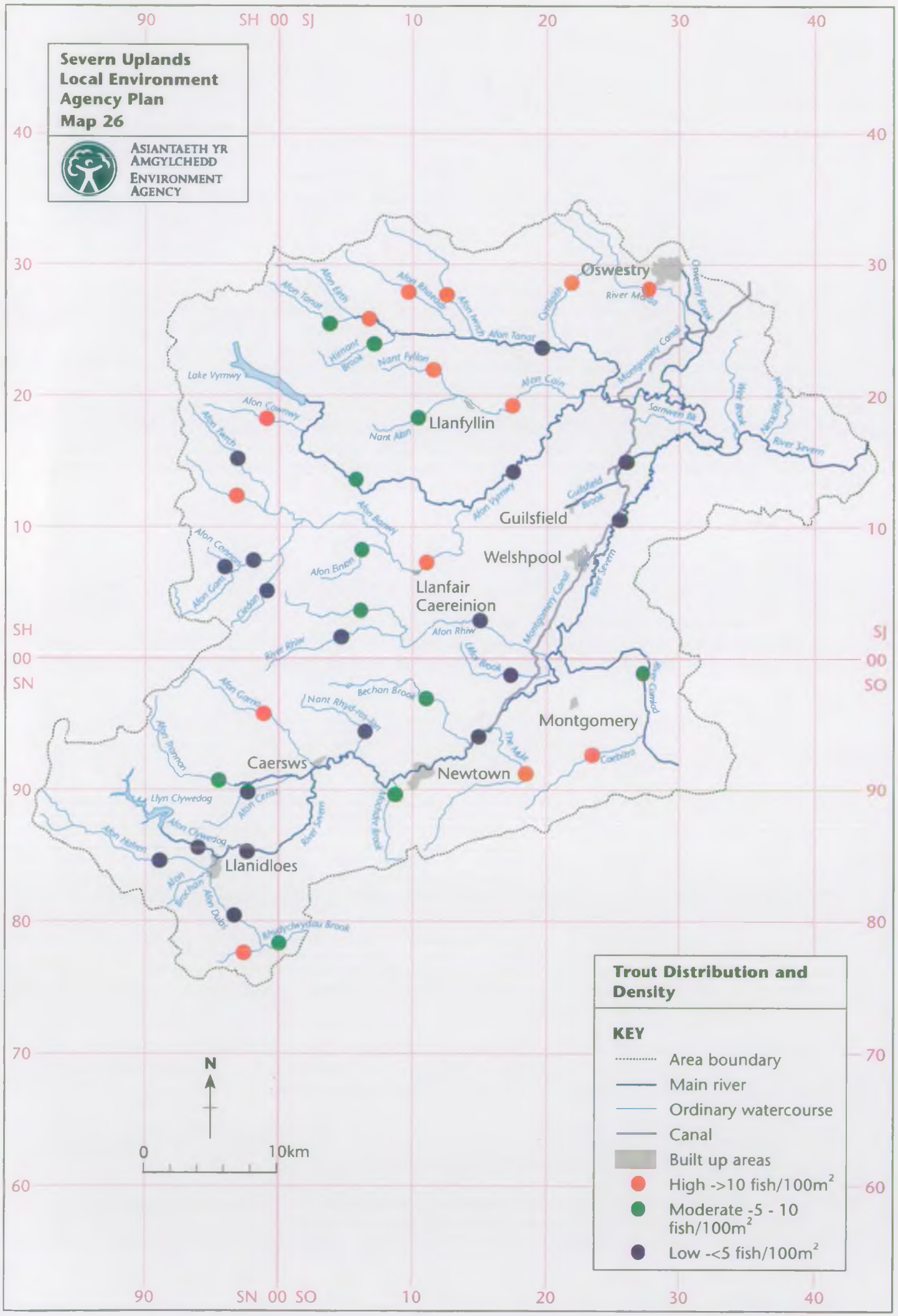
Coarse fish resources of the area are not heavily exploited at present. Reasonable sport with chub, dace and, increasingly, barbel can be found on the Severn below Newtown and the lower reaches of the Vyrnwy. The Montgomery Canal provides good quality coarse fishing, particularly for tench, roach and, in some stretches, bream.

Grayling fishing has given cause for concern in recent years especially on the River Tanat where catches have been poor, but stocks are showing signs of recovery with improving catches particularly from the Severn and Vyrnwy.

Stillwater coarse fisheries are relatively scarce in the area and there is considerable scope for promotion and development of this branch of angling through collaborative activities with various customer groups.

Map 24 shows EC designated and other important coarse fisheries in the area.


Severn Uplands
Local Environment
Agency Plan
Map 25
Asiantaeth yr Amgylchedd
Environment Agency
90
SH 00
SJ
10
20
30
40
SN 00
SO
Oswestry
Llanfyllin
Guilsfield
Welshpool
Llanfair
Caereinion
Montgomery
Caersws
Newtown
Llanidloes
Lake Vyrnwy
River Severn
Montgomery Canal
River Rhiw
Afon Tanat
Afon Vyrnwy
Afon Banwy
Afon Cain
Afon Clywedog
Afon Hafren
Afon Dulas
Rhydychwyddau Brook
Llyn Clywedog
N
0
10km
Salmon Distribution and Density
KEY
Area boundary
Main river
Ordinary watercourse
Canal
Built up areas
High ->15 fish/100m
Moderate -5 - 15 fish/100m
Low -<5 fish/100m
Obstruction to migration
Salmon spawning and rearing stretch


Severn Uplands
Local Environment
Agency Plan
Map 26
Asiantaeth yr Amgylchedd
Environment Agency
Oswestry
Llanfyllin
Guilsfield
Welshpool
Llanfair
Caereinion
Montgomery
Caersws
Newtown
Llanidloes
Lake Vyrnwy
River Severn
Montgomery Canal
Trout Distribution and Density
KEY
Area boundary
Main river
Ordinary watercourse
Canal
Built up areas
High ->10 fish/100m²
Moderate -5 - 10 fish/100m²
Low -<5 fish/100m²
N
0
10km

5.18 Recreation, Amenity and Navigation

General

The Environment Agency has a duty under the Environment Act 1995 to promote the use of waters and associated land for recreational purposes. The Agency has very few landholdings in the Severn Uplands area and therefore works in partnership with other organisations and landowners to carry out this duty. Where it does own or lease land, the Agency ensures that such land is made available for recreational purposes, and that the needs of disabled people are taken into account.

This section includes watersports such as canoeing, but excludes angling which is dealt with separately in Section 5.17 (page 142). Also included are recreational activities that are principally land based but occur within the proximity of the river corridor or wetlands, such as walking and birdwatching. The main areas of concern are access, public safety and the general aesthetic acceptability of the water environment. The Agency does not encourage swimming in rivers and lakes because of the risk of drowning and the possibility of swimmers catching waterborne diseases such as Weils disease.

The Agency's aims and objectives for recreation and navigation

Our principal aim for recreation is to protect, improve and promote recreation on or near water. Our principal aim for navigation, on navigations where the Agency is the Navigation Authority, is to maintain and improve our navigations on behalf of the nation as assets of recreational, environmental, economic and social value.

Main objectives

To achieve our aims, we will:

* Protect recreational interests and create opportunities for recreation in the course of the Agency's work
* Promote an increase in the quantity, quality and diversity of access opportunities subject to environmental constraints;
* Improve understanding and co-operation between different users
* Raise awareness of the opportunities and benefits of recreation;
* Improve our understanding of the impacts of recreation on the environment and how these can be reduced

Local Perspective

The reservoirs at Clywedog and Vyrnwy are popular sites offering informal recreation activities such as walking, cycling, and bird watching along with limited provision of non-motorised water sports, such as windsurfing and sailing.

