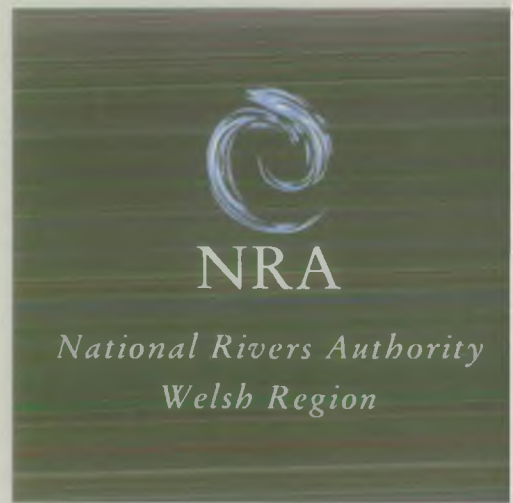


LOUGHOR AND NORTH GOWER
CATCHMENT MANAGEMENT PLAN
CONSULTATION REPORT
FEBRUARY 1996





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**LOUGHOR AND NORTH GOWER CATCHMENT
MANAGEMENT PLAN**

CONSULTATION REPORT

FEBRUARY 1996

**National Rivers Authority
Welsh Region**

Further copies can be obtained from :

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Awarded for excellence

OUR VISION FOR THE LOUGHOR AND NORTH GOWER CATCHMENT

The Loughor catchment drains the remote uplands of the Black Mountains before meandering through the rolling countryside of the middle and lower reaches to drain into the Loughor Estuary and Burry Inlet. The catchment contains areas of very high conservation and landscape value, with important agricultural activities. There are also areas which have suffered from the adverse effects of industrial activity, particularly associated with the coal industry which has been active in the catchment for over 300 years. The pressures which are put on the catchment, particularly around the estuary, present specific problems which we address in this plan.

During the life of this Plan, we wish to see significant progress in:

- **improving water quality** - the major investments in excess of £20 million into the sewage and sewerage systems will result in significant improvements in water quality, both in terms of reduced organic loadings and aesthetic quality. These will be especially noticeable in the lower river and the estuary where the migratory salmonid fishery, the commercial shellfisheries and the EC identified and non identified bathing waters will all benefit. Further improvements to water quality should be achieved through more effective control of coal extraction and processing activities and reducing the impact of the major industrial effluent discharges.
- **balancing abstraction with the needs of the environment** - the abstraction of water must be balanced against the environmental needs of the river system, and we propose to implement an objective methodology for assessing the state of the catchment in water quantity terms and determining availability of water for any new abstraction uses.
- **protecting and developing the migratory fishery** - the high quality of the sea trout fishery should be protected from major developments and illegal activity, particularly poaching of fish. The migratory fishery should develop as environmental improvements, particularly in water quality, are realised.
- **protecting river corridors and floodplains** - the concept of "buffer zones" alongside watercourses needs to be developed, in rural and urban areas, to encourage the formation and protection of natural river corridor habitats where waterside flora and fauna can thrive. Wherever possible, new development should be directed away from floodplains, unless appropriate flood defence works are in place or alleviation works form part of the proposal.

Realisation of our vision, which we expect to be able to take forward into the Environmental Agency in April 1996, will be achieved through a balanced management approach to all activities. We will encourage imaginative proposals to allow sustainable economic and community development to proceed whilst ensuring protection and improvement of the water environment. We will collaborate actively with all users of the catchment and all those statutory bodies that can assist us in striving to achieve this vision.

DAVID WALKER
AREA MANAGER - SOUTH WEST WALES

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PART I

**THE LOUGHOR AND
NORTH GOWER CATCHMENT
MANAGEMENT PLAN**



**1.0 THE PURPOSE OF
CATCHMENT MANAGEMENT
PLANS**



1.0 THE PURPOSE OF CATCHMENT MANAGEMENT PLANS (CMPS)

1.1 THE ROLE OF THE NRA

The rivers, lakes, estuaries and coastal waters of Wales are subject to large and rapidly increasing demands from the users of water. Many different uses interact, or compete for water or water space, and may come into conflict with one another. The National Rivers Authority (NRA) aims to protect and improve the water environment in England and Wales and to harmonise conflicts between competing water users. Our general duties include:-

- Maintenance and improvement of water quality by control of pollution in surface and groundwater.
- Flood defence for people and property.
- Flood warning.
- The management of water resources to achieve the right balance between the needs of the environment and those of abstractors.
- Maintenance and improvement of fisheries.
- Conservation of the natural water environment.
- Promotion of water based recreation.
- Navigation (in some rivers).

We also play a key role in the strategic management of the interaction between users of the water and land environments.

We believe that it is important that the interests of all water users are considered in the development and protection of the water environment. Consequently, we have chosen to promote our *vision* and management proposals via published Catchment Management Plans (CMPS).

1.2 WHAT THIS PLAN IS DESIGNED TO DO

This consultation document presents a number of issues and options for the future management of the Loughor and North Gower catchment, and is based on a detailed study that we carried out during 1995. A number of proposals are presented for comment and it is intended that, following consultation with you and other river users, an Action Plan will be presented which will seek to manage conflicts in river use and optimise the overall benefits to all river users within the catchment.

The Action Plan will steer us in developing our own management programme for the catchment and guiding us in the way we respond to any development proposals.

This consultation document is divided into 2 parts:

- Part I:** presents the range of management issues, and options to address them, that have been identified by the NRA;
- Part II:** provides background information on the approach we took in developing this plan, using information on identified river Uses (including those to be incorporated in the new Water Quality Objectives scheme) and the statutory and informal targets required to support them. The targets are expressed in terms of water quality, water quantity and physical features.

We hope that you find the information in this consultation document informative and thought provoking (for your convenience a glossary of terms and abbreviations is provided as an appendix). Let us know whether you agree or disagree with our current proposals: remember this is not just our document, it is also yours: without your help we cannot produce a workable Action Plan that will be of benefit to you and all users of the Loughor Catchment.

Please send any comments you may have on the Consultation Report to:

The Area Catchment Planner
National Rivers Authority / Environment Agency (after 1st April 1996)
Llys Afon
Hawthorn Rise
Haverfordwest
Dyfed
SA61 2BQ
Telephone: (01437) 760081

The Environment Agency

The new Environment Agency for England and Wales will be created in April 1996 by the merger of the NRA, Her Majesty's Inspectorate of Pollution and the Waste Regulation Authorities. It will be the largest environmental protection agency in Europe. While it will incorporate the full role of the NRA there will be wider responsibilities for integrated pollution prevention and control, of air, land and water. One of the Agency's principal aims will be to contribute towards attaining the governmental objective of achieving sustainable development by protecting or enhancing the whole environment.

The government has recognised both the success of integrated river basin management, as developed and practised by the NRA, and the importance of CMPs as an integral part of that philosophy. It is therefore anticipated that CMPs will continue as the focus for river basin management in the Agency, although they may be developed in the context of wider management plans for the protection and enhancement of water, land and air.

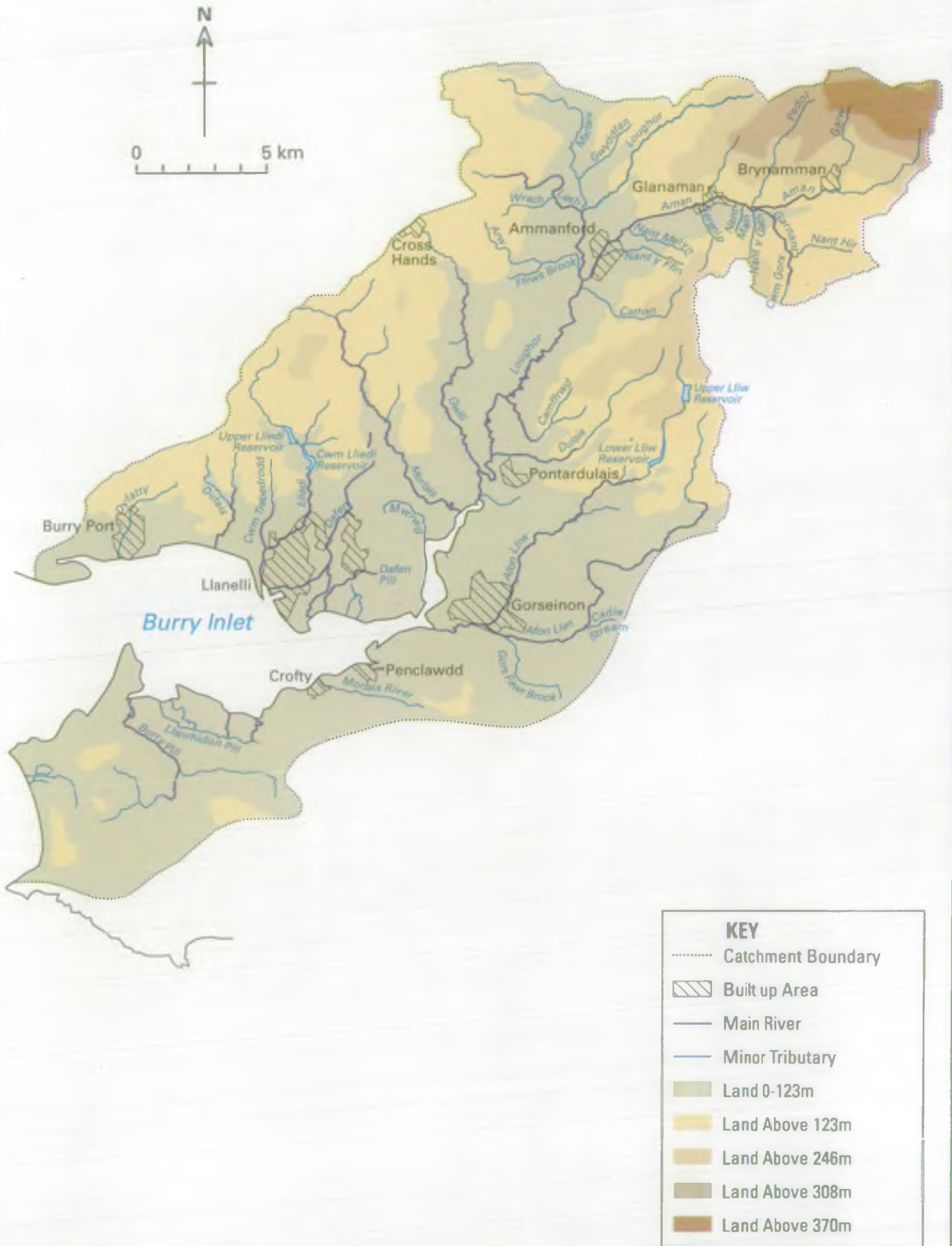


**2.0 AN OVERVIEW OF THE
LOUGHOR AND NORTH GOWER
CATCHMENT**



MAP 1.

MAIN TOWNS AND RIVERS





2.0 AN OVERVIEW OF THE LOUGHOR CATCHMENT

2.1 Introduction

The Loughor and its upper tributaries drain the remote uplands of the Black Mountains in the northeast of the catchment. The river runs in a southwesterly direction, meandering through its wide floodplain before entering the Loughor Estuary and Burry Inlet. The catchment is predominately rural in nature, but with a wide range of industry present. As with other South Wales valleys, the coal industry has had, and continues to have, a great impact on the environment.

For the purposes of this CMP the term 'catchment' refers to the catchment areas of the Loughor and the smaller rivers of the North Gower unless otherwise stated. The streams of the South Gower are included in the Tawe and South Gower CMP Action Plan published in April 1995.

2.2 Infrastructure

The M4 motorway, part of a Euroroute linking London to Fishguard, crosses the catchment to end at Pont Abraham where it joins the A48, which leaves the catchment north of Cross Hands. Also at Pont Abraham the A483 heads up the valley towards Ammanford and Llandybie, with the A474 linking Ammanford to Glanamau. The A484 links Burry Port and Llanelli, and crosses the Loughor Estuary to link with Gorseinon. The A476 is the main route between Cross Hands and Llanelli.

The main rail link is that from Swansea to Fishguard, calling at Gowerton, Llanelli and Burry Port. At Llanelli this line runs north east up the valley, with stops at Bynea, Llangennech, Pontardulais, Pantyffynnon, Ammanford and Llandybie.

2.3 Land Use

Agricultural activity is widespread although, generally, the larger dairy units are found to the west of the catchment and in North Gower, with mixed livestock farming in the east.

Much of the population has settled around the estuary, particularly in Llanelli, Burry Port and Gorseinon, with other towns located up the valley at Pontardulais and Ammanford.

The catchment is currently home to a wide range of industry, with large new industrial estates at Cross Hands, Capel Hendre and Fforestfach. Previous industrial activity has left a legacy of contaminated land, particularly around Llanelli. There is also widespread coal extraction and associated processes, with a number of deep mines, opencast sites and coal washeries present throughout the catchment.

2.4 Flood Defence

The catchment contains areas of flood plain, both tidal and fluvial, where extensive development has occurred. All these areas are at flood risk, and some have a history of extensive flooding. Our flood defence interest relates primarily to these areas and we aim to provide and maintain appropriate standards of flood protection.

Our operations generally involve maintaining channel capacity, by dredging and removing gravel and other obstructions from the channel, and maintaining and protecting against erosion of existing flood defences. These operations will continue, although they are regularly reviewed to ensure a cost effective service. Each year we spend around £100k on these maintenance operations in the catchment.

Flood protection standards at Halfway, Pontardulais and Hendy are known to be below the appropriate standard for residential land. Studies have confirmed that improvements are feasible and cost effective, and schemes are currently being progressed for implementation in 1996. Once complete, appropriate maintenance programmes will be implemented. Flooding problems also occur at many other sites in the catchment and maintenance operations will continue at these sites in order to maintain the channel carrying capacity.

We issue flood warnings via the police for flood risk areas within the catchment. These warnings, while providing advanced notice of flooding, do not comply with our target standards. Existing procedures will therefore be reviewed to determine whether improvements can be made.

2.5 Hydrology & Hydrogeology

Annual average rainfall in the catchment ranges from 1120mm on the coast west of Llanelli, to around 1200mm on the North Gower and up to 2400mm in the Black Mountains at the Northern extremes of the catchment. The catchment average of 1500mm is somewhat higher than the Welsh Region average of 1310mm and two thirds higher than the England and Wales average of 909mm. The Loughor is the principal river of the catchment. It descends steeply in its upper reaches and hence responds rapidly to heavy rainfall. This flashy characteristic dominates over the contribution of groundwater to the flow regime.

The geology of the catchment is made up primarily of Carboniferous strata, consisting mainly of Pennant Sandstone and Millstone Grit. The remainder is of the Lower Coal Series. These strata yield usable amounts of water as demonstrated by the large number of boreholes developed for agricultural use. A band of Carboniferous limestone underlying the Millstone Grit to the north provides the flow at Llygad Llŵchwr, source of a major public water supply abstraction.

2.6 Fisheries Conservation & Recreation

Fisheries - The Loughor has developed into a high quality sea trout fishery although several factors limit the continued improvement and development of stocks. These factors are largely related to man's activities including, for example, past channelisation of river reaches leading to unstable river beds and consequently poor spawning areas. Obstructions, both man made and natural, hinder or prevent upstream migration. Development has further been hampered by major mortalities of fish caused by low dissolved oxygen levels in the Loughor downstream of Garnswllt STW during low flows.

The other rivers within the catchment are predominantly brown trout fisheries, although salmon and sea trout do enter the Lliw and Llan in order to spawn.

The Burry Inlet and coastal waters support a large and highly active commercial sea fishery with both fish, predominantly bass, and shellfish being sought.

Conservation - There are 31 Sites of Special Scientific Interest, of which 16 are water related. The largest is the Burry Inlet and Loughor Estuary which is a proposed Special Area of Conservation, a RAMSAR site and a Special Protection Area due largely to its importance for wildfowl.

Otters have started to recolonise the catchment in recent years and sightings are now common.

Invasive plants, such as Japanese Knotweed and Himalayan Balsam, are present throughout the catchment and their dominating presence reduces bankside diversity and restricts native plant growth.

Recreation - The Gower peninsula is designated as an Area of Outstanding Natural Beauty and receives many visitors every year. These visitors are attracted by the beautiful scenery and the highly popular beaches which are used for watersports and bathing.

The coastal waters are used extensively by anglers. Freshwater anglers fish the rivers for salmon, sea trout and brown trout and stillwaters for rainbow trout or coarse fish.

In addition to waterside footpaths and picnic areas, one of the principal visitor attractions is the Wildfowl and Wetlands Trust reserve at Penclacwydd.

2.7 Water Quality

Water quality in the catchment is generally high with 84% of classified river length placed into Classes A and B in 1994, according to the General Quality Assessment (GQA) Scheme. Approximately 31km of the Loughor and its tributaries have been designated as Salmonid Waters under the EC Freshwater Fisheries Directive. The Estuary was classified as Class A in the 1990 Estuary Quality Survey.

The majority of sewage disposal within the catchment is into the estuary and currently causes

pollution problems at nearby beaches and local shellfisheries. Inland water quality is adversely affected by unsatisfactory overflows from the sewerage system, particularly in the Amman Valley, and discharges from the sewage treatment works of Garnswllt and Cross Hands. Many of these sewage pollution problems are being addressed by Dŵr Cymru Welsh Water as part of their capital expenditure programme for the next 5 - 10 years. This investment is expected to be in excess of £20 million and should result in a significant improvement in water quality within the catchment.