Hafren Forest also offers excellent walks and mountain biking. The Agency led project, the Severn Way footpath, begins upstream of the forest and offers an excellent long distance walk along the Severn Valley within Montgomeryshire, Shropshire and on to Bristol.

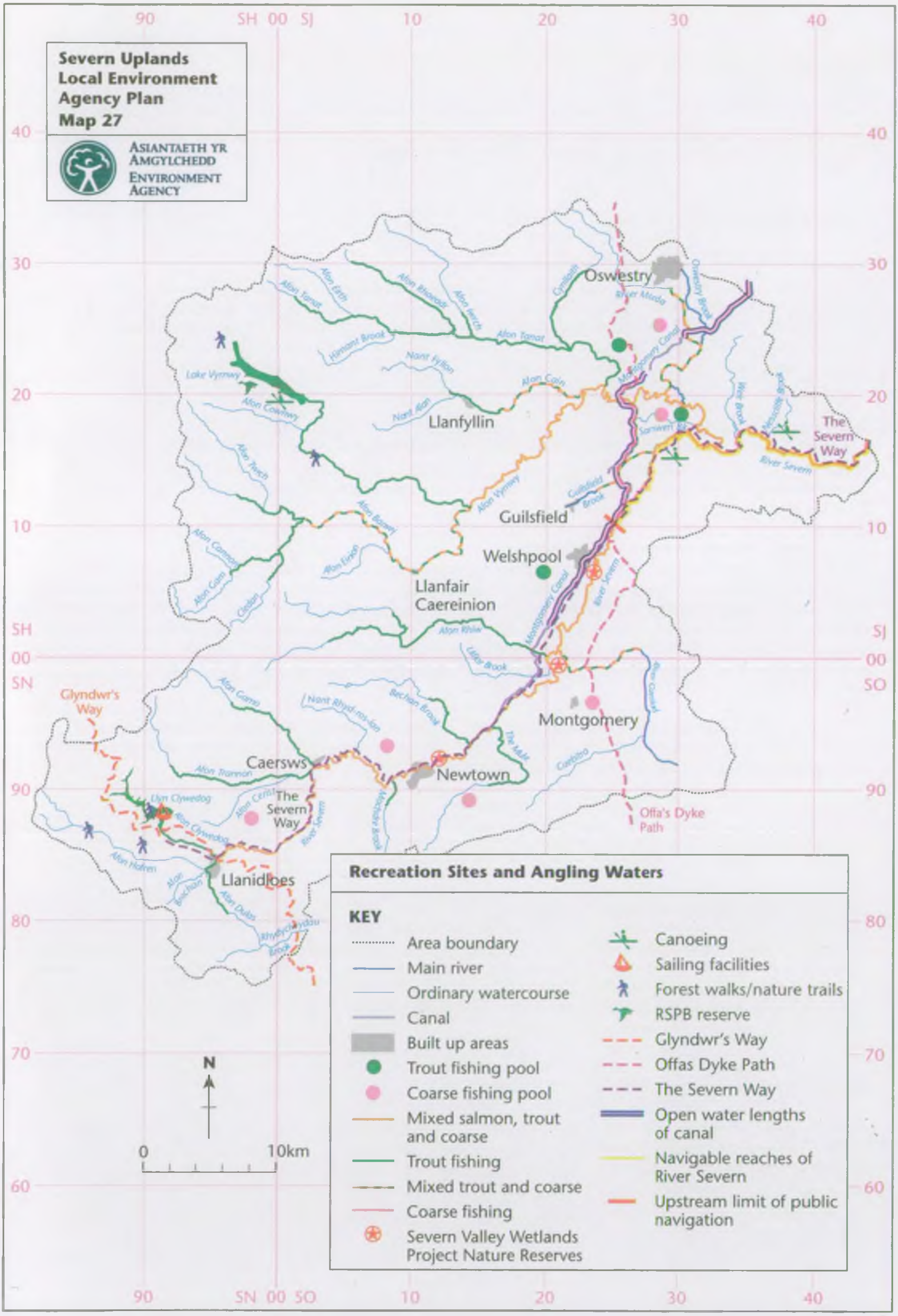
Nature reserves within the catchment also offer excellent opportunities for bird watching and wildlife studies, most notably the RSPB reserve at Vyrnwy and the Montgomeryshire Wildlife Trusts reserves along the Severn Valley, particularly those at Pwll Penarth, Dolydd Hafren and Coed y Dinas.

Tourism has been identified as a major contribution to future employment in Mid Wales, and the Wales Tourist Board launched its strategy, Tourism 2000, in 1994. This is likely to lead to increased demands for recreation, leisure and accommodation facilities in the area, all of which may impact on the environment. Tourism 2000 identifies policies in relation to water quality and the environment.

The Montgomery Canal is the main navigation within the LEAP area, but significant lengths of the canal remain dewatered or inaccessible. A major restoration programme is currently in progress, aimed at opening up the whole length of this canal form its junction with the Shropshire Union Canal to Pengarth.

Although there are environmental concerns associated with the redevelopment of the Montgomery Canal which need to be addressed, its redevelopment will increase the recreational potential of the canal. There are obvious benefits to boaters whilst improvements to the towpath will offer greater provision for cyclists and walkers.

In addition the River Severn has a public right of navigation downstream of Pool Quay to Stourport on Severn. However efforts to improve access for canoeing have to date been unsuccessful. Recent proposals for a canoe access at Newtown offer excellent opportunities for disabled canoeists and for encouraging local schoolchildren into the sport.


Severn Uplands Local Environment Agency Plan
Map 27
Asiantaeth yr Amgylchedd
Environment Agency
Recreation Sites and Angling Waters
KEY
Area boundary
Main river
Ordinary watercourse
Canal
Built up areas
Trout fishing pool
Coarse fishing pool
Mixed salmon, trout and coarse
Trout fishing
Mixed trout and coarse
Coarse fishing
Severn Valley Wetlands Project Nature Reserves
Canoeing
Sailing facilities
Forest walks/nature trails
RSPB reserve
Glyndwr's Way
Offas Dyke Path
The Severn Way
Open water lengths of canal
Navigable reaches of River Severn
Upstream limit of public navigation
Oswestry
Llanfyllin
Guilsfield
Welshpool
Llanfair Caereinion
Montgomery
Newtown
Caersws
Llanidloes
The Severn Way
Glyndwr's Way
Offa's Dyke Path
Lake Vyrnwy
Llyn Clywedog
N
0
10km
90
SH 00 SJ
SN 00 SO
10
20
30
40
SH
SJ
00
SN
SO
80
70
60

APPENDIX 1

Environmental monitoring carried out by the Agency:

Water Quantity and Quality

Rainfall

Rainfall is measured in the Seven Uplands area by 37 daily gauges and 8 monthly gauges. Observers who send returns to the Agency on a monthly basis for data quality control and archiving read the gauges. This information is sent to the Meteorological (MET) Office, at one site the information goes direct to the MET Office. In addition, there are 11 automatic rain gauges capable of measuring rainfall intensity. These can be contacted by the computer-based forecasting system, which is based at our Head Office in Solihull. Clee Hill weather radar (near Ludlow), although outside the catchment, provides good coverage for real-time rainfall data used for river regulation and flood forecasting.

River Levels and Flows

Levels are continuously recorded at 32 sites, flows can be derived at 8 sites and there is 1 multipath ultra sonic gauge at Montford. The sites have telemetry allowing automatic data retrieval by telephone providing up to date information for abstraction control, river regulation and flood warning operations. More extensive low flow surveys based on spot gaugings are undertaken during drought periods.

Groundwater Levels and Quality Monitoring

A network of seven observation boreholes is maintained to monitor groundwater levels. These sites are either dipped manually once per month or are equipped with data loggers for continuous monitoring. In addition, tubewells are monitored to measure variations in shallow water tables - mostly in the north eastern part of the catchment near to the Shropshire Groundwater Scheme boreholes. The Agency has historically only monitored groundwater quality at a limited number of points in the catchment, in order to monitor background groundwater quality. Monitoring to date has largely centred on the areas of major aquifer. However, we are currently reviewing the extent of the monitoring network and changes to the network are likely.

A small number of reservoir water level gauges and seismic monitors together with dam instrumentation to ensure structural integrity are in use at Clywedog and Vyrnwy dams and reservoirs. In addition, some river level sites are equipped with river water temperature gauges and/or fish counter data loggers.

Some automatic rainfall sites are equipped with supplementary wind/temperature sensors used for snowpack melt rates during flood forecasting. There are a small number of specially trained snow observers who calculate the water equivalent of lying snowpacks during periods of high flood risk.

Surface Water Quality - Chemical monitoring

Water Quality samples are taken on a monthly basis from a network of 53 key sites on rivers and canals in the catchment (see Map 12). The samples are analysed for a wide range of substances, the results being used to assess compliance with a range of EC Directives, Rivers Ecosystem classification targets and for General Quality Assessment purposes. In addition to the routine monitoring of river quality, samples of consented discharges are regularly taken to assess compliance against targets set by the Agency. Samples are also taken during the investigation of pollution incidents, both to help track down sources of pollution and as evidence against offenders.

Special sampling surveys are also undertaken to assess, for example, the effectiveness of liming at Clywedog and the impact of synthetic pyrethroid sheep dip.

The table below sets out the water quality criteria used to determine the RE Class for a particular stretch of river (see Section 5.2.2)

Table 21 Water Quality Criteria relating to the RE Classification

Class	Dissolved Oxygen % saturation 10 percentile	BOD (ATU) mg/l 90 percentile	Total Ammonia mg N/l 90 percentile	Unionised Ammonia mg N/l 95 percentile	pH lower limit as 5 percentile upper limit as 95 percentile	Hardness mg/l$CaCO_3$	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	-	-	-	-	-

Table 22 - GQA Chemical Grading for Rivers and Canals

Water Quality	Grade	Dissolved Oxygen	BOD (ATU)[1]	Ammonia
		(% saturation) 10-percentile	(mg/l) 90 -percentile	(mgN/l) 90-percentile
Very good	A	80	2.5	0.25
Good	B	70	4	0.6
Fairly good	C	60	6	1.3
Fair	D	50	8	2.5
Poor	E	20	15	9.0
Bad	F[2]			

[1] as suppressed by adding allyl thio-urea
[2] i.e. quality which does not meet the requirements of grade E in respect of one or more determinands

Surface Water Quality - Biological Monitoring

In addition to the chemical monitoring of watercourses, the quality of surface waters is also assessed by using the invertebrate community present as an indicator of overall water quality. Scoring systems are used for the species found, with high scores given to species known to be intolerant of pollution and lower scores to species which can live in fairly polluted water. A high total score indicates a river of consistently good quality, while a low score indicates one that is chronically or intermittently polluted.

Biological monitoring is routinely carried out at 53 sites, which are generally matched with chemical sampling sites. In quinquenial years, e.g. 1995, 2000, biology sampling for GQA assessment is carried out twice a year in strict seasons, spring (March-May) and autumn (September-November). In non-quinquenial years, e.g. 1996, 1997, sampling is still twice a year but the seasons are not so strict (February-June and September-December). Currently the computer system used to calculate the GQA grades can only handle data from strict seasons. In addition, special catchment surveys are carried out at a lower frequency to investigate, for example, the impact of abandoned metalliferous mine drainage and sheep dips.

Waste Management

Waste Management Sites

Licensed waste management sites are regularly inspected by the Agency in order to check compliance with waste management licence conditions and monitor environmental impact. The frequency of inspections depends on the type of site therefore a landfill site that accepts household and industrial wastes will be inspected more frequently than a site accepting only soil wastes.

Current guidance from the DETR as replaced by the DoE (Waste Management Paper No.4) recommends the following inspection frequencies:

Type of facility	No. of inspections per month
Co-disposal landfills*	8
Treatment plants*	4
Household, commercial, industrial transfer stations*	4
Household waste amenity sites*	4
Inert landfills	2
Metal recycling sites	1

The Waste Management Paper recognises that the actual inspection frequency may be modified to take site-specific factors into account, for example:

1. To reflect the quality and success of operational management, and
2. To provide for cases where sites are so small and remote that it would be impracticable to achieve the indicative inspection frequency.

The Agency has presently set the inspection frequency for facilities shown with an asterisk (*) above at 70% of the DETR figures. The lower frequency sites are visited at 100% of the set figures.

At landfill sites monitoring is also undertaken to ensure that the products formed as a result of the breakdown of waste, leachate and landfill gas, do not escape in an uncontrolled manner and cause pollution. Leachate is a potentially polluting liquid containing heavy metals and organic materials. Landfill gas comprises methane and carbon dioxide, both of which are greenhouse gases and between them can give rise to fire, explosion and asphyxiation. Stringent conditions are imposed on the waste management licence to prevent uncontrolled escape of leachate and landfill gas. Monitoring within and outside the site is undertaken to detect any migration of gas from site and leachate contamination of surface and groundwater.

Wildlife and Amenity

Conservation and Recreation - Habitat Surveys

River Corridor surveys have been completed for the majority of main rivers in the catchment and River Habitat Surveys are also being undertaken.

Fish Stocks

Stocks of juvenile salmon and trout are monitored annually at 10 sites on the Afon Rhiw and Afon Tanat. In addition, a further 143 sites are monitored for all fish species at locations on rivers throughout the catchment as part of the Agency's 5 year strategic sampling programme. Salmon redd counts are also carried out annually together with the collection of catch statistics for salmon from anglers' rod licence returns. An electronic fish counter is installed at Llanyblodwel gauging weir on the Afon Tanat, which may be used to monitor runs of salmon up the river.

APPENDIX 2

Policy and Practice for the Protection of Groundwater

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

It deals in particular with:

* Control of groundwater abstractions.
* Physical disturbance of aquifers and groundwater flow.
* Discharges to underground strata.
* Waste disposal to land.
* Disposal of slurries and sludge to land.
* Contaminated land.
* Diffuse pollution.
* Unacceptable activities in high -risk areas.

The implementation of the policy relies in part on the construction of a series of maps showing groundwater vulnerability (resource protection). In addition, source protection zones are being modelled to define the catchments of abstractions to ensure source protection.

In respect to resource protection the policy recognises three types of aquifer:

Major Aquifers are highly permeable formations usually with a known or provable presence of significant fracturing. They may yield large quantities of water for public supply or other purposes.

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

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

These different aquifer types relate to the vulnerability of the groundwater resources to pollution and are used in conjunction with other information in the development of the groundwater vulnerability maps being published by the Agency.