The catchment contains a wide range of industry with significant industrial discharges at BSC Trostre and at Calsonic (Llanelli Radiators) Ltd. The legacy of contaminated land within the catchment poses particular risks to water quality. In addition, the coal extraction and processing industries present water quality problems and there are a number of abandoned mine water discharges in the catchment. The new and existing industrial estates pose a risk to the quality of surface waters through contamination of surface water drains.

Agricultural activity can sometimes cause water quality problems, and discharges of farm effluent have been identified as causing pollution of watercourses.

2.8 Monitoring

River Levels, Flows and Rainfall

There is one primary river gauging station situated on the Loughor at Tir-y-Dail, 9km from the source of the river. There are 8 raingauges in the catchment but there are no groundwater monitoring sites.

We use the collected data to manage water resources, which includes the control and regulation of abstraction. The Tir-y-Dail gauging station and one of the raingauges are connected to telemetry to provide information immediately to our staff at times of flood risk.

Water Quality

Water quality monitoring takes place regularly at 33 sites, samples being analysed for many different chemical parameters. This monitoring is undertaken to assess general water quality, using the GQA scheme, and compliance with the requirements of certain EC Directives, as well as to support special investigations and pollution incident investigations. All significant discharges are sampled and analysed routinely to ensure they meet standards required by the NRA.

Regular inspections are carried out at sites which present a high risk of pollution, including farms, trade premises, industrial sites and sewage installations, as part of our pollution prevention programme.

Biology

Routine biological monitoring is undertaken at 33 sites within the catchment as part of the GQA scheme. An assessment of the biological quality is made by analysing different types of insect larvae and other small aquatic animals that are present. Other surveys are carried out within the catchment to assess impacts of discharges, such as treated sewage effluent discharges and CSOs.

Habitat Surveys

A River Corridor Survey was completed for the Loughor catchment in 1994 which recorded the nature and extent of different habitats found along the river corridor, and forms part of a strategic national programme. We also commissioned an ornithological survey of the fens and marshes of South-East Carmarthenshire in 1994 within which the wetlands in the Burry Port, Llanelli and Upper Loughor Estuary areas were included.

Fish Stocks

Assessment of juvenile stocks is undertaken regularly as part of the Regional Juvenile Salmonid Monitoring Programme which estimates abundance using electric fishing techniques. The most recent survey in 1995 collected data from 25 separate sites throughout the Loughor catchment. Trends in adult stocks are monitored using catch returns received from salmon and sea trout anglers. However, these figures are based on declared catches and represent at best minimum catch statistics.

2.9 KEY DETAILS

CATCHMENT DETAILS

Area	539km ²												
Population (1991 census)	133,380												
Main Towns (by ward)	<table> <tr> <td>Llanelli & District</td> <td>41,795</td> </tr> <tr> <td>Burry Port</td> <td>1,350</td> </tr> <tr> <td>Cross Hands</td> <td>6,077</td> </tr> <tr> <td>Ammanford</td> <td>5,753</td> </tr> <tr> <td>Pontardulais</td> <td>5,179</td> </tr> <tr> <td>Gorseinon</td> <td>3,923</td> </tr> </table>	Llanelli & District	41,795	Burry Port	1,350	Cross Hands	6,077	Ammanford	5,753	Pontardulais	5,179	Gorseinon	3,923
Llanelli & District	41,795												
Burry Port	1,350												
Cross Hands	6,077												
Ammanford	5,753												
Pontardulais	5,179												
Gorseinon	3,923												
Population Density	247.5/km ²												

TOPOGRAPHY

Ground Levels	Maximum level:	616m AOD
Sea Levels	Mean High Water Springs:	3.9m AOD
	Mean Low Water Springs:	-3.6m AOD
Geology	Surficial:	Principally quaternary river and estuarine alluvium, and glacial till.
	Solid Geology:	Carboniferous Limestone, Millstone Grit comprising shales and sandstones, Upper and Lower Carboniferous Coal Measures of the South Wales Coalfield.

ADMINISTRATIVE DETAILS

		% of catchment area
County Councils	Dyfed	60
	West Glamorgan	40
Borough Councils	Llanelli	31
	Dinefwr	18
	Carmarthen	1
	Lliw Valley	25
	City of Swansea	15
National Park	Brecon Beacons	10
New Unitary Authorities (from April 1996)	Carmarthenshire	50
	Swansea	40
Local Flood Defence Committee	South West Wales Flood Defence Committee	
National Rivers Authority	Welsh Region - South West Area (Eastern District)	
Water Company	Dŵr Cymru Welsh Water (DCWW)	

CATCHMENT OVERVIEW

WATER QUALITY

Length of Classified River in 1994 General Quality Assessment (GQA)	Class A	55.2 km
	Class B	39.6 km
	Class C	15.8 km
	Class D	2.1 km
Estuary Quality (1990 Survey)	Class A	23.8 km
Designated under EC Freshwater Fisheries Directive (78/659/EEC)	Salmonid	30.7 km

WATER RESOURCES

Average Annual Rainfall	1500mm	
Total Licensed Abstraction	Public	23,877Ml/a
	Industrial/ Agricultural	18,354Ml/a
Total Number of Abstraction Licences	106	
Primary Gauging Station	Loughor at Tir-y-Dail	
Principal Reservoirs (volumes)	Upper Lliw	1,318Ml
	Lower Lliw	1,137Ml
	Cwm Lliedi	1,637Ml

FLOOD PROTECTION

Length of Designated Main River	173.93km
Length of River on which Flood Alievation Schemes implemented	5.24km
	(Walls) 1.54km)
	(Embankments) 3.70km)
Length of River covered by a Flood Warning Scheme	42 km

FISHERIES

Declared Annual Migratory Rod Catches (Annual Average: 1980 - 1994 inclusive)	Salmon:	12
	Sea Trout:	201

3.0 ISSUES AND OPTIONS

This section of the Plan presents the key Issues that we have identified from our analysis of the catchment. One or more suggestions are made for addressing each issue and you are invited to comment on these. This section relates solely to those areas which have been shown not to be able to support certain of the identified Uses, the rest of the catchment should be regarded as being able to support **all** identified Uses.

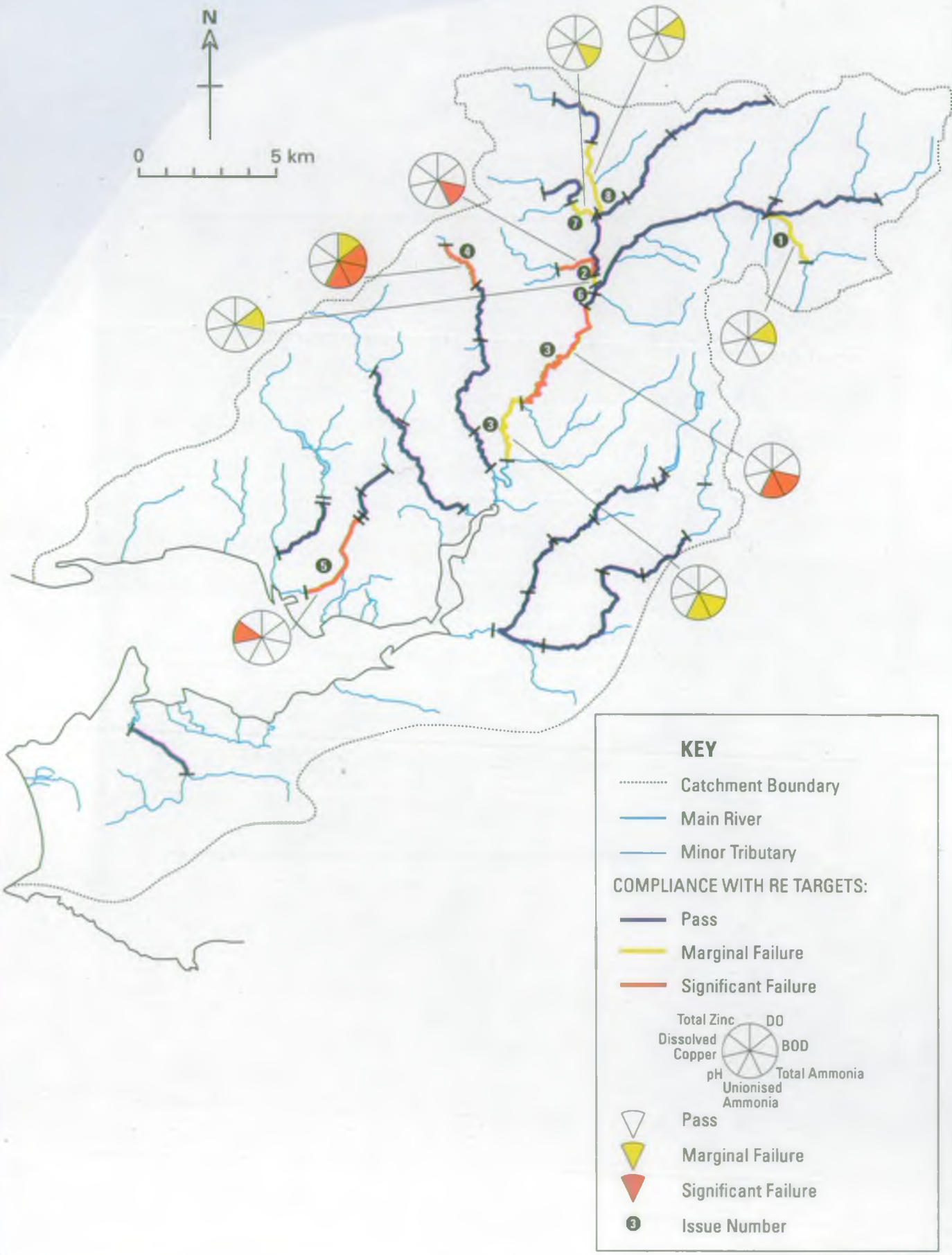
- Section 3.1 identifies in detail, those areas that fail to meet specific targets to support identified Uses. Significant areas of conflict between Uses are also discussed.
- Section 3.2 presents these **Issues** along with **Options**, identified by the NRA, to address them.
- The background information that has been used to identify these Issues is provided in **Part II** of this report, which lists the known Uses of the catchment and sets targets to support them.
- You should note that the Issues and Options do not constitute NRA policy but have been considered within our policy framework: no priority should be inferred from the order in which they appear.



3.1 THE STATE OF THE CATCHMENT

- This section reviews the current quality of the catchment against the Targets set in **Section 5 in Part II**
- The **Targets** are designed to protect the needs of the identified catchment Uses.
- The targets are also guided by the concepts of **sustainable development and environmental capacity**.
- This allows the key management **Issues** to be identified: potential solutions are addressed in **Section 3.2**.

MAP 2. STATE OF THE CATCHMENT - COMPLIANCE WITH RIVER ECOSYSTEM TARGETS



3.1.1 WATER QUALITY

General

In addition to compliance with water quality targets, we used information from biological monitoring surveys to assess the state of the catchment. Information on the invertebrate fauna found in rivers is particularly useful since the animals present reflect the water quality of the river in the preceding weeks or months, unlike chemical data which presents a series of 'snapshots' of water quality. A further benefit is that invertebrates respond to a far wider range of polluting materials than are routinely tested for by chemical monitoring. We can therefore, use biological data as supporting evidence for issues generated by assessment of chemical quality and to identify new issues which are not detected by chemical sampling alone. Biological monitoring is particularly useful in small streams which are not routinely sampled chemically. In Welsh Region we use biological techniques for the rapid assessment of watercourses affected by acidification (acid rain) and farm pollution. Additionally we employ biological assessments of point sources such as sewage treatment works, industrial sites and mine discharges to identify the need for improvements.

Issues from failure to achieve River Ecosystem Targets

Issue 1

Biochemical Oxygen Demand (BOD) concentrations in the Garnant, immediately upstream of the confluence with the Aman, marginally fail to achieve RE Class 1, causing the stretch to fall into RE Class 2. This failure is considered to be due to the operation of combined sewer overflows (CSOs) in the Gwaun Cae Gurwen area.

Issue 2

The Fferws Brook upstream of the confluence with the Loughor fails to achieve RE Class 1 due to elevated total ammonia concentrations causing it to fall into RE Class 2. This is because of problematic CSOs and a pumping station on the Capel Hendre sewerage system. This system is currently being upgraded and work is due for completion at the end of 1995/96.

Issue 3

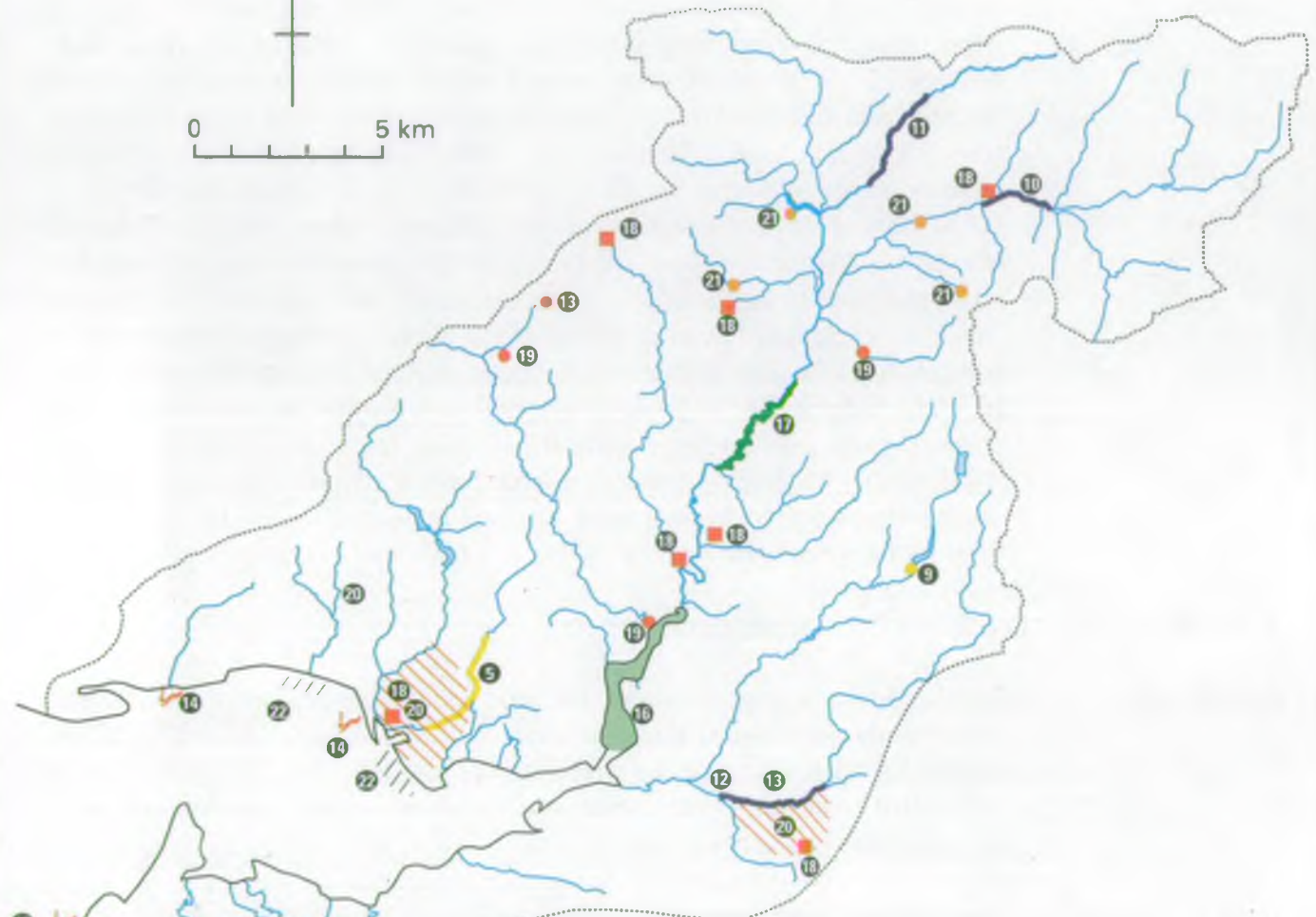
The Loughor, downstream of Garnswllt sewage treatment works (STW) to Pontardulais road bridge, fails to achieve RE Class 2 due to elevated concentrations of both total and unionised ammonia, causing this stretch of river to fall into RE Class 4. This is as a result of the discharge of sewage effluent from Garnswllt STW.

Issue 4

The upper reach of the Gwili at Cross Hands fails to achieve RE Class 2 due to reduced dissolved oxygen (DO) and elevated BOD, total ammonia and unionised ammonia concentrations. This reach falls into RE Class 4. The cause of these failures is the discharge of sewage effluent from Cross Hands STW.

MAP 3.