The policy recognises three source protection zones:

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

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

Zone III (Source Catchment): The complete catchment area of groundwater source.
The controls to be exerted on a given activity will be more stringent, the more vulnerable the resource and the nearer the source. These protection zones apply to major aquifers and to minor aquifers where the aquifer provides a critical resource.

APPENDIX 3

Flood Defence Activities

Regulation

Main River

All watercourses are classified as either 'main river' (which is defined on maps held by the Agency and MAFF) or 'ordinarywatercourse' (sometimes referred to as 'non-main river'). In broad terms main river includes all watercourses which contribute significantly to a catchment's drainage though ordinary watercourses may be more significant locally. The legislation dealing with main river is the Water Resources Act 1991 and is supplemented by local Byelaws. The Agency supervises all flood defence matters but have special powers to carry out or control work on main rivers.

Local Authorities and in some areas Internal Drainage Boards (IDB's) are responsible for flood defence on ordinary watercourses. The appropriate legislation relating to ordinary watercourses is to be found in the Land Drainage Act 1991. Proposed revisions to main river are dealt with through a consultation and advertising process with the decision whether to main a river, or not, being made by MAFF.

Flood Risk Areas - DoE Circular 30/92 - Section 105 Surveys

It is preferable to avoid increased risk from flooding through control of development rather than to have to carry out works to alleviate problems once they occur. The relevant authority for controlling development in the floodplain is not the Agency but the local planning authority through the Town and Country Planning Act 1990 process.

Local Planning Authorities and the Agency are required by the Department of the Environment (now DETR) in Circular 30/92, on Development and Flood Risk, to liaise closely on flooding and surface water runoff matters. The aim is to ensure that flooding risks that might arise from a development are recognised and made an integral part of the decision making process undertaken by local planning authorities. Flooding and drainage issues are also to be taken fully into account during the preparation of land use development plans. In this respect the Agency has responsibility to prepare surveys under Section 105 of the Water Resources Act 1991 to define the nature and extent of flood risks.

Land Drainage Consents and Surface Water Control

The Agency's consent is required for works on or near the bank of a main river. This includes construction in, over, under or within 8 metres of the watercourse including such activities as the planting of trees and mineral extraction. On ordinary watercourses, consent is only required for building any structure that would affect the flow. These powers are used to ensure that people both upstream and downstream of the proposed works are not exposed to an increased risk of flooding.

Access along river banks for staff and equipment needs to be preserved wherever possible, especially for emergency works. To ensure this access is kept clear we will not grant a consent to any development within eight metres of a main river watercourse, which would compromise flood defence work activities.

In deciding whether to issue a consent we will also take into account whether the proposed works conserve and enhance the environment. 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 problems in due course. Increases in both the amount and rate of water reaching rivers can, if not managed, lead to greater risk of flooding. We will seek to ensure new development is carefully located and designed and where appropriate we will require measures to control surface water to be incorporated into the overall scheme.

Water Level Management Plans

The government on the preparation of Water Level Management Plans has issued recent guidance for Sites of Special Scientific Interest or other areas of high ecological or landscape importance. Where we are the operating authority, we will liaise with English Nature to prepare a plan to ensure appropriate key water levels are safeguarded.

Flood Defence Standards of Service

As an aid to decisions on priorities for works we have 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. These include housing, commercial property, agriculture, highways and other transport networks. Such features are each allocated a financial value (based on the potential losses that would ensue if the features were subject to flooding) which allows comparison of different features on the same basis.

Each land use band has a target for the maximum flood risk to which it should be exposed. The standards are expressed in terms of the frequency at which a flood is likely to occur which exceeds the magnitude for which protection is available or should ideally be provided.

For example, a standard of 1 in 50 years means that, for any given year, the likelihood of a flood flow occurring which significantly affects key land use features, is 1 to 50 or 2% in any one year.

A comparison of the target and actual standards of service allows improvement and maintenance works to be prioritised towards those rivers that do not meet their target standards. Descriptions of land use bands are given in the table below.

Table 23 - Standards of Service Land Use Bands and Targets

Land use band	Description of typical land use	Target standard of protection (return period)	
		Fluvial	Saline
A	High density urban areas containing significant amounts of both residential and commercial property at risk	1:50 - 1:100	1:100 - 1:200
B	Medium density urban areas, some parks and open spaces, or high grade agricultural use at risk	1:25 - 1:100	1:50 - 1:200
C	Low density urban areas or rural communities. Typically large areas of high grade agricultural land with some properties also at risk from flooding	1:5 - 1:50	1:10 - 1:100
D	Generally farmland with occasional properties at risk. Medium productivity agriculture which may also be prone to the effects of water-logging	1:1.25 - 1:10	1:2.5 - 1:20
E	Typically low grade agricultural land or public open space, often grassland or scrub, with very few properties at risk	<1:2.5	<1:5

Routine Maintenance Regime

The Agency does not own watercourses (except in a few specific locations where flood defence structures have been constructed and their ownership retained). The ultimate responsibility for the upkeep of a watercourse rests with the person who owns the land on the side of the river (also known as the riparian owner).

We have permissive powers, on main river, to undertake works and exercise our powers in this respect according to available resources and priorities. Regular maintenance is essential if the river system is to operate properly at times of high water levels. Such maintenance works include vegetation control, repairs to earth embankments and other floodwalls, obstruction and blockage removal and dredging. Maintenance can contribute significantly to

reducing the risk of flooding.

Emergency Response

At times of high water levels in addition to our flood warning role (see section 5) our operational priorities are to patrol the defences, check and operate flood defence structures, remove blockages and carry out any emergency repairs needed.

District councils have permissive powers to offer assistance to owners and occupiers during floods. This may include placing sandbags, moving possessions, evacuating people. Each Council has a different policy on the type and amount of help they give. 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.

Depending on the location, the County Council or the Local Unitary Authority are responsible for public highways and would deal with any flooding problems associated with road drainage. All County Councils and Unitary Authorities have Emergency Planning Officers who may become involved in more serious flood events.

Capital Works

In addition to general maintenance work, the Agency can build new flood defences if flooding is a serious problem in a particular area. Nowadays we usually only build new defences to protect built up areas from flooding. All schemes must be technically, economically and environmentally sound. We keep a list of schemes called a Programme of Capital Works that helps us to plan for the future.

Duty of Care for Conservation

All new schemes and maintenance works are carried out after consultation with our conservation staff to ensure that the work is done in an environmentally acceptable manner. Under the legislation three main areas have to be considered, namely to take into account the impact of proposals on natural features, to have regard to protection features of historic interest, and to further the conservation and enhancement of flora, fauna and other natural features.

Flood Warning

Flood Warning Responsibilities

The Agency recognise that irrespective of attempts to minimise the risk from flooding through the implementation of various policies and actions, flooding can occur and on occasion represents a risk to human life. With regard to public safety we operate a flood forecasting service in the catchment which uses rain gauge and river level data from a number of sites, radar and rainfall forecast data from meteorological agencies, and information from flood defence staff in the field.

As well as issuing flood warnings we have the lead role in making sure that they actually get through to the people at risk. Arrangements are agreed in consultation with Local Authorities and the emergency services. Regular flood warning liaison meetings are also held to review the effectiveness of the flood forecasting and warning process. The Agency works in partnership with Local Authorities and people at risk to get the flood warnings to those affected by flooding. Automatic voice message computers send the warnings directly to Senior Flood Wardens who operate a cascade system to ensure that all that need the warnings get them. Other media such as local radio, teletext, AA Roadwatch and the Met Office are used to get the widest possible coverage. In addition, recorded up to date local information is available by telephone on **Floodcall 0645 88 11 88** (see Issue 19).

APPENDIX 4

National and European legislation

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

National Legislation

A summary of the most relevant legislation is given below:

Salmon and Freshwater Fisheries Act 1975
Police Act 1964 and the Police and Criminal Evidence Act 1984
Control of Pollution (Amendment) Act 1989
Environmental Protection Act 1990
Water Resources Act 1991
Land Drainage Act 1991
The Water Industry Act 1991
The Radioactive Substances Act 1993
Environment Act 1995

European Legislation

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

Surface Water Abstraction Directive (75/440/EEC)
Disposal of Waste Oils Directive (75/439/EEC)
Waste Directive (75/442/EEC)
Dangerous Substances Directive (76/464/EEC)
Freshwater Fisheries Directive (78/659/EEC)
Incineration of Municipal Waste Directive (89/369/EEC)
Urban Waste Water Treatment Directive (91/271/EEC)
Nitrate Directive (91/676/EEC)
Batteries and Accumulators Directive (91/157/EEC)
Adapting to Technical Progress Directive (93/86/EEC)
Packaging and Packaging Waste Directive (94/62/EEC)
Incineration of Hazardous Waste Directive (94/67/EEC)
List of Hazardous Waste Directive (94/904/EEC)
Commission decision on the Standard Consignment Note Referred to
in Council Regulation (EEC No. 259/93 on Shipments of Waste (94/774/EC))
Integrated Pollution Prevention and Control Directive (96/61/EC)

APPENDIX 5

Agricultural Land Classification (ALC) Grades (MAFF)

Grade 1 - Excellent Quality Agricultural Land

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

Grade 2 - Very Good Quality Agricultural Land

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

Grade 3 - Good to Moderate Quality Agricultural Land

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

Subgrade 3a - Good Quality Agricultural Land

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

Subgrade 3b - Moderate Quality Agricultural Land

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

Grade 4 - Poor Quality Agricultural Land

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

Grade 5 - Very Poor Quality Agricultural Land

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

APPENDIX 6

Developments Requiring Environment Agency Consultation

General

1 Development within or adjacent to any watercourse.

2 Development that includes land raising, in areas at risk of flooding from rivers including tidal lengths, and the sea.

3 Development on, under or adjacent to any flood bank, sea defence or other flood control structure.

4 Development that may affect an aquatic/wetland site of conservation interest.

5 Development of contaminated land, e.g. gas works, historic industrial use, bulk fuel storage, chemical production and landfill.

6 Development involving the disposal of sewage other than to a public sewer, including the use of septic tanks, cesspits, private sewers and private sewage treatment works.

7 Development that could affect groundwater protection zones.

8 Development that could exacerbate existing sewerage or sewage disposal problems.

9 Developments within 250 metres of land that is or has, at any time in the 30 years before, been used for the deposit of refuse or waste and has been notified by the Agency.

10 Development on the site of or within 500 metres (measured from site boundary) of a process subject to Integrated Pollution Control.

11 Development involving the raising of reclamation of land.

12 Development that falls within the Environmental Assessment Regulations 1988.

Specific

13 Residential, industrial or commercial developments greater than 0.5 hectares in area or which incorporate an access road.

14 Major infrastructure schemes e.g. highways, railways, power stations, wind farms, airports, tunnels, oil refineries, pipelines and any associated facilities.

15 Waste management operations including landfill, waste transfer stations, incinerators, scrap yards, solvent recovery plants, bailing and re-cycling plants.

16 Mineral working and exploratory works to include oil and gas exploration and land restoration projects.

17 Petrol stations or other bulk storage facilities for petroleum products and chemicals, include hazardous substances, fertilisers and pesticides (above or below ground).

18 Vehicle parks including plant hire and transport depots.

19 Agricultural developments to include intensive livestock and poultry units, chemical and fertiliser storage, the making and storage of silage and the storage and disposal of manure and effluents.

20 Kennels, catteries, stables, etc.

21 Camping and caravan sites.

22 Timber treatment plants.

23 Cemetaries and crematoriums.

24 Fish farming activities, fish stocking or relocating of fish or works which will restrict movement of fish.

25 Water-based recreation facilities or developments affecting access to water or water areas.

26 Ponds, lakes and reservoirs, including water storage for irrigation.

27 Golf courses.

28 Swimming pools.

29 Forestry activities.

APPENDIX 7

Results of Informal Issues Consultation

During June 1998, all Local Authorities in the LEAP area were contacted, together with representatives of over 48 other organisations that have an interest in the local environment. This pre-consultation exercise was designed to focus on key groups and organisations that were likely to have information and ideas about the sort of environmental problems facing the area, and to give them an opportunity to comment on the issues the Agency see as important in the Severn Uplands area. 14 of the 71 consultees responded (23%). The members of the Area Environment Group were also consulted.

Overall comments on the issues raised were supportive and the opinion from many of the respondees was that the issues list was comprehensive. However, some additional specific issues did arise from the consultation responses and these have been incorporated into the issues in Section 3, where appropriate. Many other more general points were also raised which have been included in other sections of the plan. The Agency is grateful for all comments received.

The main areas of interest were: impacts of developments within the floodplain upon biodiversity; monitoring of species; potentially damaging river works affecting habitats; provision on riparian land of facilities for watersports; guidance for sports facilities within the floodplain; climate change; problems relating to water resources especially low flow; provision for the landscape and historic environment within floodplain management; inclusion of objectives and aims for wildlife.

Consultee List for the Informal Issues Consultation (June 1998):

Area Environment Group (Upper Severn Area)
Berriew Angling Club
Birmingham Angling Association
British Canoe Union (Nottingham)
British Canoe Union (Powys)
British Canoe Union (Shrewsbury)
British Canoe Union (West Midland Region)
British Waterways
Caersws Angling Association
Campaign for the Protection of Rural Wales
Countryside Council for Wales
Council for the Protection of Rural England (Shropshire)
Darlack Angling Society
Drummond Outdoor Kayak & Canoe Centre
Dwr Cymru Welsh Water
English Nature (West Midlands)
English Sports Council
Farmers Union of Wales
Forest Enterprise
Farming and Rural Conservation Agency (Welsh)
Friends of the Earth (Powys)
Friends of the Earth (North Shropshire)
Friends of the Earth (Shropshire)
Heart of England Tourist Board
Institute of Fisheries Management (Wales)
Institute of Hydrology (Plynlimon Catchment)
Llanidloes & District Angling Association
Melverley Internal Drainage Board
Montgomeryshire Angling Association
National Farmers Union (Welsh)
National Farmers Union (Montgomeryshire Branch)
National Farmers Union (N Wales Region)
National Farmers Union (West Midlands Region)
North West Water Ltd (Warrington)
Otters in Wales
Oswestry Borough Council (3 departments)
Potteries Angling Society
Powys County Council (3 departments)
Powysland Internal Drainage Board
Prince Albert Angling Association
Ramblers Assocation (Powys)
Ramblers Association (Worcester)
Ramblers Association (Wrexham)
Regional Fisheries Ecology & Recreation Advisory Committee (RFERAC):
- Anglesey - Mr I Bonner
- Gwynedd - Mr R Lee
- Powys – R C P Williams
- Stourbridge - Mr G Ayres
- Worcestershire - Mr D H Morgan