STATE OF THE CATCHMENT - GENERAL WATER QUALITY



KEY	
-----	Catchment Boundary
—	Main River
—	Minor Tributary
ISSUES DUE TO MINING:	
●	Abandoned Mine Discharge
●	Coal Mines and Processing Plants
INDUSTRY:	
■	Pollution from Industrial Estates
—	Dissolved Copper and Total Zinc
SEWAGE EFFLUENT:	
—	Low Do and Excess Algal Growth
↘	Fail Informal Bathing Water Standards
■	Low Do and Elevated Unionised Ammonia
OTHER:	
▨	Bacterial Contamination of Shellfish
▨	Approximate Area of Contaminated Land
UNKNOWN:	
—	Poor Biology, Good Water Quality
●	Hydrocarbons and Chromium
⓪	Issue Number

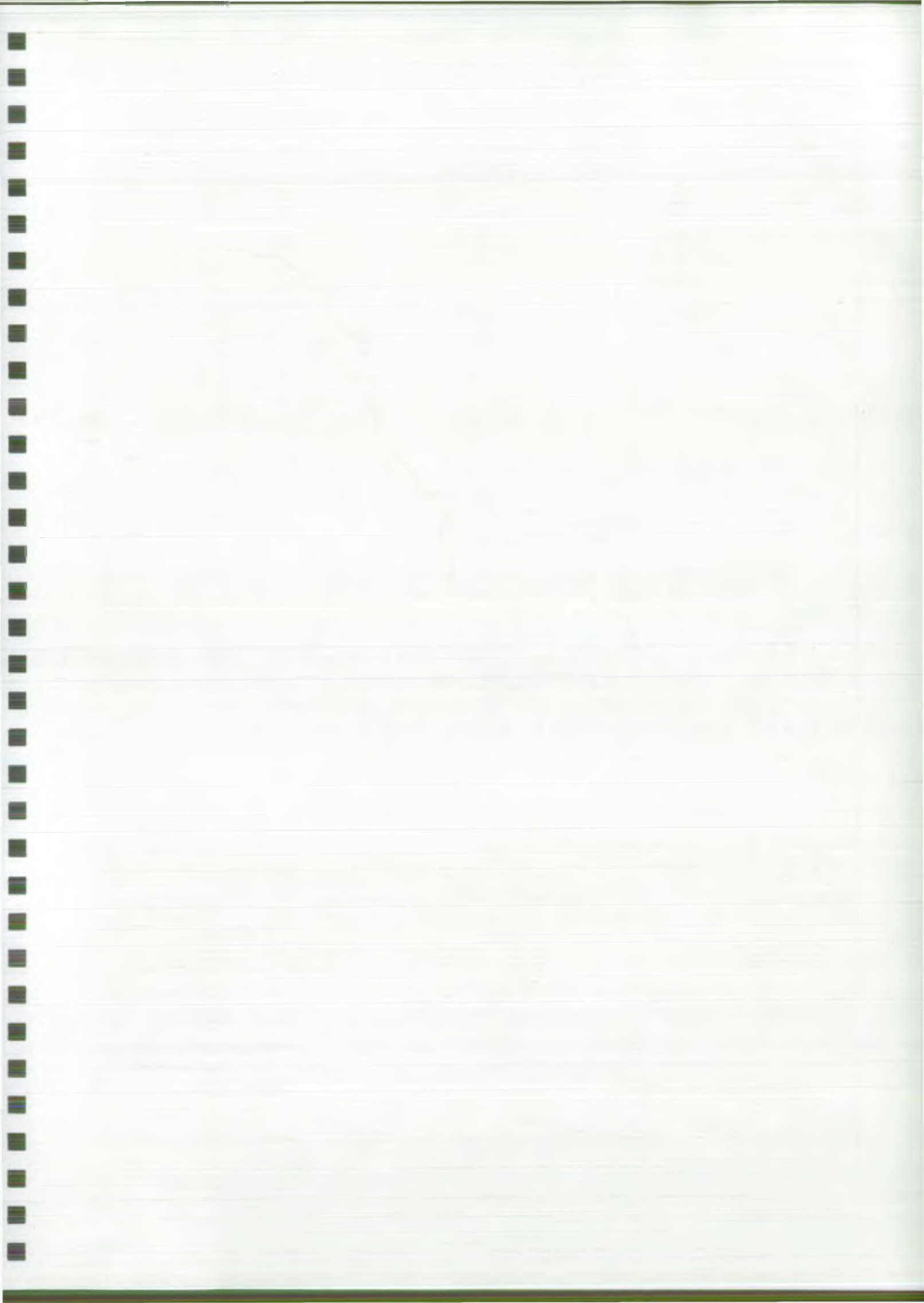
STATE OF THE CATCHMENT

- Issue 5** The lower reach of the Dafen fails to achieve RE Class 3 due to elevated concentrations of dissolved copper, causing it to fall into RE Class 5. This reach has also failed standards for dissolved copper and total zinc under the EC Dangerous Substances Directive. These failures are as a result of the discharge of industrial effluent from Calsonic (Llanelli Radiators) Ltd.
- Issue 6** The Loughor, between the confluence of the Aman and Fferws Brook, marginally fails to achieve RE Class 1 due to elevated BOD concentrations. This is considered to be due to the operation of CSOs on the Amman Valley trunk sewer.
- Issue 7** The Lash, upstream of the confluence with the Loughor marginally fails to achieve RE Class 1 due to elevated total ammonia concentrations, causing it to fall into RE Class 2. Poor biological results have also been recorded in this stretch. The poor water quality is attributed to discharges from the Penygroes/Blaenau STW. This, in combination with the discharges from abandoned mines and opencast activities, is also likely to be causing the poor biological quality observed.
- Issue 8** The Marlais, upstream of the confluence with the Loughor, marginally fails to achieve RE Class 1 due to elevated BOD concentrations. The exact causes are unknown, but are considered to be as a result of agricultural activities.

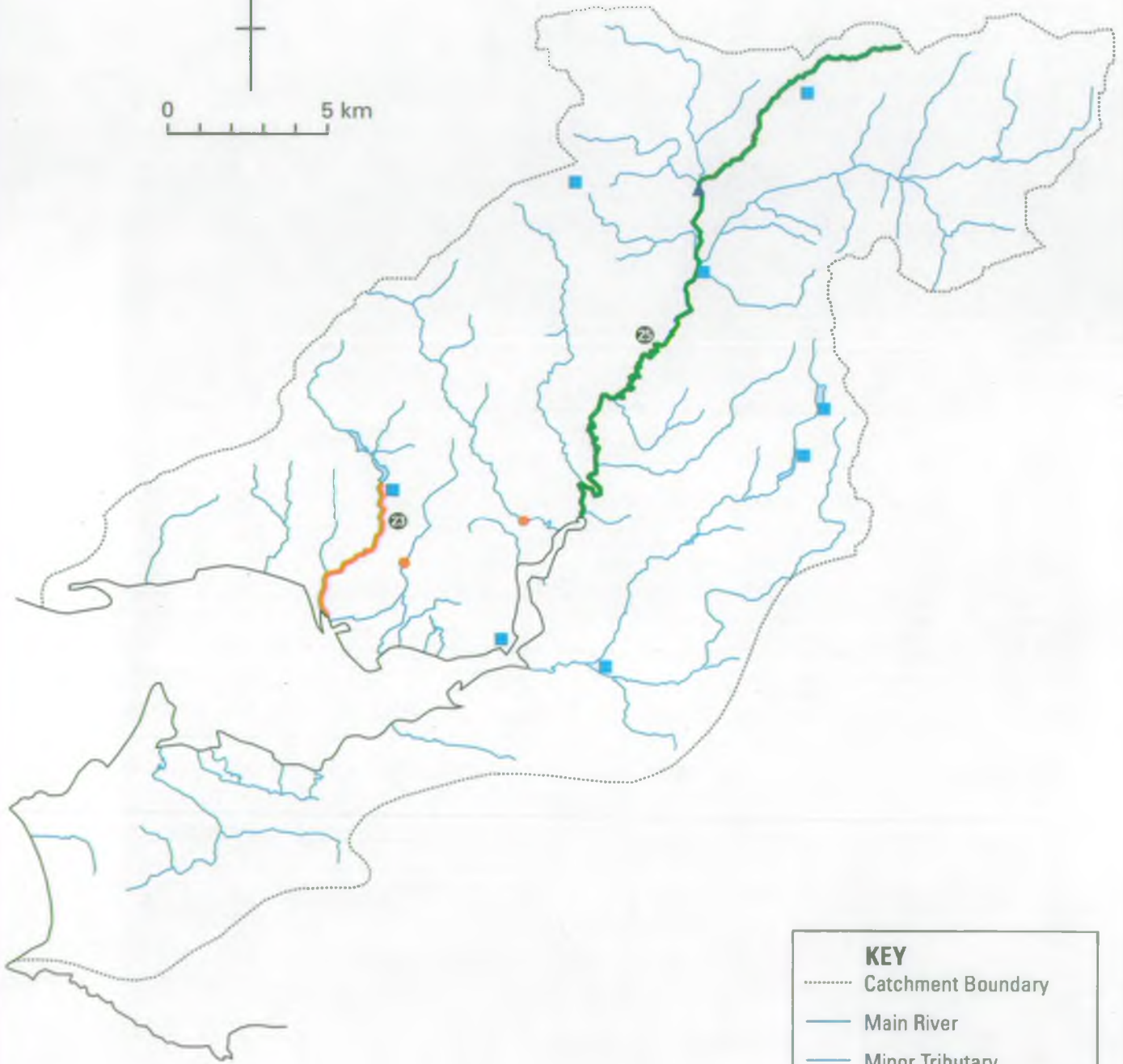
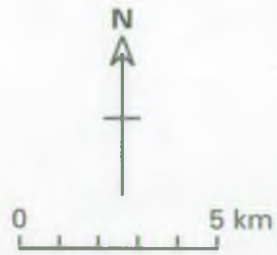
In addition to the above, a number of issues have arisen from our routine work programme, and other investigations and surveys as follows:

- Issue 9** The potable abstraction at the Lower Lliw reservoir has failed EC Surface Water Directive Standards for hydrocarbons and chromium. The cause of these failures is being investigated.
- Issue 10** Poor biological quality in the Aman, downstream of the confluence with the Pedol, is believed to be caused by problematic CSOs in this locality.
- Issue 11** Poor biological quality in the upper reaches of the Loughor may be due to discharges from the former Wernddu Waste Disposal Site.
- Issue 12** Poor biological quality in the Llan, upstream of the confluence with the Lliw, is attributed to contaminated run off and discharges from Fforestfach Industrial Estate.
- Issue 13** Poor biological quality in the middle reaches of the Llan is attributed to discharges from CSOs draining into the Cadle stream.
- Issue 14** Llanelli and Burry Port beaches are recreational waters not currently identified as Bathing Waters under the EC Bathing Waters Directive. These beaches would have failed the standards contained in the Directive between 1992 and 1995, if the beaches had been so identified.

- Issue 15** The beach at Broughton is not currently identified under the EC Bathing Waters Directive but is used for recreational purposes. Had it been so identified, water quality at this beach would not have met the Directive standards in 1994, but would have done so in 1995.
- Issue 16** The Loughor Estuary at Loughor Road Bridge has occasionally failed to meet estuarine dissolved oxygen standards, designed to protect migratory salmonids. Problems with unionised ammonia have also been detected.
- Issue 17** Extensive algal growths occur downstream of Garnswllt STW which, under low flow conditions, cause severe de-oxygenation of the water at night. This has led to significant fish mortalities, the most recent of which occurred in 1995.
- Issue 18** A number of large industrial estates in the catchment give rise to pollution incidents as a result of contaminated surface water drainage.
- Issue 19** Abandoned minewater discharges occur within the catchment giving rise to aesthetic, biological and water quality impacts. Two of these, on the Morlais and Cathan, are included in the NRA/Welsh Office list of priority discharges for minewater remedial schemes. Other sites exist, and there is potential for further discharges if any existing mines close.
- Issue 20** Areas within the catchment have been left contaminated by previous industries such as gasworks, iron and steel production and chemical manufacturing. The rehabilitation of those sites can lead to deterioration in water quality if not properly controlled and adequate precautions taken.
- Issue 21** Discharges of minewater, site run-off and process effluent occur from a number of active coal mines, opencast sites and coal processing plants throughout the catchment. These can potentially cause problems due to the presence of high concentrations of suspended solids, low pH and high iron concentrations. These problems can be particularly acute in headwater streams where the substrate of the stream bed can become coated and affect biological quality and the success of fish spawning.
- Issue 22** The shellfish harvesting areas at Pwll and Machynys were classified in category 'D' in 1992 under the EC Shellfish Hygiene Directive, thereby prohibiting any harvesting of shellfish from these areas. The classification was due to the very high concentrations of bacteria within the shellfish flesh.



MAP 4. STATE OF THE CATCHMENT - WATER RESOURCES



- KEY**
- Catchment Boundary
 - Main River
 - Minor Tributary
 - ▲ Tir-y- Dail Gauging Station
 - Raingauges
 - Reach may be affected by Lledi Reservoirs
 - Key sites currently meeting targets
 - Loughor affected by abstraction
 - ② Issue Number

3.1.2 WATER QUANTITY

General

A catchment would fail its targets for water resources if abstraction was causing rivers and streams to dry up or flows to become unacceptably low, or if groundwater levels were declining.

Licences of Right had to be granted in 1965 without regard to the ability of the resource to sustain the abstraction in the long term without detriment. Over the years, the actual rates of abstraction have, in some cases, increased to the volumes specified in the licences. As this occurs, the potential arises for low flows or declining groundwater levels.

We have considered carefully the available surface and groundwater resources within the Loughor catchment and their degree of utilisation. The following Section and Map summarise the results of this analysis. It must be stressed that where no problems or areas for further investigation have been identified, we are satisfied that resources are adequate. As more information becomes available, for example about the actual flow requirements of the aquatic ecosystem, we will review our management of resources in each catchment.

Assessment of the catchment assumes that existing licence conditions are complied with. The NRA has a policy of active inspection and enforcement of licence conditions.

No allowance has been made for climatic change because future scenarios are uncertain and within the lifespan of this Plan (5 years) any change is unlikely to be significant.

Local Perspective

The Gwili and Dafen rivers are meeting current water quantity targets, in that there are no licensed net surface water abstractions in operation, although the Loughor fails to meet the 95 percentile flow target because of longstanding upstream abstractions.

The Lliw and Lliedi reservoirs form total barriers to the passage of migratory fish, and with no compensation flow set below Cwm Lliedi, there is potential for the Lliedi to be dried for extended periods. The abstraction weir at Pontlliw, (Lliw Mill Fish Farm) forms a partial barrier to migratory fish.

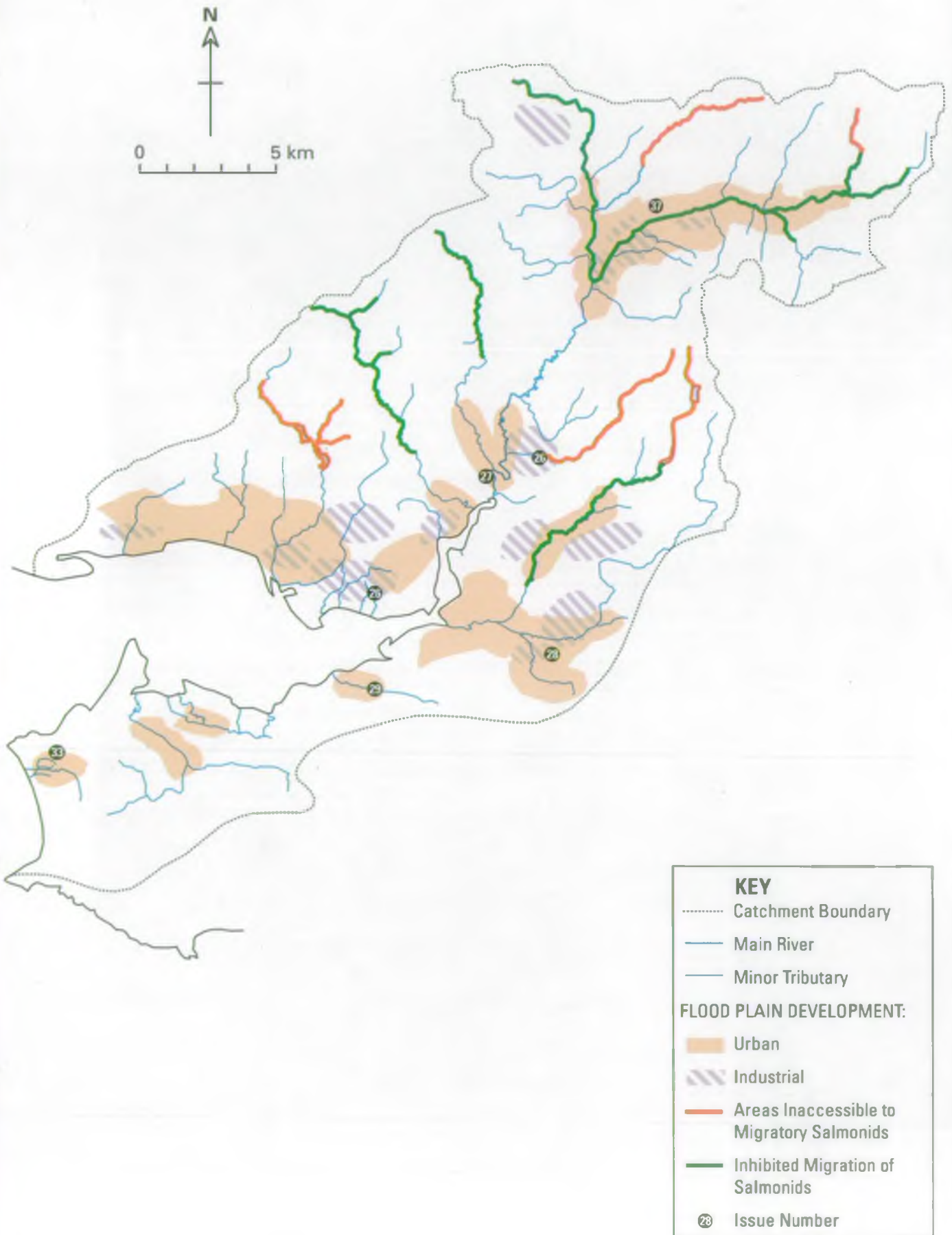
We have only one river gauging station in the catchment on the Loughor at Tir-y-Dail.