RSPB (Powys)
Rural Development Commission (Shropshire)
Salmon & Trout Association (Worcestershire)
Salmon & Trout Association (Shropshire)
Severn Fisheries Consultative Council
Severn Navigation Restoration Trust
Severn Trent Water Ltd
Shrewsbury & Atcham Borough Council
Shropshire County Council
Shropshire Association of Parish and Town Councils
Shropshire Wildlife Trust
South Shropshire District Council
Sports Council for Wales
The Clywd & Powys Archaeological Trust
The Inland Waterways Association
Upper Tanat Fishing Club
Welsh Canoeing Association (Gwynedd)
Wales Tourist Board
Warrington Anglers Association
Welsh Canoeing Association (Powys)
White Swan Piscatorials
Wild Trout Society
Wildlife Trust Montgomery
Wildlife Trust Radnor
Wildlife Trust Shropshire

Severn Uplands LEAP-Responses Received From:

Mr Tony Bostock (AEG)
Countryside Council for Wales
Drummond Outdoor
English Nature
English Sports Council
Farmers Union of Wales
Forest Enterprise
Montgomeryshire Wildlife Trust
Mr Selby Martin (AEG)
Montgomeryshire Wildlife Trust
Otters in Wales
Rural Development Commision
Severn Navigation Restoration Trust
Shropshire Association of Parish and Town Councils
Shropshire County Council Environment Department
South Shropshire District Council
The Clywd-Powys Archaeological Trust
Worcestershire Wildlife Trust

APPENDIX 8

The Relationship between CMP and LEAP Issues

The table below illustrates the continuity between the Severn Uplands Local Environment Agency Plan (LEAP) and the River Severn - Upper Reaches Catchment Management Plan (CMP) in relation to the issues raised, (also see Section 1.0). Progress on the CMP issues and actions were reported in the Second Annual Review of the CMP, published in August 1997. Some issues require further action and have therefore been carried over from the CMP into the LEAP. (Other issues which were in the CMP have been included in other sections of this LEAP, for example in the Land Use Statements in Section 4), and some have been completed or are now considered to have become part of the day to day work of the Agency i.e. a routine activity. New issues contained in the LEAP mainly relate to the Agency's new duties.

Table 24 - Comparison of Issues in the River Severn - Upper Reaches CMP and the Severn Uplands LEAP

CMP Issues	LEAP Issues
1 Need to safeguard high quality water, water resources and habitats	Now generally considered routine activity. Previous action 1.1 now in Issue 11.
2 Reduction and mitigation acidification impacts	9 Surface water acidification
3 Achievement of longer term Water Quality Objectives (WQOs) and compliance with EC Water Quality Objectives	10 Non compliance with River Quality Objectives (RQOs) 11 Non compliance with EC Directives (for 1997)
4 Sewerage and sewage disposal in rural areas	13 Sewerage and sewage disposal in rural areas
5 Stewardship role for abundant surface waters - review of River Severn Regulation Controls and reservoir operations (Issues 5 and 6 previously merged)	1 Review of River Severn regulation controls and reservoir operations
7 Export of water from the catchment: review of use of Lake Vyrnwy (Issues 7 and 13 previously merged)	2 The role of strategic water resources
8 Future transfer of water using the River Severn	2 The role of strategic water resources
9 Water supplies in Llandinam and North Montgomery distribution area	Completed, related issue: 3 Reliability of water supplies in meeting peak demands
10 Shropshire Groundwater Scheme: use and impacts	1 Review of River Severn regulation controls and reservoir operations
11 Use of River Severn water for Montgomery Canal	Completed and no longer a water resources issue, ongoing/routine work taking place
12 Abstractions from river gravels: use and impacts	9 Reliability of water supplies in meeting peak demands
13 Lake Vyrnwy possible future change of use (previously merged with Issue 7)	2 The role of strategic water resources
14 Groundwater Abstraction licensing	Completed. Desk study - no issues

CMP Issues	LEAP Issues
exemptions	
15 Protection of rare and threatened species	5 Protection of rare and threatened species
16 Increased demand for amenity and recreation opportunities	14 Increased demand for amenity and recreation opportunities
17 Restoration of damaged habitats	6 Restoration of damaged habitats
18 Obstacles to salmon migration	7 Obstacles to salmon migration
19 Protection and maintenance of native brown trout population	8 Protection and maintenance of native brown trout population
20 Poaching and illegal fishing	Now considered routine/ongoing activity
21 Impact of piscivorous birds on fish stocks	Not raised as an issue
22 Prevention of unauthorised and other environmentally damaging river works	15 Unauthorised and other environmentally damaging river works
23 Water level management in the Severn-Vyrnwy confluence area	16 Environmental strategy for the Severn-Vyrnwy confluence area 17 Severn-Vyrnwy confluence - maintenance of the argae system
24 Preservation and definition of flood plain	20 Floodplain management
25 Caravan sites on flood plain	20 Floodplain management
26 Impact of land use changes, including hill land improvement and afforestation, on rates of run-off	21 Impact of land use changes, including hill land improvement and afforestation, on rates of run-off
27 Impact of development on the water environment	Now considered routine/ongoing activity. Also Issue 25, The need to raise and promote environmental awareness and education
	New Issues: 18 Increased threats of pollution from sheep dipping 19 Development of flood warning system 22 Landspreading for agricultural improvement 23 Sustainable waste management 24 Illegal waste deposits 25 The need to raise and promote environmental awareness and education

APPENDIX 9

Environment Agency Leaflets and Information

Listed below is a selection of leaflets available from the Environment Agency. It is intended as a guide to the type of information available rather than as a complete list as new leaflets are being produced. It does not include policy documents or technical reports.

General Information

- A Guide to Information Available to the Public
- Guardians of the Environment
- 0800 Leaflet (Emergency Hotline)
- Customer Charter
- Corporate Plan Summary
- Annual Report and Accounts
- Complaint and Commendation Procedure
- Worldwide Web - State of the Environment
- The Environment of England and Wales - A Snapshot
- Green Shoots - Strategy for Environmental Education
- An Environmental Strategy for the Millennium and Beyond
- Partnership in Environment Protection
- Our Midlands Environment
- Local Agenda 21
- Planning and acting for a Better Environment (joint leaflet with West Midlands Local Govt. Association)

Environment Protection / Pollution Prevention

- Blue Green Algae
- Identifying Freshwater Life
- 'How to Avoid' Pollution Series
- Making the Right Connection - Avoiding Water Pollution
- Designs that Prevent Pollution - Nature's Way
- Farm Waste Management Plans
- The Oil Care Code: a number of leaflets
- Pollution Prevention Guidelines (PPGs): PPG1-PPG20
- Building a Cleaner Future
- Water Pollution Incidents in England and Wales - Report Summary
- Recovering the Cost of Pollution
- Accreditation Scheme for Spill Response Contractors
- Discharge to Controlled Water - Annual Charges
- Assessing Water Quality
- The Use of Licences to prevent pollution
- A Guide to Groundwater Vulnerability Maps
- A Guide to Sustainable Urban Drainage
- Integrated Pollution Control Fees and Charges
- Charging Scheme for Radioactive Substances Act Regulation
- Integrated Pollution Control and You
- What a Waste!
- Special Waste Regulations 1996 - How they affect you
- Classification of Special Waste
- Use of the Consignment Note
- Obtaining and Sending Consignment Notes
- Waste Regulation and You
- The Registration of Waste Carriers
- New Packaging Regulations - How do they affect you
- Clinical Waste
- Producer Responsibility Obligations 1997 (1st Ed, July 1997)
- Producer Responsibility Obligations (Packaging Waste) Regs 1997