Issues Identified

- Issue 23** There is no compensation flow set below Cwm Lledi reservoir. There is potential for the Lledi to dry up for extended periods when the reservoir is drawn down.
- Issue 24** The hydrometric network needs to be reviewed. The only river gauging station in the catchment, at Tir-y-Dail, is located too far upstream to provide a full assessment of the flow regimes of the catchment. Also, there are no groundwater monitoring sites within the catchment.
- Issue 25** The Loughor fails to meet its water quantity target because of nett abstraction in the upper catchment, in particular the public water supply abstraction at Llygad Llchwyr. The impact of abstraction on flow is especially relevant at Garnswllt STW where the quantity of water available to dilute effluent is reduced.



MAP 5. STATE OF THE CATCHMENT - PHYSICAL FEATURES



3.1.3 PHYSICAL FEATURES

General

Flood risk has been assessed by studying the flood history over the past 25 years and the known distribution of flooding.

Many of the environmental targets for Physical Features are necessarily subjective (Section 5.3) and it therefore follows that their assessment often cannot be precise. Data from many sources including routine fisheries, biological and habitat surveys and special investigations are used to identify areas that are apparently deficient in certain essential or desirable features such as spawning gravels, riparian tree cover or in-river habitats.

The following section and map illustrate the current state of the catchment and identify areas where there are felt to be deficiencies.

Issues Identified**Issue 26**

The levels of protection against flooding at Halfway, from the Dafen, and at Pontardulais, from the Loughor, are known to be below the indicative standards of service for land used for residential and non-residential purposes (Land Use Band A).

Issue 27

The level of protection against tidal flooding at Hendy is known to be below the indicative standard of service for land used for residential and non-residential purposes (Land Use Band B).

Issue 28

The levels of protection against flooding at Glan Marlais from the Llan, and on the Gors Fawr Brook are not known precisely but are believed to be below the indicative standard of service for land used for residential and non residential areas (Land Use Band B). Maintenance operations are severely hampered by limited access due to encroachment of development onto the river banks.

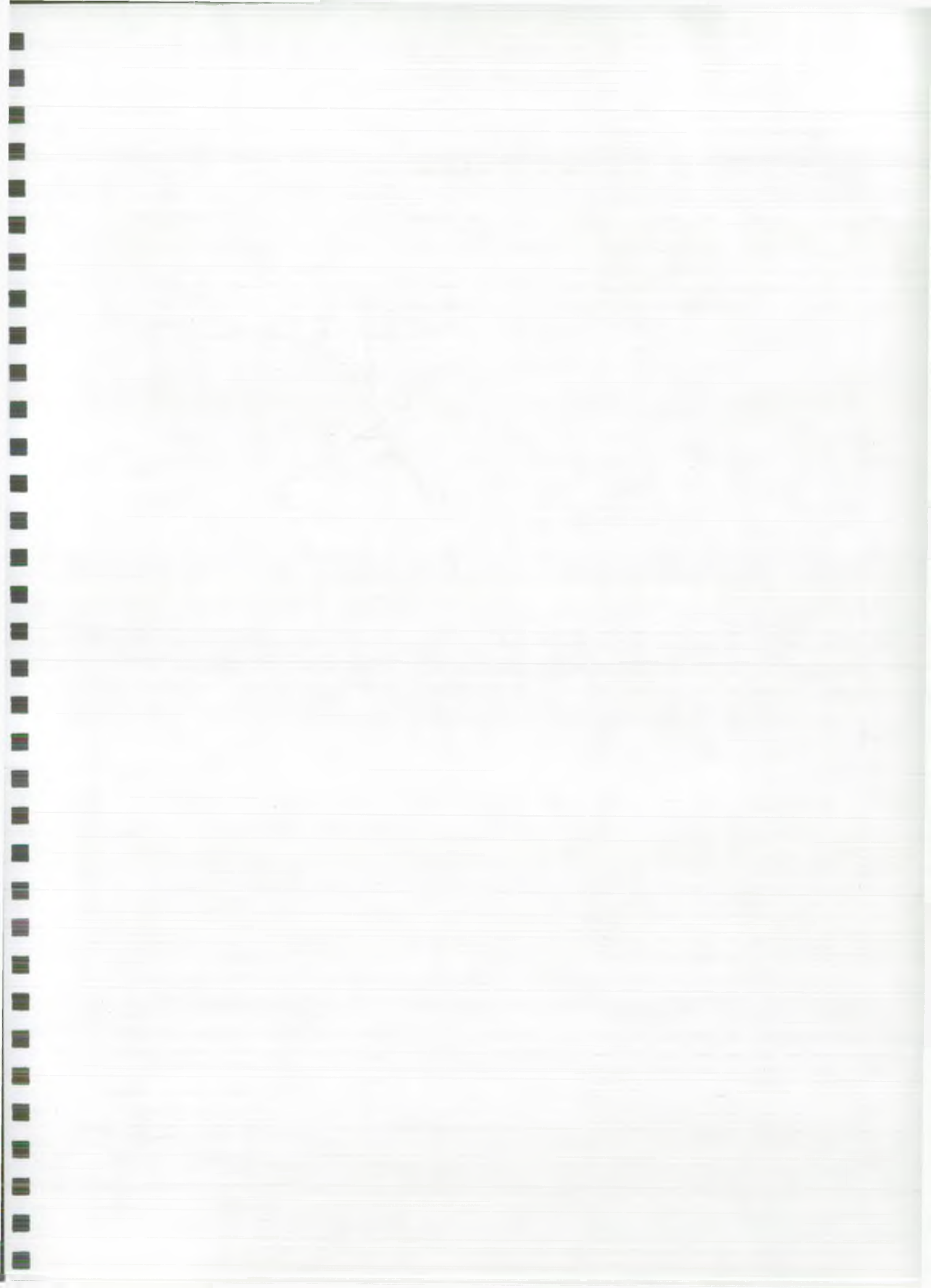
Issue 29

The tidal flood defences at Crofty do not provide a standard of protection suitable for a residential area, and are expensive to operate.

Issue 30

A significant element of the maintenance regime for the catchment involves the removal of gravel in order to maintain channel capacity and existing flood protection standards. The cost of removing and disposing of the dredged material is increasing and may threaten the viability of the operation.

- Issue 31** The Government has indicated that our main input to development plan preparation regarding flooding issues should be via surveys undertaken as required under Section 105 (2) of the Water Resources Act 1991. These surveys will identify the extent of land liable to flood and will highlight any likely flood defence problems. Survey work for the Loughor catchment will commence in 1997.
- Issue 32** Flood warnings for the Loughor catchment do not meet our target standards.
- Issue 33** We have yet to agree formally with CCW a "standard of service" for SSSIs, and Water Level Management Plans need to be prepared and implemented for Llangenneth Moors and Cwm Ivy Marsh.
- Issue 34** Past activity has resulted in the degradation of fishery and riparian habitats. Consequently, the ecological value of the river corridor has been reduced in particular locations and these need to be identified and remedial works planned where funding allows.
- Issue 35** The upstream migration of salmonids is impeded by man-made obstructions. The feasibility and desirability of easing fish passage to waters upstream should be considered, taking account of cost/benefit, landscape issues and our regional Brown Trout Policy, which addresses the protection of the genetic integrity of natural stocks.
- Issue 36** Japanese knotweed, an invasive plant species present in many parts of the catchment, poses a threat to the native habitat and hinders access to the river bank.
- Issue 37** Juvenile surveys have indicated lower trout densities in the Aman in comparison to other areas within the catchment and the reason for this remains unclear. However, there has been extensive bed movement in the Aman which may have resulted in poor spawning substrate, few holding pools and egg washout during floods.
- Issue 38** The otter population is recovering but is still vulnerable to environmental change, and has yet to reach its full potential. There is a need to develop a Priority Otter Catchment Management Plan to help safeguard current populations and extend their range.
- Issue 39** Little is known about the coarse fish stocks of the catchment, the potential for development, or need for their protection and enhancement.
- Issue 40** Public access to many areas of the river system is restricted due to the lack of public footpaths. Consideration needs to be given to the feasibility of extending and linking the existing footpath network to improve access to the river corridor.



MAP 6.

CONFLICTS BETWEEN USES



3.1.4 CONFLICTS BETWEEN USES

General Certain conflicts may arise between different catchment uses, irrespective of the catchment's ability to support these uses in terms of Water Quality, Water Quantity or Physical Features. For example, demands placed on the catchment by recreational uses often come into conflict with the need to conserve the wider environment. This section identifies conflicts between uses which are present within the catchment.

Local Perspective We have set out where significant areas of conflict have been identified within the catchment and suggest that a change in mode of operation by the use/interest shown in bold should be considered. Options for solving these issues are proposed in Section 3.2.

Conflicts Identified

Issue 41 Fisheries/Angling/Flood Defence/**Engineering Works**

In-river works causes conflict with the angling bodies who claim loss of amenity. Works causing disturbance include the removal of gravels, bankside revetments and urban improvement schemes.

Issue 42 **Angling/ Riparian Owners/Conservation Interests**

Natural erosion processes on the Loughor lead to the creation of ox-bow lakes and the loss of land and fishing rights in addition to a reduction in the length of fishery. Conservation interests are keen to preserve the natural features and oppose the use of large scale river bank protection measures.

Issue 43 Fisheries, Conservation/**Opencast Development**

The opencast mining of coal has resulted in damage to riverine ecosystems, including, in the case of the Lash, a major diversion. The impact is usually long-term and results in reduced fish production and ecological value for the catchment.

Issue 44 Canoeing/**Angling**

The Loughor would be well suited to canoeing. However, at present, angling clubs do not permit canoeing at any time.

Issue 45

Conservation/Development

Bankside development can impinge upon the conservation value of the river corridor and, in particular, reduce bankside cover for fish and birds, and prevent habitation by other aquatic wildlife including otters.

Issue 46

Fisheries & Angling/Poaching

The poaching of salmon and sea trout includes illegal coastal netting, snaring in-river during the summer months and spawning infringements in the late Autumn in the upper reaches. The illegal activity conflicts with the proper management of the fishery as defined by our duty to maintain, improve and develop fisheries; it also conflicts with anglers' interests.

3.2 A SUMMARY OF THE ISSUES, AND OPTIONS FOR THEIR RESOLUTION

General

This section of the plan considers options to address the issues that have been raised in the preceding section. The options as presented are the initial thoughts of the South West Area, Welsh Region of the NRA and do not constitute policy statements. We invite you to comment on these issues and options and would welcome any new ideas/suggestions that you may have.

Wherever possible the body responsible for carrying out each option has been identified. In some cases this is identified as an individual(s) or an organisation other than the NRA. However, the options as presented are intended to facilitate improvements to the water environment for the benefit of all users. Their implementation will entail many bodies and individuals co-operating.

In the tables of issues and options that follow, no priority has been assigned to the issues. They are listed in accordance with the current understanding of when the work, or a significant part of the work will be completed.

Local Perspective

The following abbreviations are used in the tables:

CCW	Countryside Council for Wales
CSO	combined sewer overflow
DCWW	Dŵr Cymru Welsh Water
LA	Local Authority
LPA	Local Planning Authority
LTRQO	Long Term River Quality Objective
MPA	Mineral Planning Authority
NRA	National Rivers Authority
OPW	Otter Project Wales
p.a.	per annum
RCS	River Corridor Survey
RE	River Ecosystem
SCC	Swansea City Council
STW	sewage treatment works
WCA	Welsh Canoeing Association
WDA	Welsh Development Agency
WO	Welsh Office
WRA	Waste Regulation Authority

Issue 1 The Garnant has elevated BOD concentrations immediately upstream of the confluence with the Aman causing a marginal failure to achieve RE Class 1.			
OPTIONS	Responsibility	Advantages	Disadvantages
Complete improvements to Amman Valley trunk sewer and specifically deal with problem CSOs.	DCWW	Improvement in water quality towards the achievement of RE Class 1.	Cost: £1.1 million (total scheme).

Issue 2 The Fferws brook, upstream of the confluence with the Loughor, has elevated total ammonia concentrations causing failure to achieve the LTRQO of RE Class 1.			
OPTIONS	Responsibility	Advantages	Disadvantages
Upgrading of the Capel Hendre sewerage system. Reducing the number of CSOs from three to one and the abandonment of a problematic pumping station at Wernos. Due for completion in March 1996.	DCWW	Improvement in water quality towards the achievement of RE Class 1.	Cost: £1.39 million (total scheme).

Issue 3 The Loughor, downstream of Garnswllt STW to Pontardulais road bridge, has elevated concentrations of both total and unionised ammonia causing failure to achieve the LTRQO of RE Class 2.			
OPTIONS	Responsibility	Advantages	Disadvantages
Improved effluent treatment at the STW to achieve nitrification of the effluent. Due for completion by the end of 1996.	DCWW	Improvement in water quality towards the achievement of RE Class 2.	Cost: £2.4 million (total scheme).

Issue 4 The upper reach of the Gwili at Cross Hands has reduced concentrations of DO and elevated concentrations of BOD, total and unionised ammonia, causing failure to achieve the LTRQO of RE Class 2.			
OPTIONS	Responsibility	Advantages	Disadvantages
Improved effluent treatment at Cross Hands STW.	DCWW	Improvement in water quality towards the achievement of RE Class 2.	Cost: £1.3 million (total scheme).
Relocation of the final effluent outfall to a point where greater dilution is available. (Both due for completion by March 1997).	DCWW		
Suggest use of Grampian conditions in planning permissions to restrict connections to the works	NRA/LPAs	No deterioration in water quality	Restrictions on development

Issue 5 The lower reach of the Dafen has elevated concentrations of dissolved copper and total zinc. These have caused failures of the LTRQO of RE Class 3, interim targets and the EC Dangerous Substances Directive.			
OPTIONS	Responsibility	Advantages	Disadvantages
Improved effluent treatment at Calsonic Ltd.	Calsonic Ltd.	Improvement in water quality towards the achievement of RE Class 3.	Cost (unknown).
Discharge of the Calsonic effluent to the foul sewer for treatment and disposal by DCWW	Calsonic/DCWW	As Above.	Cost (unknown).
Investigate any potential upstream sources of zinc and copper and progress any remedial actions as appropriate.	NRA	Classification of sources of copper and zinc.	Cost: £2k.

Issue 6 The Loughor, between the confluence of the Aman and the Fferws Brook, has elevated BOD concentrations, causing a marginal failure to achieve RE Class 1.			
OPTIONS	Responsibility	Advantages	Disadvantages
Complete improvements to Amman Valley trunk sewer and specifically deal with problem CSOs. Due for completion in March 1996.	DCWW	Improvement in water quality towards the achievement of RE Class 1.	Cost: £1.1 million (total scheme)

Issue 7 The Lash upstream of its confluence with the Loughor has elevated ammonia concentrations. This causes a failure to achieve RE Class 1. This stretch also has poor biological quality.			
OPTIONS	Responsibility	Advantages	Disadvantages
Investigate the causes of poor water quality in the catchment, in particular the discharge from Penygroes/Blaenau STW.	NRA	Identify causes of poor water quality	Cost: £1.5k
Progress any remedial actions necessary.	DCWW	Improvement in water quality towards the achievement of RE Class 1.	Cost (unknown).
Suggest use of Grampian conditions in planning permissions to restrict connections to the works.	NRA/LPAs	No deterioration in water quality.	Restrictions on development.
Investigate the causes of poor biological quality, in particular the impact from abandoned mines and opencast operations.	NRA	Identify causes of poor biology.	Cost: £1.5k
Progress any remedial actions necessary.	NRA/Site Operators	Improved biological quality	Cost (unknown).

Issue 8 The Marlais, upstream of its confluence with the Loughor, has elevated BOD concentrations that cause a failure to achieve RE Class 1.			
OPTIONS	Responsibility	Advantages	Disadvantages
Investigate the sources and causes of problems. These are suspected to be from agricultural pollution.	NRA	Identify sources and causes of pollution	Cost: £1.5k
Progress remedial actions as appropriate.	NRA/Farmers	Improvement in water quality towards the achievement of RE Class 1.	Cost (unknown).

Issue 9 The potable abstractions from the Lower Lliw reservoir have failed to meet EC Surface Water Directive standards for hydrocarbons and chromium.			
OPTIONS	Responsibility	Advantages	Disadvantages
Hydrocarbon failures may be due to natural occurrences or erroneous data. Continue monitoring to establish cause.	NRA	Confirmation if the failures are due to real occurrences.	Cost: £0.5k p.a.
Elevated chromium levels may be due to erroneous data. Maintain monitoring on a watching brief to establish if this is a real problem.	NRA	As above	Cost: £0.5k p.a.

Issue 10 The Aman has poor biological quality below the confluence with the Pedol.			
OPTIONS	Responsibility	Advantages	Disadvantages
Complete improvements to Amman Valley trunk sewer and deal specifically with problem CSOs.	DCWW	Improved water quality which should lead to improved biological quality.	Cost: £1.1 million (total scheme).

Issue 11 Poor biological quality of the Loughor upstream of the confluence with the Marlais.			
OPTIONS	Responsibility	Advantages	Disadvantages
Investigation into the possible causes of the problem - suspected to be due to discharges from former Wernddu Waste Disposal Site.	NRA/Tip Owners	Identify sources and causes of pollution.	Cost: £1.5k
Progress any remedial actions as appropriate.	WRA/NRA/Tip Owners	Improvement in biological quality.	Cost (unknown).

Issue 12 Poor biological quality in the Llan upstream of the confluence with the Lliw to the Llewitha Road Bridge.			
OPTIONS	Responsibility	Advantages	Disadvantages
Investigate the causes of the problem - suspected to be run off from the Fforestfach Industrial Estate.	NRA/Factory Occupiers	Identify sources and causes of pollution.	Cost: £5k.
Progress remedial actions as appropriate.	Factory Occupiers/ Industrial Estate Owners	Improvement in biological quality.	Cost (unknown).

Issue 13 Poor biological quality in the middle reaches of the Llan, upstream of Llewitha Road Bridge.			
OPTIONS	Responsibility	Advantages	Disadvantages
Investigations into the causes of the problem - suspected to be due to the operation of CSOs in the Cadle stream.	NRA	Allows the cause of the problem to be confirmed.	Cost: £2.5k.
If confirmed collate information on the operation of the CSOs to allow prioritisation in the DCWW AMP3 capital expenditure programme.	NRA	Provides evidence for expenditure to be targeted against these CSOs.	Cost: £2.5k.

Issue 14 Llanelli and Burry Port beaches are recreational waters not currently identified as Bathing Waters under the EC Bathing Waters Directive. These beaches would have failed the standards contained in the Directive between 1992 and 1995, if the beaches had been so identified.			
OPTIONS	Responsibility	Advantages	Disadvantages
Complete new Llanelli Sewage Disposal Scheme. Due for completion by the end of 1996.	DCWW	Improved water quality in the estuary and significant improvements to the water quality and aesthetic quality at Llanelli and Burry Port.	Cost: £13.7 million (total scheme).

Issue 15 The beach at Broughton is not currently identified under the EC Bathing Waters Directive but is used for recreational purposes. Had it been so identified, water quality at this beach would not have met the Directive standards in 1994, but would have done so in 1995.			
OPTIONS	Responsibility	Advantages	Disadvantages
Investigate potential sources of bacterial contamination.	SCC	Sources of bacterial contamination identified.	Sources may not be identified.
Implement any remedial actions required to prevent further failures.	SCC	Improvements in bathing water quality.	Cost (unknown).

Issue 16 Failure of estuarine dissolved oxygen standards at Loughor Road Bridge and problems with unionised ammonia have been detected.			
OPTIONS	Responsibility	Advantages	Disadvantages
Completion of new Llanelli Sewage Disposal Scheme. Due for completion by the end of 1996.	DCWW	Improved estuary water quality.	Cost: £13.7 million (total scheme).
Maintain and improve existing discharge quality at Gowerton STW by 2000.	DCWW	Improved estuary water quality at Loughor Road Bridge.	Cost: £2.6 million (total scheme).

Issue 17 Fish mortalities downstream of Garnswllt STW as a result of low dissolved oxygen levels, caused by excessive algal growths, linked to the input of nutrients from the STW.			
OPTIONS	Responsibility	Advantages	Disadvantages
Identify sources and extent of nutrient enrichment within the catchment.	NRA	Nutrient loadings identified.	Cost: £1.5k.
Implement nutrient removal at Garnswllt STW.	DCWW	Nutrient loadings to river reduced.	Cost (unknown).
Undertake nutrient removal at other identified sources, and consider other strategies.	Other, to be identified	Nutrient loadings to river reduced.	Cost (unknown).
Undertake emergency remedial action (aeration and fish rescues) until problem is resolved.	NRA	Amelioration of effects of low oxygen levels.	Cost: Dependent on severity of incident.

Issue 18 Discharges of contaminated surface water from Industrial Estates in the area give rise to pollution incidents.			
OPTIONS	Responsibility	Advantages	Disadvantages
Undertake targeted campaign of pollution prevention site visits to Industrial Estates.	NRA.	Improvements in water quality and reduction in pollution incidents.	Cost: £2.5k
Where problems are identified, discuss and progress remedial actions with occupiers and owners.	NRA/Factory Occupiers and Owners.	As above.	Cost (unknown).
Ensure pollution prevention measures are incorporated into future developments through planning liaison process	NRA/LPAs	As above	Cost to developers

Issue 19 Abandoned minewaters cause aesthetic, biological and water quality impacts at a number of locations within the catchment.			
OPTIONS	Responsibility	Advantages	Disadvantages
Progress remedial schemes to resolve impacts of minewater discharges in accordance with Regional and National Priorities	Local and Central Government/Coal Authority/Private Mine Owners/NRA	Improved water quality.	Cost (unknown, but may be substantial).
Ensure pollution prevention measures are incorporated into future developments through planning liaison process.	NRA/MPAs/LPAs	As above.	Cost (unknown).

Issue 20 Pollution of both groundwater and surface water can occur during the rehabilitation of former contaminated land sites.			
OPTIONS	Responsibility	Advantages	Disadvantages
Identify these areas and ensure developers are aware of the risks and necessary precautions to avoid contamination of controlled waters.	NRA	Avoids contamination of controlled waters during rehabilitation and re-development.	Cost: £1.5k p.a.
Ensure pollution prevention measures are incorporated into future developments through planning liaison process.	NRA/LPAs/MPAs	Avoid pollution problems.	Cost to developer.

Issue 21 Watercourses are affected by the discharges from coalmines, opencast sites and coal processing plants.			
OPTIONS	Responsibility	Advantages	Disadvantages
Identify the sources of the problems and ensure site operators take remedial action.	NRA/Site Operators.	Improved water quality and reduction in pollution incidents.	NRA Cost: £5k p.a. Cost for Site Operator will be site specific.
Ensure pollution prevention measures are incorporated into future developments through planning liaison process.	NRA/LPAs/MPAs	Avoid pollution problems.	Cost to developer.

Issue 22 Classification of Pwll and Machynys Shellfisheries as Class 'D' under the EC Shellfish Hygiene Directive.			
OPTIONS	Responsibility	Advantages	Disadvantages
Completion of new Llanelli Sewage Disposal Scheme. Due for completion by the end of 1996.	DCWW	Reduced bacterial loadings to estuary.	Cost: £13.7 million (total scheme).
Monitor shellfish bacterial concentrations and review classification if appropriate.	Llanelli Borough Council	Potential for improved classification.	Cost of monitoring.

Issue 23 There is no compensation flow set below Cwm Lliedi reservoir.			
OPTIONS	Responsibility	Advantages	Disadvantages
Undertake study to quantify impact on downstream flow regime and the effects this may have on fisheries, other aquatic wildlife and water quality.	NRA	Increased knowledge of catchment.	Solution involving implementation of compensation flow may be difficult to achieve.

Issue 24 There is an inadequate hydrometric monitoring network within the catchment.			
OPTIONS	Responsibility	Advantages	Disadvantages
Undertake hydrometric review of the catchment to assess benefits and costs of installing monitoring facilities.	NRA	More accurate assessment of water resources to enable better determination of licences and consents. May improve flood warning standards of service.	Cost: Additional monitoring is expensive to provide.

Issue 25 The Loughor fails to meet the current water quantity target, reducing available dilution at Garnswllt STW.			
OPTIONS	Responsibility	Advantages	Disadvantages
Apply newly developed surface water abstraction policy to river to review target. If revised target is still not met, undertake review of abstractions impacting on river.	NRA	Improved water quality if targets are met. More effective management of catchment water resources.	Difficulty of implementing changes to licences if required.

Issue 26 Flood Protection Standards at Halfway and Pontardulais are below the indicative standard of service for land used for residential and non-residential purposes			
OPTIONS	Responsibility	Advantages	Disadvantages
Do nothing.	NRA	No additional costs.	Property remains at flood risk and owners suffer regular loss/damage.
Promote improvement to flood defences.	NRA	Property protected against flooding to a reasonable standard.	Cost: £600k (approx. cost of construction). Short term disruption to locality during construction.

Issue 27 The level of protection against tidal flooding at Hendy is known to be below the indicative standard of service for land used for residential and non-residential purposes.			
OPTIONS	Responsibility	Advantages	Disadvantages
Do nothing.	NRA	No additional cost.	Property remains at flood risk. Owners suffer regular loss/damage and stress.
Promote an improvement scheme.	NRA	Property protected against flooding to a reasonable standard.	Cost: £10k (approx. cost of construction). Short term disruption to locality during construction.

Issue 28 The levels of protection against flooding at Glan Marlais from the Llan, and on the Gors Fawr Brook are believed to be below the indicative standard of service for land used for residential and non residential areas. Maintenance operations are severely hampered by limited access onto the river banks.			
OPTIONS	Responsibility	Advantages	Disadvantages
Undertake feasibility study to determine whether flood defence improvements are possible.	NRA	Understand problem and determine whether cost effective improvements are feasible.	Cost: £5k.
Implement improvements where possible.	NRA	Enhanced flood protection standards. Reduced flood damage for residents. Reduced maintenance costs.	Cost: £100k (approx. cost of construction). Short term disruption to locality during construction.

Issue 29 The tidal flood defences at Crofty do not provide a standard of protection suitable for a residential area, and are expensive to operate.			
OPTIONS	Responsibility	Advantages	Disadvantages
Do nothing.	NRA	No additional cost for new works.	Property remains at flood risk. Emergency response cost will remain high.
Promote improvement scheme.	NRA	Enhanced flood protection for residents. Emergency response costs will reduce.	Cost of construction approx £15k. Short term disruption to locality during construction.

Issue 30 The cost of gravel removal from the river channel to maintain existing flood protection standards.			
OPTIONS	Responsibility	Advantages	Disadvantages
No change.	NRA	None.	Cost of operation will continue to rise and could threaten viability of operation.
Review maintenance regime and identify and implement improvements.	NRA	More cost effective river management. Improved levels of service.	Cost of establishing new regime. Cost of review approx £1k.

Issue 31 Section 105 surveys are required to establish the extent of land liable to flood.			
OPTIONS	Responsibility	Advantages	Disadvantages
Undertake flood surveys of the catchment.	NRA	Provide better advice to Planning Authorities to assist in development plan preparation.	Cost of survey approx £50k.

Issue 32 The flood warnings for the Loughor catchment do not meet our target standards.			
OPTIONS	Responsibility	Advantages	Disadvantages
Improve existing flood forecasting methods.	NRA	Provision of more accurate and timely warning of flooding to residents of the flood risk areas.	Cost of improvements to existing systems approx £5k.

Issue 33 "Standards of Service" for SSSIs have not been formally agreed with CCW.			
OPTIONS	Responsibility	Advantages	Disadvantages
Agree "Standards of Service" and implement.	NRA/CCW	SSSIs safeguarded.	Cost (unknown).
Develop Water Level Management Plans	NRA/CCW/LAs	SSSIs safeguarded.	Cost (unknown)

Issue 34 Fisheries and riparian habitats have been degraded by industrial activity.			
OPTIONS	Responsibility	Advantages	Disadvantages
Identify and report on areas of degraded habitat using RCS and other data.	NRA	Enables areas requiring improvement to be identified.	Cost (unknown).
Plan remedial works in conjunction with riparian owners.	NRA/Riparian Owners	Shared objectives achieved and cost savings through collaborative work.	
Implement remedial works when appropriate.	NRA	Improved riparian habitat. Improved fish production.	Difficult to plan implementation if dependent on third parties.

Issue 35 Impaired migration of salmonids due to man-made obstructions.			
OPTIONS	Responsibility	Advantages	Disadvantages
Identify easements required and prioritise sites.	NRA	Appropriate solutions identified. Cost/benefit analysis undertaken	Cost (unknown).
Negotiate with owners, the possibility of easement.	NRA/Riparian Owners	Increased natural productivity.	Increase in vulnerable poaching areas.
Implement schemes when appropriate.	NRA/Riparian Owners	Increased natural productivity.	Cost: dependent on each individual scheme.

Issue 36 Invasive weeds are present throughout the catchment.			
OPTIONS	Responsibility	Advantages	Disadvantages
Continue to implement effective and co-ordinated control measures within the catchment.	NRA/WDA/CCW/ Riparian Owners/ LAs	Improved native habitat. Improved access. Reduce spread of invasive species.	Cost (unknown). Re-invasion always possible.
Refine methods and adopt "best practice".	As above	Reduce cost of control activity, find effective method of eradication.	
Increase public awareness about invasive weeds and control measures by the distribution of the NRA leaflet, "Guidance for the Control of Invasive Plants near Watercourses".	NRA	Increased public awareness. Prevention of spread of invasive weeds.	

Issue 37 - Low population densities of juvenile trout have been recorded on the Aman.			
OPTIONS	Responsibility	Advantages	Disadvantages
Identify and report on the extent of the low populations and the possible causes.	NRA	Identifies cause of problem.	Cost (unknown).
Plan remedial works to address identified impacts.	NRA	Enables prioritisation of remedial works.	Cost (unknown).
Implement mitigation works in collaboration with other functions /organisations.	NRA/LAs	Objectives can be achieved by all parties working together.	Cost (unknown). May take longer to implement joint initiatives.
Monitor impact of mitigation works to ensure problem is resolved.	NRA	Ensures that work has been successful.	Cost (unknown).

Issue 38 The need to safeguard the otter population.			
OPTIONS	Responsibility	Advantages	Disadvantages
Establish contact with relevant organisations and groups	NRA/OPW/Conservation Interests	Local expertise and knowledge	Cost (unknown).
Review available information and develop a Priority Otter Catchment Management Plan	NRA/OPW/Conservation Interests	Efficient, pragmatic and co-ordinated approach	Cost (unknown).
Implement plan to timescale, subject to availability of resources.	NRA/OPW/Conservation Interests	Realistic objectives achieved.	Cost (unknown).

Issue 39 Status and development needs of coarse fisheries are unknown.			
OPTIONS	Responsibility	Advantages	Disadvantages
Review catchment needs in relation to Coarse Fish Strategy	NRA/Angling Clubs/Riparian Owners	Appropriate resources deployed for catchment	Cost (unknown).
Implement Coarse Fish Strategy	NRA/Angling Clubs/Riparian Owners	Realistic objectives attained	Cost (unknown).

Issue 40 Public access to many areas of the river system is restricted due to the lack of public footpaths. Consideration needs to be given to the feasibility of extending and linking the existing footpath network to improve access to the river corridor.			
OPTIONS	Responsibility	Advantages	Disadvantages
Undertake a feasibility study to identify areas where access could be improved.	NRA/LAs/Riparian Owners	Enhance recreational potential and access to the river corridor	Cost (unknown).

Issue 41 In-river engineering works can cause disturbance of silts and detract from the amenity value of the fishery.			
OPTIONS	Responsibility	Advantages	Disadvantages
Ensure that works are undertaken in a sympathetic manner and adopt best practice.	NRA/Developers	Reduces environmental damage. Reduces loss of amenity. Ensures risk of conflict minimised.	Cost (unknown).
Encourage liaison between developers and anglers.	NRA/Developers/ Anglers	Reduced disruption to both parties.	

Issue 42 Natural erosion processes in the lower Loughor cause land loss to riparian owners, and the loss of fishing for angling associations.			
OPTIONS	Responsibility	Advantages	Disadvantages
Encourage riparian owners, anglers and conservation bodies to seek mutually acceptable solutions.	NRA/Riparian Owners/ Conservation Bodies	All parties satisfied.	Possible failure to agree.

Issue 43 Opencast mining activity causes considerable habitat degradation, including the diversion of watercourses, resulting in long term reductions in fish production and damaged ecosystems.			
OPTIONS	Responsibility	Advantages	Disadvantages
Identify areas degraded by past open cast activity.	NRA	Enables prioritisation of sites according to extent of damage and cost of remedial works.	Cost (unknown).
Prioritise remedial works and implement when appropriate.	NRA/Developer	As above.	Cost (unknown).
Identify future schemes and seek to reduce their impact through consultation with developers and LPAs.	NRA/Developer/ LPA	Prevents long-term damage and allows for mitigation works at an early stage of development.	Cost (unknown).

Issue 44 No canoeing access in the Loughor upstream of the tidal limit.			
OPTIONS	Responsibility	Advantages	Disadvantages
WCA to establish contacts with angling clubs and riparian owners in order to pursue access arrangements.	WCA/NRA	<p>Increase recreational use of rivers.</p> <p>Possible income for angling clubs.</p> <p>More "eyes" on the river which may deter poachers.</p>	Possible disturbance to fisheries, conservation and angling interests.

Issue 45 The conservation value of the river corridor may be severely impacted by bankside developments and other changes in land use.			
OPTIONS	Responsibility	Advantages	Disadvantages
Protect a minimum of 7m from the river bank from all new developments.	NRA/Developers	Preservation of conservation value within river corridor.	Cost to developer.
Keep river banks free from new development.	NRA/LPA/WO	As above.	Cost (unknown).