Fisheries Conservation and Recreation

- Anglers and the Agency
- Rod Fishing Licences
- Buyer Beware - Your Guide to Stocking Fish
- Fisheries News
- Fishing Guide
- Climatic Change and the Garden
- Conservation - Work in the Midlands Region
- Mink
- Understanding Buffer Strips
- Control of Invasive Plants near Watercourses
- Have Fun, Have a Care (Water recreation information)
- Recreation Sites (Midlands)
- Enjoy Your Garden - Care for our Environment
- Conservation Designations
- Rod Fishing Bylaws
- Severn Bore and Trent Aegir
- The Severn Way
- Aquatic Weed Control Operation
- Phytopthora disease of Alder
- River Life - from Source to Sea

Flood Defence and Water Resources

- Flood Warning Information: What to do if your property is at risk
- Flood Warning Information: Various rivers
- Schedule of Main Rivers
- Land Drainage Byelaws
- Water Abstraction Charges
- Water Abstraction Can Cause Pollution
- Abstraction Licensing and Water Resources
- Spray Irrigation
- Making the most of your Spray Irrigation Abstraction Licence
- Water Alert - The Campaign for Water Conservation in England and Wales
- Information Sheets 1-23 - Flood Defence - various subjects
- Flood Defence Factsheet
- Application for Consent for works affecting watercourses and/or flood defences- Explanatory Notes
- Rivers and Wetlands - Best Practice Guidelines
- Defying the Disaster: Memories of the 1947 floods
- Living on the Edge - a guide for riverside owners
- Safeguard the Environment: A guide for developers

Please contact Customer Contact team at your Area office for further information and to obtain these and other leaflets (subject to stock availability). Tel: 01743 272828

APPENDIX 10

Glossary

Abstraction	The removal of water from any sources, either permanently or temporarily.
Abstraction Licence	A statutory document granted by the Environment Agency to permit removal of water from a source of supply Section 38 Water Resources Act 1991.
Acidification	The detrimental effect of acid rain on soils and freshwater.
Afforrestation	Planting trees, turning an area into forest.
Agenda 21	A comprehensive programme of worldwide action to achieve a more sustainable pattern of development for the next century. UK Government adopted the declaration at the UN Conference on Environment and Development (the Earth Summit) held in Rio de Janeiro in 1992.
Ammonia	A chemical compound found in water often as a result of pollution by sewage effluents. It is widely used to determine water quality. Ammonia detrimentally affects fish.
AOD (Above Ordnance Datum)	Land levels are measured relative to the average sea level at Newlyn in Cornwall. This Average level is referred to as 'Ordnance Datum'. Contours on Ordnance Survey maps of the UK show heights in metres above Ordnance Datum.
AONB	Area of outstanding natural beauty.
Aquatic	Pertaining to the water environment.
Aquifer	A water bearing-stratum situated below ground level. The water contained in aquifers is known as groundwater.
Argae	Flood embankment.
Asset Management Plan (AMP)	Water Companies' Strategic Business Plans (see Section 3 Issue 1 and Section 6.2.2.1), part of the periodic review of water company charges.
Attenuation	Dilute or slow the spread of contamination or the speed of water flow.
Augment	The addition of water by artificial input. (Usually to "top up" low flows in summer by either groundwater pumping or via reservoir release.)
Base flow	The proportion of river flow that is provided by groundwater discharge from an aquifer
Base poor soils	Soils, which only very slowly release into the water the dissolved chemical, or minerals, which normally result in hard water. They are therefore unable to neutralise the effects of acid rain.
Benzene	Air pollutant from fossil fuels released by vehicular traffic and by industry, carcinogenic. A target pollutant in the UK National Air Quality Strategy.
Biochemical Oxygen Demand (BOD)	A standard test which measures over 5 days the amount of oxygen taken up by aerobic bacteria to oxidise organic (and some inorganic) matter.
Biodegradable	Capable of being decomposed by bacteria or other biological means.
Biodiversity	Diversity of biological life, the numbers of species present.
Borehole	A well sunk into a water bearing rock.
Buffer Zone	Strip of land 10-100m wide, alongside rivers which is removed from intensive agricultural use and managed to provide appropriate habitat types.

1, 3 Butadiene	A gas derived mainly from the combustion of petrol and other materials. A carcinogenic and a target pollutant in the UK National Air Quality Strategy.
Carbon dioxide (CO_2)	Gas present in the atmosphere and formed during respiration, the decomposition and combustion of organic compounds (e.g. fossil fuels, wood etc). A greenhouse gas.
Carbon Monoxide (CO)	Gas formed by the incomplete combustion of fossil fuels. At very high exposures, prolonged exposure can be life threatening. A target pollutant in the UK National Air Quality Strategy.
Catchment	The total area from which a single river system collects surface run-off.
Coarse Fish	Freshwater fish other than salmon and trout.
Consent (Discharge)	A statutory document granted by the Environment Agency to discharge effluent of specified quality and volume to a Controlled Water. Schedule 10 Water Resources Act 1991
Consent (Land Drainage)	An approval for specified structural works in, under or over a watercourse.
Controlled Waste	Industrial, household and commercial waste, as defined in UK legislation. Controlled waste specifically excludes mine and quarry waste, wastes from premises used for agriculture, some sewage sludge and radioactive waste.
Controlled Water	All rivers, canals, lakes, groundwater, estuaries and coastal waters to three nautical miles from the shore, including the bed and channel which may at some times be dry.
Culvert	Drain or covered channel carrying water across or under a road, canal etc.
Cyprinid fish	Coarse fish e.g. Roach, Dace and Bream.
Dangerous Substances	Substances defined by the EC as in need of special control. This is because they are toxic, accumulate and concentrate in plants and animals, or do not easily breakdown into less dangerous substances. They are classified as List I or List II.
Dry Weather Flow (Sewage)	For sewage works, this is calculated by adding the estimates of the domestic sewage discharge plus any industrial discharges plus infiltration into the sewer.
Dry Weather Flow (River)	For the river, this is taken to be what is known as the 95 percentile low flow (or Q95) which means the river is higher than the Q95 for 95% of the time.
EC Directive	A type of legislation issued by the European Community which is binding on Member States in terms of the results to be achieved but which leaves to Member States the choice of methods.
Ecosystem	A functioning, interacting system composed of one or more living organisms and their effective environment, in biological, chemical and physical sense.
Effluent	Liquid waste from industry, agriculture or sewage treatment plants.
Environmental Quality Standard (EQS)	The concentration of a substance which must not be exceeded if a specific use of the aquatic environment is to be maintained
Environmentally Sensitive Area (ESA)	An area where special grant in aid schemes are available to encourage environmentally sensitive farming practices.
Evaporation	Water lost from a water body to air by a change in state from liquid to vapour.
Fauna/Flora	Animal life/Plant life
Flood defences	Anything natural or artificial that protects against flooding, to a designed return period.
Floodplain	This includes all land adjacent to a watercourse over which water flows or would flow but for flood defences in times of flood.
Flytipping	Illegal disposal of trade / domestic waste in unauthorised / unlicensed places.