Issue 46 Illegal fishing reduces stocks of fish for <i>bona fide</i> angling and spawning.			
OPTIONS	Responsibility	Advantages	Disadvantages
Continue enforcement of legislation in an effective and co-ordinated manner.	NRA	Protects stocks for legitimate harvesting and natural production.	Ongoing cost of activity.
Review the effectiveness of all byelaws and introduce new proposals where necessary.	NRA	As above.	Cost (unknown).

PART II
SUPPORTING INFORMATION



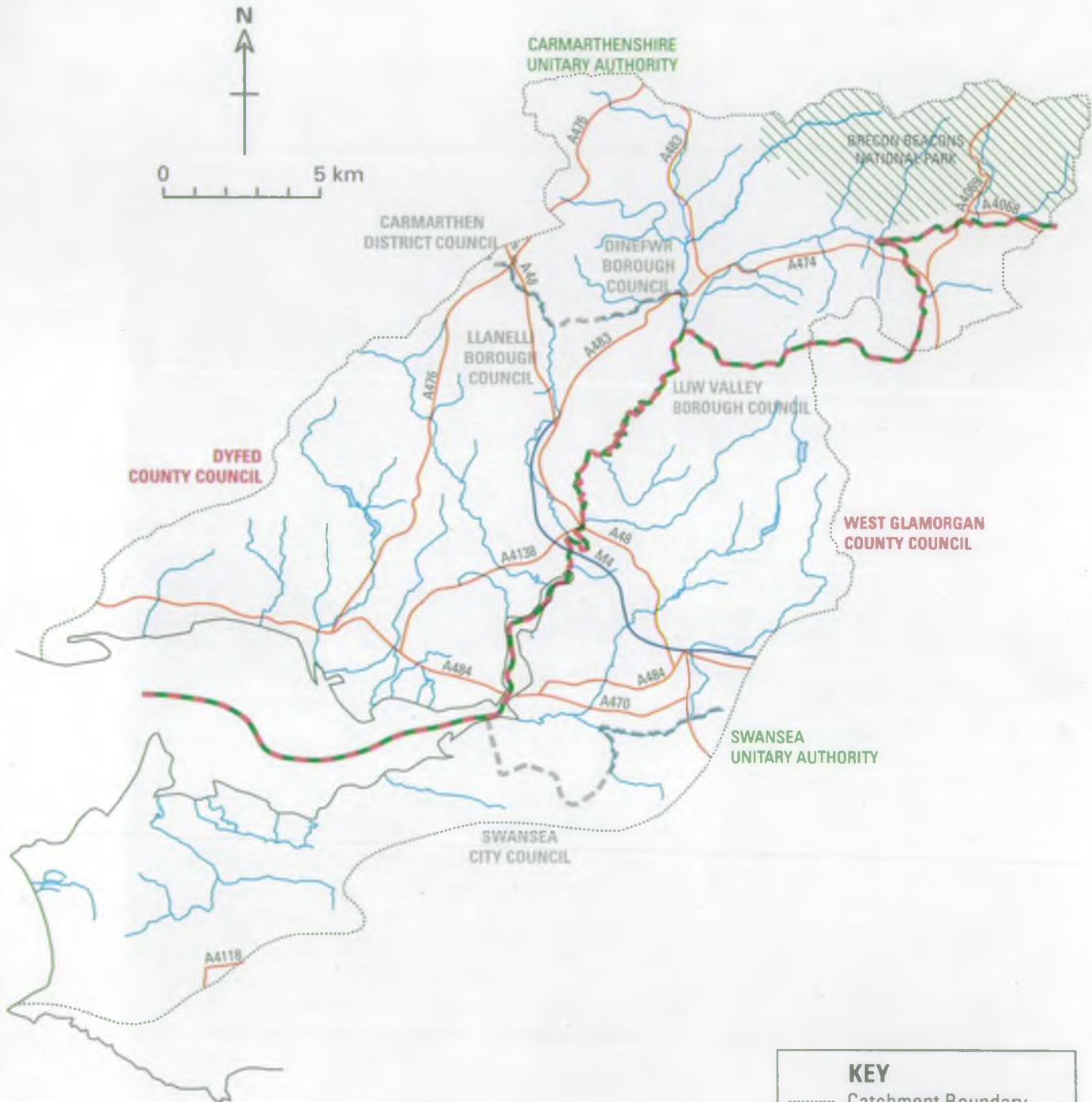
4.0 THE USES OF THE CATCHMENT

The following sections catalogue the legitimate Uses of the catchment which fall under our control or affect us in one way or another.

- The **General information** gives an outline of the nature of our responsibility towards each Use.
- The **Local Perspective** gives more detailed information about the Uses, within this catchment.
- We have set management **Aims** and **Environmental Requirements** for each Use. These are designed to protect both the environment and the needs of other Uses.
- In **Section 5** these specific targets are used to help us set overall **targets**, for the whole catchment, for water quality, water quantity and physical features, that reflect our view of the balance of interests between the different users of water.

MAP 7.

INFRASTRUCTURE AND POPULATION



KEY	
.....	Catchment Boundary
— (blue)	Main River
— (light blue)	Minor Tributary
— (dark blue)	Motorway
— (orange)	A Road
- - - (red)	County Boundary
- - - (grey)	District Boundary
— (green)	Unitary Boundary
▨ (hatched)	National Park

4.1 URBAN DEVELOPMENT (including road and rail)

General Information

The development of the urban or "built" environment is a land use which can affect the water environment and its uses. Such development is generally controlled via the local authority planning process involving the production of development plans and the approval of specific development proposals. The move to "plan led" development has further increased the importance of development plans.

We attach great importance to the effective influence of the planning process through all its stages. Detailed comments are provided on all development plans and development proposals received by the NRA as a statutory planning consultee. The Authority has produced the document "Guidance Notes for Local Planning Authorities on the methods of protecting the water environment through development plans". Responses to planning consultations often include proposed "planning conditions" which the planning authority may include within planning approval.

Certain types of development are promoted for approval by other statutory procedures. These include major developments such as roads, railways, airports and barrages. These also are influenced and controlled by early consultation.

A key purpose of this plan is to provide planning authorities and prospective developers with information about the management and use of the water environment in this catchment, our policies and potential environmental constraints including flood risk. This should also facilitate the identification of appropriate development opportunities.

The final decision on development plan policies and development proposals are taken by planning authorities, planning inspectors or the relevant Secretary of State. However government guidance includes reference to the need to fully consider our comments when determining development plans or proposals.

When the Authority objects formally to a development proposal then supporting evidence will be provided at any subsequent Planning Appeal or Public Inquiry.

The NRA's policies for the management of the water environment are based on the sustainability principle. It is hoped that this plan can effectively link with other plans for the built environment so as to provide mutual support for development which is environmentally and economically sustainable.

Local Perspective

The catchment is split currently between the administrative counties of Dyfed and West Glamorgan. Llanelli, Dinefwr, Carmarthen, Lliw Valley and Swansea Councils are responsible for district matters, along with the Brecon Beacons National Park which occupies approximately 10% of the catchment area. The current council boundaries will change in April 1996 with the formation of the two new Unitary Authorities, Carmarthenshire and Swansea, which will take over the functions of the Councils. The percentage of the catchment which each occupies is shown below.

County Council	District/Borough/ City Council	Unitary Authority (from April 1996)
Dyfed (60%)	Llanelli (31%)	Carmarthenshire (50%)
	Dinefwr (18%)	
	Carmarthen (1%)	
West Glam (40%)	Lliw Valley (25%)	Swansea (40%)
	Swansea (15%)	

The Dyfed County Structure Plan was adopted in 1983 and, following review, an amended document was approved in 1989 to cover the period 1986 to 1996. The Structure Plan will continue in force after the reorganisation of local government, until such time as a unitary development plan becomes fully operative.

The West Glamorgan County Structure Plan was adopted in 1986, with Alteration No. 1 approved in 1988. Alteration No. 2 was subject to an 'Examination in Public' following which the plan was placed on further deposit during November 1995.

Most of the allocation for development is within the existing towns and main villages. However, future trends in the economy will influence growth to a large extent. Our estimates suggest that the population in the catchment will increase by around 6% by 2021, based on 1991 figures.

We have prepared statements for inclusion within County Structure Plans which refer to aims and policies in respect of development. These statements should allow developers to take the policies into account in the preparation of their proposals.

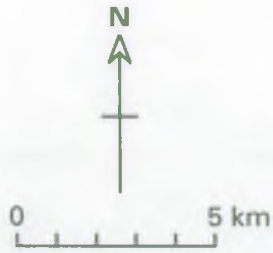
- Aims**
- To ensure that development or construction activity does not damage the water environment or detract from its use.
 - To ensure that development does not affect the water environment so as to threaten life or property.
 - To promote opportunities within developments that will enhance the water environment and its use.

Environmental Requirements:

- Water Quality**
- Development should not adversely affect the water quality requirements of other uses in the catchment.
 - Development must not cause the failure of any Statutory Water Quality Objective within the catchment.
 - Developments should be consistent with relevant NRA policies. These include the "Policy and Practice for the Protection of Groundwater", and policy on "Development in Sewered Areas".
- Water Quantity**
- To protect inland waters and groundwater, which is a locally important source of supply, from the detrimental effects of development, including afforestation and other changes in land use.
- Physical Features**
- Development should not have an unacceptable flood risk.
 - Development should not create an unacceptable flood risk in other areas.
 - Developers must pay for work needed to assess and reduce flood risk.
 - Development should be consistent with NRA policies, including the Flood Plain Policy (in production), and Policy and Practice for the Protection of Groundwater.
 - Development should not adversely affect the requirements of other uses in the catchment, including those associated with the conservation of the natural water environment.

MAP 8.

FLOOD DEFENCE



KEY	
.....	Catchment Boundary
— (thick blue)	Main River
— (thin blue)	Minor Tributary
— (thick blue)	Statutory Main River
-	Weirs
●	Culverts
○ (brown)	Lake/Reservoir
— (orange)	River Maintenance Areas
— (green)	Sea Defences
— (yellow)	Fluvial Defences

4.2 FLOOD DEFENCE

General Information

This Use relates to the protection of people and property against flooding from rivers and the sea and primary role of the river as a drainage system for surface water.

Flooding normally follows from extreme climate conditions such as very heavy rainfall causing high river flows and, in coastal areas, surge and storm generated waves combining with high tides. The severity of an individual flood event is generally described in terms of its frequency of occurrence. This is often expressed as a return period in years, for example, 1 in 50 years (i.e. a flood of this severity would, on average, be expected to occur once in a 50 year period).

Areas of land next to rivers known as flood plains or washlands take the additional flow or naturally store water when the channel capacity is exceeded. If significant areas of flood plain are embanked, tipped or built upon the lost storage volume leads to higher river levels elsewhere.

The coastline of Wales has been divided into a series of Coastal Cells. The boundaries of each cell has been set to reflect the boundaries of the natural physical processes acting on that section of coast. Coastal Groups have been formed containing representatives of each Maritime District Council, the NRA and other bodies with an interest in the management of the Coastline.

Recent Government publications such as the PPG on Coastal Planning and Circular 68/92 Development in Flood Risk Areas, place a requirement on local planning authorities to take account of coastal processes and flood risk in their determinations. The sources of information to assist these decisions will be the S.105 Survey presently under preparation by the NRA and the Shoreline Management Plan as agreed with the Coastal Group formulated from study work undertaken on the physical influences affecting the coastline.

Recent guidance has now been issued by Central Government on the preparation of Shoreline Management Plans to ensure a consistent approach between Coastal Groups.

Flood alleviation schemes are constructed where necessary and cost effective. The standard of protection to be provided is determined by an analysis of the options for the most economically and technically advantageous solution. For a scheme to proceed the benefits in financial terms must outweigh the costs.

The Water Resources Act 1991 requires the NRA to exercise general supervision over all matters relating to flood defence. Powers are also provided for the issue of consents for works on rivers and watercourses designated as Main River and for ensuring the maintenance of flow in river channels and the removal of obstructions.

The Land Drainage Act 1991 provides the Local Authority and where appropriate Internal Drainage Boards with powers to carry out flood defence works to ensure the proper flow of water. The 1991 Act also provides the NRA with additional consenting powers on ordinary watercourses.

The provision of flood defences including the maintenance of channel capacity, needs to be executed with care if other Uses - notably fisheries and conservation - are not to be affected unduly. Consultations are carried out within and outside the NRA during the formulation and undertaking of schemes. In this way, wherever feasible, and consistent with the original purpose, habitat enhancements and the needs of landscape and heritage will form part of the scheme.

Water Level Management Plans will be drawn-up for sites agreed with the Countryside Council For Wales and/or English Nature in accordance with the guidance issued by MAFF/Welsh Office.

The NRA provides and operates a flood warning system on designated main rivers and coastal areas at risk from flooding by the sea. The system provides warnings to the Police who pass the warnings to the general public.

Local Perspective

The upper reaches of the primary watercourses within this catchment are characterised by their rapid response to rainfall and their heavy bed load. Their banks tend to be gravel based and as such are vulnerable to erosion. As a result, the river channels tend to be relatively mobile and the banks are free from mature vegetation, although Japanese Knotweed is becoming a major problem particularly on the Aman.

The frequency of flooding has precluded much development on the floodplain of the lower Loughor, other than roads, railways and services. Further upstream, and along the major tributaries, development has encroached onto the flood plain and is at risk from flooding. This is particularly so on the coastal flood plain to the north of the estuary, and in the upper catchment. In the past, flood defences have been constructed to improve flood protection standards for some of these areas. Our flood defence operations in this catchment relate primarily to the maintenance of these flood defences together with the maintenance of the flow carrying capacity of the river channel in order to minimise flood risk. These operations also involve regularly inspecting and maintaining flood defences, protecting them from erosion, removing gravel shoals and managing bankside vegetation. We also inspect and maintain these defences during flood events.

Major flooding incidents have occurred in the past at Pontardulais, Halfway and Furnace. At Pontardulais, the town centre has been inundated by floodwaters originating from both the Loughor and the Dulais. In the late 1980's flood defences were constructed along the Dulais and in the case of the Loughor are planned for 1996. In Halfway, residential and commercial property adjacent to Halfway Bridge have suffered frequent flooding from the Dafen and downstream industrial estates are known to be at risk. Flood protection standards have been improved in recent years by the removal of culverts and improvements to the river channel and the began to construct new defences in 1995. At Furnace, properties on the flood plain of Cwm Trebedrodd have flooded due to the limited flow carrying capacity of the river channel and blockages of culverted sections of the system. During the 1980's the watercourse was significantly improved and the culverts replaced.

Elsewhere, there are many more sites where frequent flooding of property occurs on a lesser scale: Llandybie, Ammanford, Brynamman, Penybanc, Fforestfach, Cheriton, Pontlliw, Garnswllt and the Llwyn Hendy Moors. At these locations, limited channel capacity results in flood water escaping the channel and affecting highways and threatening adjoining property. These sites are frequently inspected and maintenance works are undertaken to maximise channel capacity as required. At Llanmarlais and on the Gors Fawr Brook, the problem is made worse by urban development encroaching onto the river bank, making access to the watercourse for maintenance works both difficult and expensive.

Extensive development is present on the coastal flood plain particularly on the north bank of the estuary and is at risk from flooding. Following a history of tidal flood events, sea defences were constructed in the early 1980's by the Welsh Water Authority along the Machynys/Llwyn Hendy frontage. These defences protect Trostre Steel Works, the main railway line and property in the Bynea area of Llanelli from tidal inundation. In recent years the coastal plain to the west of these defences has been further developed and extensive coast protection works have been constructed which provide protection against both erosion and tidal flooding.

At Hendy and Llangennech properties are threatened by a combination of tidal effects and floodwaters from the Gwili and Marlais respectively. Defences are currently being constructed at Hendy to enhance flood defence standards at that site. Similarly, at Crofty properties are threatened by a combination of tidal and fluvial conditions. These properties are protected by defences which we own and operate and a scheme to enhance these defences is presently being considered.

Water Level Management Plans will need to be developed for Llangennech Moors and Cwm Ivy Marsh SSSIs to ensure that both the land use and conservation value of these areas can be maintained.

Aims

To maintain existing flood defences for people and property against flooding from rivers and the sea, taking account of environmental requirements.

To improve the standard of flood defences where appropriate by promoting and constructing new flood defences.

To maintain effective drainage, taking account of environmental requirements.

To provide warnings of imminent flooding to the public (via the police) where appropriate.

Environmental Requirements:

Physical Features

In protected areas, the flood defences/river bank should not be overtopped by a flood flow within a specified return period.

In areas where land use is primarily agricultural, the watercourse should provide effective drainage, taking account of environmental requirements.

No development should be permitted which would impair the effectiveness of any flood defence scheme or prevent access for maintenance of flood defences.

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

Adequate arrangements should be provided for flood warning.

Environmental requirements will be taken into account when designing and undertaking flood defence works.

The operating practices agreed in Water Level Management Plans will be followed.

4.3 SOLID WASTE DISPOSAL (LANDFILL)

General Information

The disposal of domestic, commercial and industrial waste into landfill sites is a common form of waste disposal in England and Wales. Sites receiving material that is not inert have the potential to produce a toxic liquid effluent (leachate) which can pollute surface and groundwater. Consequently our policy is for all new sites to be designed and operated in a way that contains any liquid effluents. This is monitored by the NRA. Older sites may cause pollution long after tipping has ceased and in these cases, the owner or operator may be required to undertake remedial works.