Gauging station	A site where the flow of a river is measured.
General Quality Assessment (GQA)	A means of assessing and reporting environmental water quality in a nationally consistent and objective way.
Groundwater	Water which saturates a porous soil or rock substratum (or aquifer). Water held in storage below ground level.
Groundwater Units	Administrative sub-divisions of aquifers, defined on geological and hydrogeological criteria which form the basis for groundwater resource management and licensing policy decisions.
Habitat	The locality or environment in which a plant or animal species lives.
Heavy Metals	A loose term covering potentially toxic metals used in industrial processes, common ones include chromium, copper, lead, zinc and cadmiun.
Integrated Pollution Control (IPC)	An approach to pollution control in the UK that recognises the need to look at the environment as a whole, so that solutions to particular pollution problems take account of potential effects upon all environmental media.
Invertebrate	Animal that lacks a vertebral column - used for biological classification. Especially macro-invertebrates (animals of sufficient size to be retained in a net with a specified mesh size.
Landfill	Site used for waste disposal into/onto land.
Leachate	Liquor formed by the act of leaching, often from landfill sites.
Main River	The watercourse shown on the statutory 'main river maps' held by the Environment Agency and MAFF. The Agency has permissive powers to carry out works of maintenance an improvement on these rivers.
Nitrate Sensitive Areas (NSA)	An area where nitrate concentrations in sources of public drinking water exceed, or are at risk of exceeding the limit of 50 mg/l laid down in the 1980 EC Drinking Water Directive, and where voluntary, compensated agricultural measures have been introduced as a means of reducing those levels.
Nitrate Vulnerable Zone (NVZ)	An area where nitrate concentrations in sources of public drinking water exceed, or are at risk of exceeding the limit of 50 mg/l laid down in the 1991 EC Nitrate Directive, and where compulsory, uncompensated agricultural measures will come into force on 19 December 1998 as a means of reducing those levels.
Nitrogen dioxide (NO_2), Nitric Oxide (NO), Oxides of Nitrogen (NO_x)	NO_2 and NO are both oxides of nitrogen (NO_x) produced by traffic and industry. NO_2 can have an adverse effect on human health, increasing the symptoms associated with respiratory illness. NO_2 is a target pollutant in the UK National Air Quality Strategy.
National Nature Reserve (NNR)	An area given a statutory designation by English Nature or the Countryside Council for Wales due to its national nature conservation value.
Ordinary Watercourse	A watercourse that does not form part of the main river.
OFWAT	Office of Water Industry's Financial Regulator of Water Service Companies.
Ozone	Caused by a chemical reaction in sunlight, at lower levels in the atmosphere by oxides of nitrogen and volatile organic compounds reacting to form ozone. Affects the respirator system. A target pollutant in the UK National Air Quality Strategy.
Particulates	Small particles of matter released from a number of sources which can affect the respiratory and cardiovascular systems. A target pollutant in the UK National Air Quality Strategy. PM_{10} - particles below 10μm.
Pesticide	Substances used to kill pests, weeds, insects, fungi, rodents etc which can have significant harmful environmental effects.
pH	A measure of the acidity or alkalinity of a solution.

Prescribed Flows	That flow which should not be artificially reduced if the riverine environment is to be protected.
Renewable Energy	Energy produced from resources which are unlimited or rapidly replenished e.g. wind, water, sunlight, wave power or waste.
Riparian Owner	Owner of land contiguous to the river.
River Ecosystem Classification (RE)	Classification used to measure water quality, see RQO definition below.
River Quality Objectives (RQO)	Water quality targets to secure specific formal minimum quality standards for specific stretches of water by given dates. A new component of these was introduced by "The Surface Waters (River Ecosystem Classification) Regulations 1994"; a classification scheme applied by the Agency to the rivers and watercourses of England and Wales.
Run Off	Water that runs off the surface of the ground, usually after heavy or prolonged rainfall.
Salmonid Fish	Game fish e.g. trout and salmon.
Septic tank	A tank used for the treatment of sewage from properties without mains drainage. The sewage is settled and some bacterial treatment occurs. Discharge of effluent is usually to a soakaway system.
Sewage	Liquid waste from cities, towns and villages which is normally collected and conveyed in sewers for treatment and/or discharge to the environment.
Sewerage	System of sewers usually used to transport sewage to a sewage treatment works.
Sewage Treatment Plant (STP)	A private treatment plant capable of producing effluent to a higher quality than a septic tank suitable for discharge to soakaway or watercourse.
Sherwood Sandstone	A thick, sequence of poorly cemented red-brown sandstones with interbedded marls an conglomerates deposited during the Triassic era, and constituting one of the main aquifers in the British Isles.
Shropshire Groundwater Scheme	A river augmentation scheme designed to supplement flows in the River Severn during prolonged drought conditions. Groundwater from the Permian Bridgnorth, Triassic Sherwood Sandstone formations of North Shropshire is pumped, via a phased network of interlinked abstraction boreholes, and discharged directly into the River Severn and its main tributaries.
Site of Special Scientific Interest (SSSI)	A site given a statutory designation by English Nature or the Countryside Council for Wales because it is particularly important, on account of its nature conservation value or geological interest.
Sludge	The accumulation of solids from treatment processes. Sludge can be incinerated or spread on farmland.
Slurry	Animal waste in liquid form.
Soakaway	System for allowing water or effluent to soak into ground, commonly used in conjunction with septic tanks.
Soil unit	A cartographic term for a main 'lead' soil and two or more subsiduaries that occur in small pockets and cannot be separated at the scale of mapping used.
Storm Sewage Discharges	The discharge of diluted untreated sewage in times of heavy rainfall and high flows.
Sulphur dioxide (SO_2)	A gas which dissolves in water to give an acidic solution, can lead to acid rain affection ecosystems and water quality. Irritant when inhaled and may cause breathing difficulties. A target pollutant in the UK National Air Quality Strategy.
Surface Water	Water collecting on and running off the surface of the ground.
Sustainable Development	Development that meets the needs of the present without compromising the ability of future

generations to meet their own needs.

Telemetry — River leves, rainfall, temperatures etc. are recorded on data loggers connected to the telephone network. Information from the recording sites can be automatically accessed by computer from a central point.

Trade Effluent — Effluent, other than domestic, derived from commercial process/ premises.

Transfer Station — Waste disposal facility where waste is collected prior to transport to final disposal point.

Water Table — Top surface of the saturated zone within the aquifer.

Wetland — An area of low lying land where the water table is at or near the surface for most of the year leading to characteristic habitats.

Winter Storage Reservoir — Reservoirs built by farmers to store water during the winter months when it is "plentiful" for re-use during the summer.

1:10 Year Drought/Flood — A drought/flood event with a statistical probability of occurring once in a ten year period (other periods may be specified in a similar way).

UNITS

ppm	parts per million
ppb	parts per billion
$\mu g/m^3$	micro (10^{-6}) grammes per cubic metre
$\mu g/l$	micro (10^{-6}) grammes per litre
mg/l	milli (10^{-3}) grammes per litre
kilotonne	= 1000 tonnes

Length	10mm = 1cm (equivalent to 0.394 inches)
	100cm = 1m (equivalent to 39.37 inches)
	1,000m = 1km (equivalent to 0.621 miles)
Area	$10,000m^2$ = 1ha (equivalent to 2.47 acres)
Flow	1,000l/s = $1m^3/s$ (equivalent to 35.31 cuft/sec)
	$1,000m^3/d$ = 11.6 l/s (equivalent to 0.41 cuft/sec)
	Ml/d = Megalitres per day, 1 Ml/d = 11.6 l/s

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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For general enquiries please call your local Environment Agency office. If you are unsure who to contact, or which is your local office, please call our general enquiry line.

ENVIRONMENT AGENCY GENERAL ENQUIRY LINE
0645 333 111

The 24-hour emergency hotline number for reporting all environmental incidents relating to air, land and water.

ENVIRONMENT AGENCY EMERGENCY HOTLINE
0800 80 70 60

ASIANTAETH YR AMGYLCHEDD
ENVIRONMENT AGENCY

MI-12/98-1k-C-BDV8 Printed on recycled paper

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