Waste Regulation Authorities (WRAs) presently issue Waste Management Licences to handle waste or operate a waste disposal site under the Environmental Protection Act 1990. The NRA is a statutory consultee on applications for all landfill waste management licences.

Local Perspective

The majority of waste disposal sites (WDSs) in the catchment are licensed to accept inert waste only and are not subject to discharge consent controls. There are no active sites for the receipt of domestic refuse. However, Wernddu at Ammanford and Gwenlais at Pont Lliw have previously accepted such wastes.

The Wernddu site was closed by Dinefwr Borough Council in 1993 and site restoration is ongoing. Leachate was previously tankered away from the site for treatment elsewhere, although a willow and reed bed treatment system was established in 1995. All leachate is now passed through this before being pumped to the foul sewer under a trade effluent agreement with Dŵr Cymru Welsh Water.

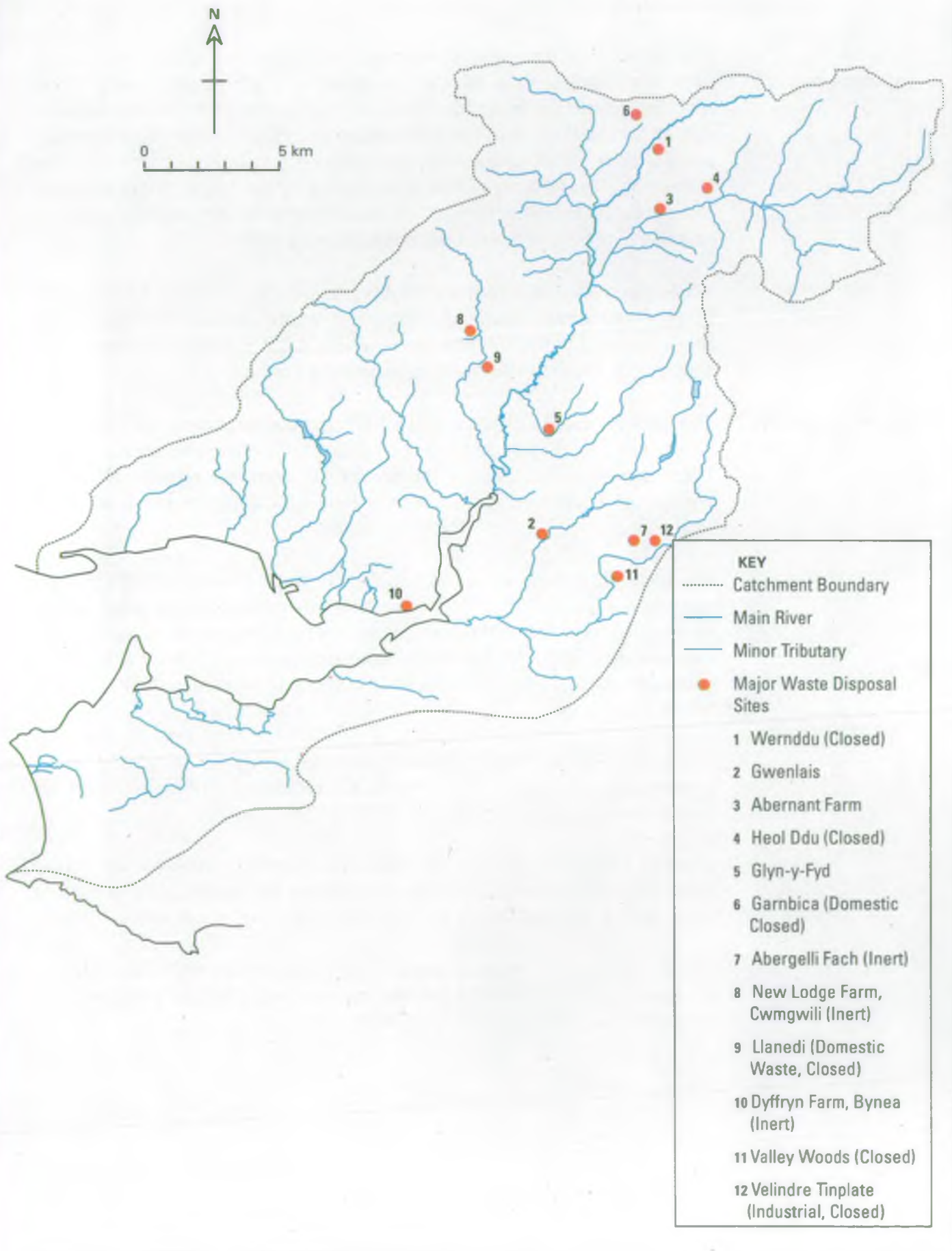
Gwenlais WDS no longer receives domestic waste, although the site is licensed to accept inert waste. Leachate is recirculated or tankered off-site during periods of high rainfall.

Abernant Farm WDS provides full containment and is licensed to accept inert waste and those which decompose slowly and are only slightly soluble in water, such as timber products, boiler scale, silicate slag, paper and cardboard.

New Lodge Farm, Cwmgwili, currently operates as an inert WDS, although it is licensed for non-hazardous industrial/commercial waste. Dyffryn Farm, Bynea, is also operating as an inert WDS.

MAP 9.

SOLID WASTE DISPOSAL



There are a number of historical closed sites, some of which still produce leachate. Heol Ddu near Glanamau accepted household and miscellaneous wastes until closure in 1982. Land opposite the Royal Oak Pub, Llanelli, accepted domestic waste.

There are other licensed facilities including transfer stations, scrapyards and numerous small active landfill sites. Some factories such as British Steel, Trostre operate licensed waste disposal and/or transfer stations on-site.

A WDS is proposed at Glyn-y-Fyd Quarry, Pontardulais, for which a waste disposal licence would be required prior to any operations taking place. An inert waste disposal site is also proposed for Glynwernen Quarry, Dafen.

Aims

To ensure that waste disposal sites are designed and operated in a way that does not adversely affect other uses of surface water or groundwater.

To protect the quality of groundwaters by implementing the NRA's Groundwater Protection Policy.

Environmental Requirements:

Water Quality

Waste disposal sites must be designed and managed to prevent liquid effluent from adversely affecting the quality of surface water and groundwaters.

All Waste Management sites must comply with the conditions included in the licence, enforced by the WRA.

Sites must comply with the conditions included on any discharge consent or prohibition notice, issued and enforced by the NRA.

Water Quantity

Waste disposal activities must not harm groundwater resources or adversely affect the rights of water abstractors.

The NRA's Position Statement regarding landfill and waste management can be found in the document "Landfill and the Water Environment".

Physical Features

Windblown litter from waste disposal sites must not be permitted to create an aesthetic problem in adjacent rivers, estuaries or coastal waters.

Following the cessation of tipping, all aftercare provisions stated on the planning consent, or licence surrender conditions, must be carried out by those responsible.

4.4 FISHERIES

General Information

The Fisheries Use addresses the protection, maintenance and improvement of fish stocks within the catchment: angling is covered in Section 4.13 as a recreational Use.

In order to protect different types of fishery the EC Freshwater Fish Directive (78/659/EEC) provides two levels of protection for water quality to support:-

- Salmonid fisheries - e.g. salmon and trout.
- Cyprinid fisheries - generally referred to as coarse fisheries.

A third category:-

- Migratory waters - i.e. waters that are used for the passage of migrating fish such as salmon and sea trout.

is largely protected by the provisions of the EC Dangerous Substances Directive which applies to all controlled waters. In addition, standards contained in our policy for the protection of estuarine water are applied to this use.

While the Freshwater Fish Directive can only be applied by statute to certain 'identified waters', the standards it contains will be used informally, for the purposes of CMPs, to assess the whole catchment for this Use.

Water quantity and the physical habitat are also very important factors in the conservation of fish stocks. While these factors do not receive the protection from formal targets, as applied to water quality, the CMP process will help to identify the requirements for their protection in the clearest manner possible.

The control of 'poaching' is a vital aspect in the conservation of fish stocks and we employ a sizeable Bailiff force to enforce the legal protection offered to fish stocks by both the Salmon and Freshwater Fisheries Act (1975) and the Salmon Act (1986).

Local Perspective**Salmonid**

The Loughor supports spawning populations of sea trout, brown trout and to a lesser extent, salmon which have a more limited distribution.

Given that salmon and sea trout migrate through the estuary at least twice during their lifecycles, water quality standards relevant to the protection of salmonid migration are applied to the estuary.

Rod catches declared by anglers have fluctuated widely over the past 14 years. The average catch of adult salmon and sea trout since 1980 has been 11 salmon and 187 sea trout, although 428 sea trout were reported in 1987.

Monitoring during the summer of 1995 has indicated that there are low numbers of juvenile salmon in many of the tributaries, with the highest densities being found in the Loughor downstream of Glynhir Falls. In contrast, juvenile trout are widely distributed with excellent numbers being recorded in the Morlais and Garenig. Previous surveys have found high densities in the Camffrwyd but this tributary was dry during the 1995 survey. Low numbers of trout were noted in the Aman and this river in general had suppressed populations, possibly due to poor spawning success as a consequence of excessive bed movement during flood conditions.

The further enhancement of riverine fish stocks is likely to be limited by the availability of spawning and nursery areas. Some of these have been rendered inaccessible to migrating fish by man-made obstructions, such as abstraction weirs and bridge supports.

Damage to riverine habitats, and subsequent reductions in fish stocks, have occurred from opencast mining and other industrial activities.

Other threats are posed to the well being of the fishery by the activities of poachers, who operate throughout the year, and from the risk of intermittent fish kills in the lower Loughor. During periods of extreme low flows and high temperatures, as experienced in the summers of 1976, 1984, 1989 and 1995, fish kills occurred as a consequence of excessive algal growth causing low oxygen levels at night.

MAP 10.

FISHERIES



In order to protect important native brown trout populations, the rivers within the plan area have been categorised in accordance with the our Brown Trout Strategy. Those areas which have never been stocked are afforded the greatest protection. Future stocking of these areas will not be permitted nor will natural impassable obstructions be removed. This strategy is being implemented in order to maintain the genetic integrity and fitness of these stocks to ensure their long term survival. The majority of the area fished by anglers fall within the category where a mixed fishery exists and hence existing stocking constraints will apply in future.

Stillwater brown and rainbow trout fisheries are managed primarily for angling purposes at Lliw Valley and Lledi Reservoirs and at Felindre Fishery. All are known to contain natural populations of brown trout and at Lower Lliw reservoir rainbow trout are known to have reproduced successfully.

Cyprinids

The rivers within the plan area all contain indigenous species such as minnows, bullheads, stone loach, eels and lampreys although there is no riverine coarse fishery largely due to the unsuitable natural habitat and flow regimes.

Coarse fisheries are largely confined to small stillwaters such as Furnace Pond, Penllergaer Pond and Whitesprings Fishery. These waters, managed primarily for anglers, contain species such as carp, tench, rudd, roach and bream.

Threats to coarse fish populations are posed by the illegal movements of fish which may spread disease and lead to the inappropriate stocking of non-indigenous species.

Aim

To sustain, or assist the recovery of, the populations of wild fish species at the levels appropriate to a catchment of this type and to protect the passage of migrating fish into and from freshwater.

Environmental Requirements:

Water Quality:

Rivers Waters should comply with the appropriate standards under the EC Freshwater Fish Directive (78/659/EEC).

Stillwaters These waters should comply with the same standards as set for rivers.

Estuaries These waters should comply with the appropriate standards of the EC Dangerous Substances Directive and the appropriate standards in the NRA policy for the protection of estuarine water quality.

Water Quantity The NRA has the task of balancing the needs of the environment with those of abstractors and other users. An abstraction licensing policy has been developed to ensure that this is carried out consistently and effectively for all new abstractions.

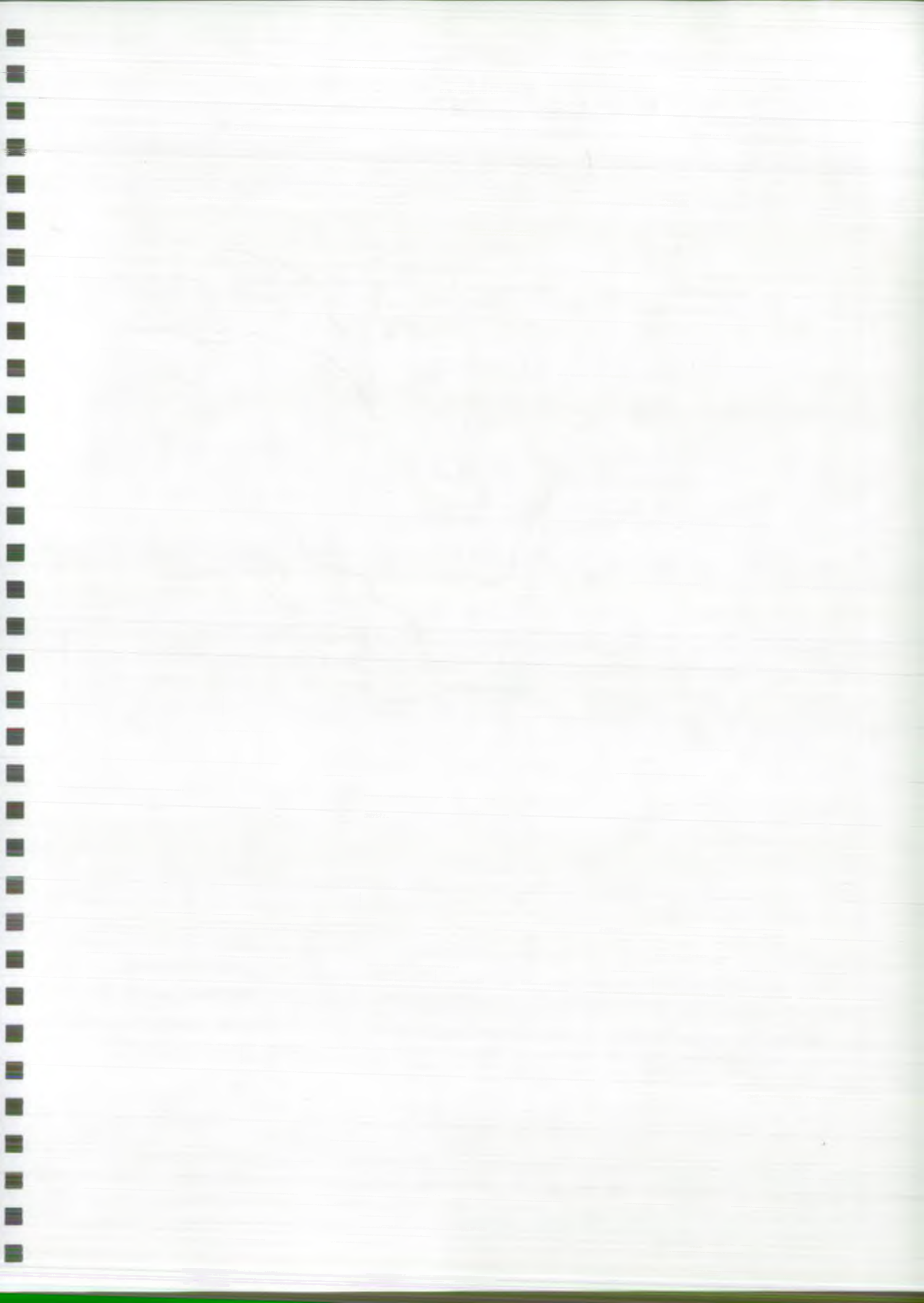
Physical Features An appropriate diversity of natural instream and bankside habitats should be maintained to support the fish typical of the river type.

Appropriate levels of riparian and instream vegetation should be maintained to provide adequate cover for fish.

Artificial barriers should not obstruct passage of migratory fish.

Natural or artificial barriers should not lead to excessive exploitation of fish.

River maintenance and other works should be carried out in a way that causes the least detrimental impact on the fishery.



MAP 11.

CURRENT QUALITY AS DEFINED BY RIVER ECOSYSTEM (RE) STANDARDS



4.5 RIVER ECOSYSTEM

General Information

The River Ecosystem (RE) Use addresses the protection, maintenance and improvement of the basic water quality required to support different types of river ecosystem (including fisheries). The Use is based on the River Ecosystem Classification Scheme which comprises five classes of water quality of which RE Class 1 has the highest quality.

RE Class 1: Water of very good quality (suitable for all fish species)

RE Class 2: Water of good quality (suitable for all fish species)

RE Class 3: Water of fair quality (suitable for high class coarse fish populations)

RE Class 4: Water of fair quality (suitable for coarse fish populations)

RE Class 5: Water of poor quality (which is likely to limit coarse fish populations)

Further details of the scheme may be found in Surface Waters (River Ecosystem) (Classification) Regulations 1994.

This scheme is especially useful for setting objectives which we use as planning targets to manage catchment water quality (see section 5.1).

Local Perspective

The water quality of the Loughor and its tributaries should be capable of supporting a healthy river ecosystem and a thriving salmonid fish population. This would require a minimum of RE Class 2. The proposed Long Term River Quality Objectives (LTRQOs) for the catchment are generally within RE Class 1 for the headwater tributaries and RE Class 2 for the more urbanised reaches.

The current water quality is generally within RE Class 1 and RE Class 2 although there are localised stretches of poor water quality as follows:

RE Class 4 - the Loughor downstream of Garnswilt STW
 - the Gwili downstream of Cross Hands STW

RE Class 5 - the Dafen downstream of Dafen Pond

Aim

To provide water quality suitable to support a healthy River Ecosystem appropriate to the type of river.

Environmental Requirements:

Water Quality Waters should comply with the appropriate standards, applied formally or informally, under the Surface Waters (River Ecosystem) (Classification) Regulations 1994.

Water Quantity The NRA has the task of balancing the needs of the environment, with those of abstractors and other users. An abstraction licensing policy has been developed to ensure that this is carried out consistently and effectively for all new abstractions.

Physical Features An appropriate diversity of natural instream and bankside habitat should be maintained to support the Ecosystem typical of this river type.

4.6 GENERAL ECOSYSTEM

General Information

This Use relates to the protection of aquatic flora and fauna along with dependent organisms in the river corridor. In this context, dependent organisms are those which rely, at some stage of their life cycle, on the aquatic and bankside environment.

This basic Use is applied to **all** controlled waters within the catchment and provides protection to the aquatic environment from substances identified as "Dangerous to aquatic life" under the EC Dangerous Substances Directive. There is also a requirement to protect physical features and water quantity at appropriate levels.

Where areas of the catchment are important for more specific ecological reasons their protection/development is dealt with in the specific Use related chapters that follow and suitable, rigorous water quality standards will be applied.

Local Perspective

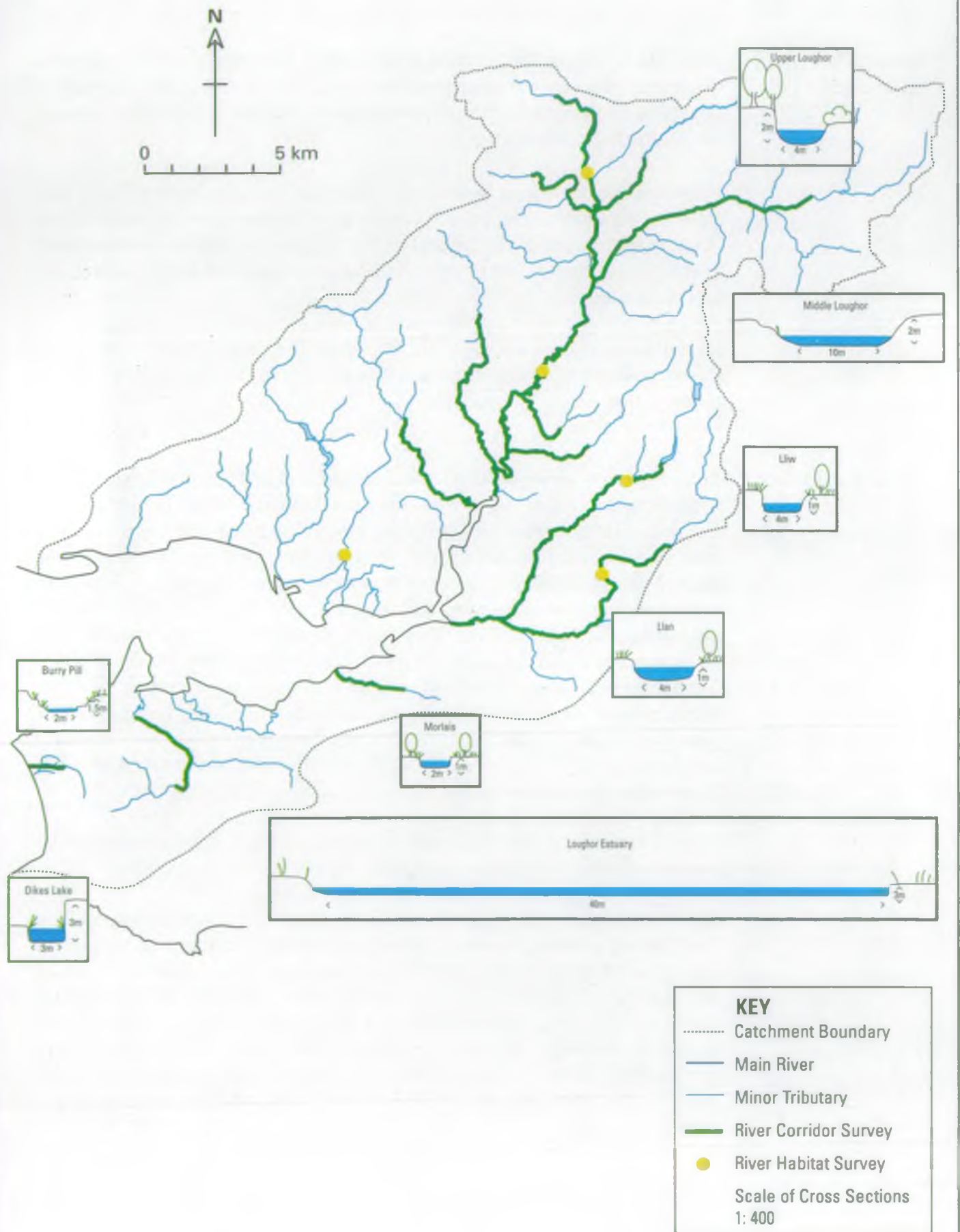
River Corridor Surveys (RCS) were carried out in 1984 for 85km of the Loughor and its major tributaries (the Lliw, Llan and North Gower rivers). The rivers in this catchment are relatively unmodified and have natural features, although localised industry, predominantly past mining activity, has reduced habitat diversity in the upper reaches of several tributaries. Bankside vegetation is dominated by trees and shrubs, principally ash, alder, sycamore and hawthorn in the middle and upper reaches, whereas grasses dominate the lower reaches where the river is actively meandering within the flood plain. One, locally rare, variety of willow (*Salix alba fragilis*) occurs along the main river downstream of Ammanford. Macrophytes are poorly represented in these watercourses where the substrate of the river bed is very mobile. Localised stands of grasses (*Phalaris arundinacea*) and water crowfoot (*Ranunculus penicillatus*) are the most frequently recorded species.

River Habitat Surveys (RHS), which provide data for comparing physical features of similar river types, have been carried out for five 500m reaches.

Otters have been seen throughout much of the catchment in recent years. The Otter Survey of Wales reported 73% of sites on the Loughor and tributaries had signs of otter presence when surveyed in 1991. Even the small watercourses of the Llan and Lliw support otters with 40% of sites having signs of activity. Reports of sightings in these areas suggest that the otter population is increasing and extending its distribution. Consequently the catchment has been designated under our Otter Conservation Strategy for Wales for the production of a Priority Otter Catchment Management Plan.

MAP 12.

GENERAL ECOSYSTEM



ENVIRONMENT AND WATER QUALITY

Riparian birds include kingfisher, heron, grey wagtail and dipper with sandmartin colonies particularly abundant in the lower reaches of the Loughor.

Rivers in the south of this catchment, which flow within the Swansea District boundary, are included in the Countryside Council for Wales farmland stewardship scheme, Tir Cymen. This experimental scheme encourages landowners to protect and enhance the countryside, including wetland habitats.

The Forestry Authority has recently launched a woodland scheme, The Aman and Gwendraeth Woodland Initiative, which encourages the creation and regeneration of woodlands. The area includes the Loughor and coastal rivers in Dyfed where the planting of native broadleaves may be increased in future years.

Aim To protect the basic general ecosystem associated with the aquatic environment and its associated corridor.

Environmental Requirements:

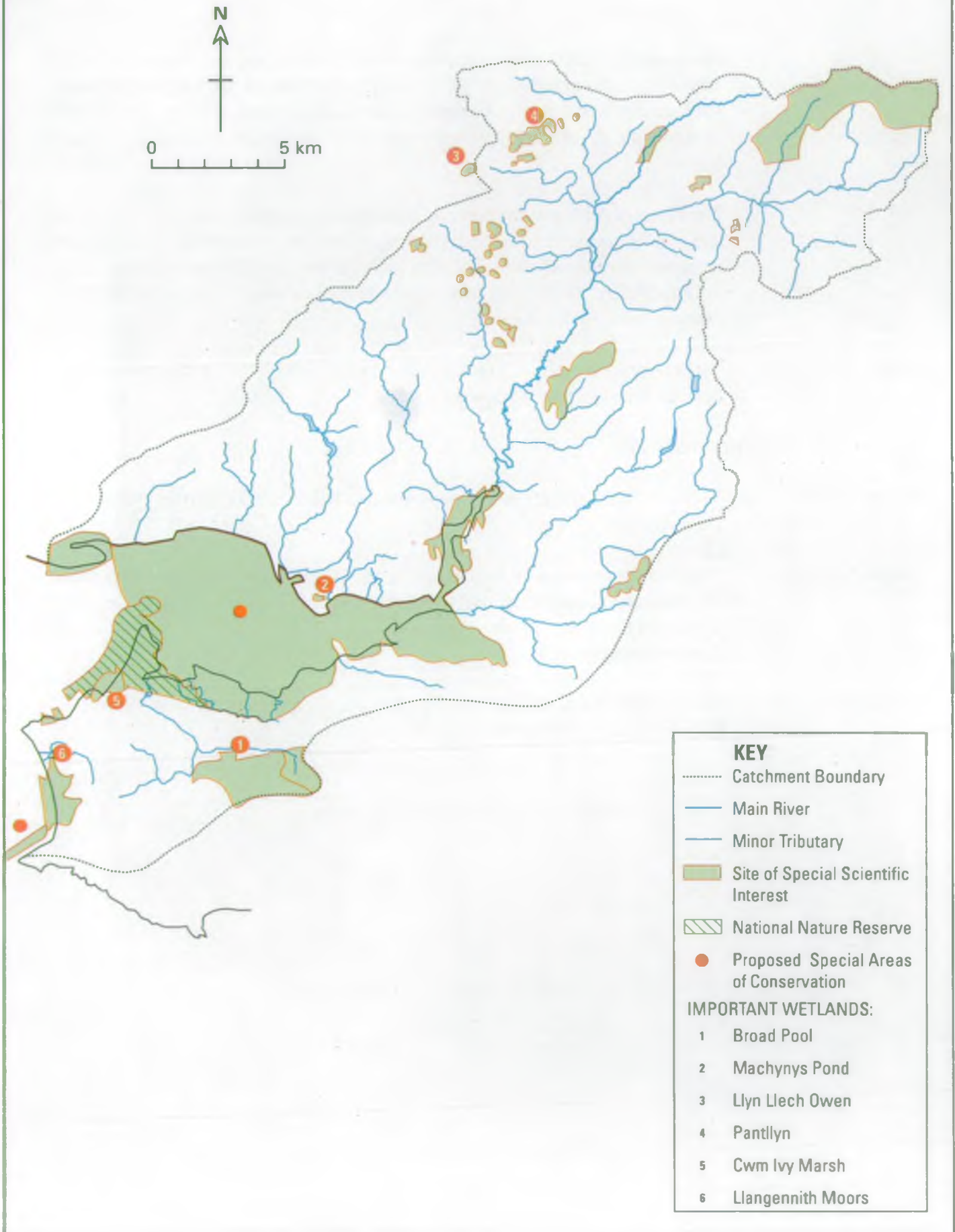
Water Quality Waters should comply with requirements of the EC Dangerous Substances Directive.

Water Quantity The NRA has the task of balancing the needs of the environment, with those of abstractors and other users. An abstraction licensing policy has been developed to ensure that this is carried out consistently and effectively for all new abstractions.

Physical Features The diversity of natural instream features and river plants and animals should be maintained and enhanced.

MAP 13.

SPECIAL ECOSYSTEMS



4.7 SPECIAL ECOSYSTEMS

General Information

Special ecosystems are regarded as those areas that are formally designated for their high conservation value. Such areas include National Parks, National Nature Reserves (NNRs), Sites of Special Scientific Interest (SSSIs) and Special Areas of Conservation and Special Protection Areas designated under the EC Habitats and Birds Directives.

This Use is extended to sites that are valuable in conservation terms but are not formally protected e.g. Nature Reserves and County Trust Sites and other non-statutory nature reserves.

It is possible that a WQO for the Special Ecosystems Use will be introduced by the DoE during the lifespan of this Plan. Proposals by the NRA and English Nature are being considered and will be the subject of separate public consultation.

Local Perspective

There are 31 SSSIs covering a total area of 13,216 hectares within the catchment, 16 of which include wetland habitats.

Habitats within three of these sites, namely the Burry Inlet Saltmarsh and Estuary, the Burry Inlet Dunes and the Gower Commons, are currently being considered as potential Special Areas of Conservation (SACs) under the Habitats Directive (92/43/EEC). Only one of these, Burry Inlet Dunes, has been formally submitted to the European Commission to date. Recognition of the importance of these sites in a European context will provide additional protection when they would be included in a network of protected areas ("Natura 2000"). A review of all our consenting and licensing activity affecting potential SACs will have to be completed in line with guidance from the Welsh Office.

The Burry Inlet and Loughor Estuary SSSI, in its entirety, is of national importance, providing invertebrate rich mudflats for wading birds and wildfowl populations which can exceed 46,000 during winter months. The area has been designated a RAMSAR site and is a Special Protection Area for its wetland communities and bird life.

The coastal strip from Whitford Burrows to Landimore Marsh in North Gower is a National Nature Reserve occupying 827 ha.

Locally important wetland SSSIs include Broad Pool, Machynys Pond, Llyn Llech Owen and Pantyllyn which support rare and locally important species, and Llangenneth Moors and Cwm Ivy marsh which require the development of Water Level Management Plans.

Aim To protect the special features interest for which the site has been designated for their ecological or landscape importance.

Environmental Requirements:

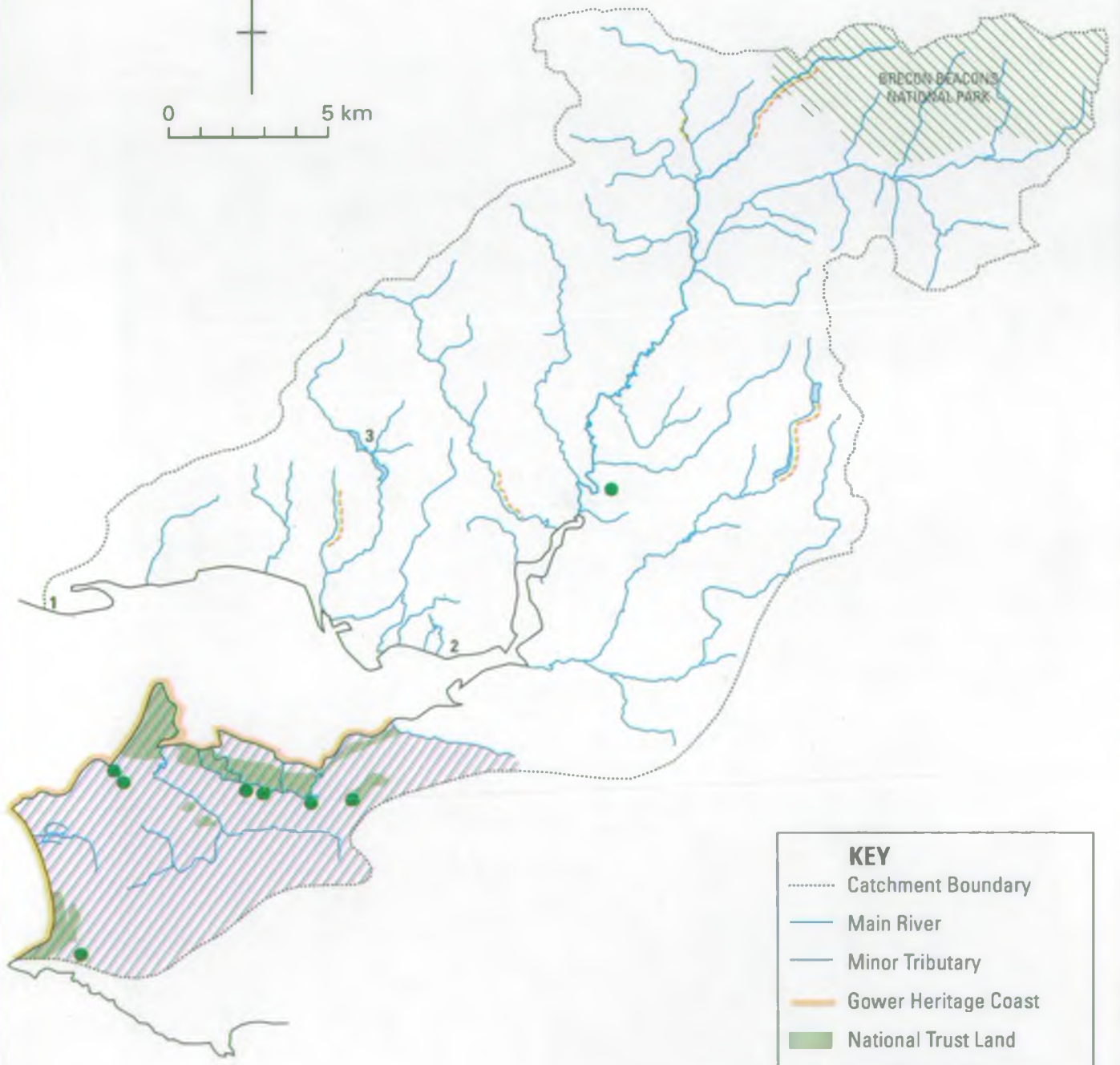
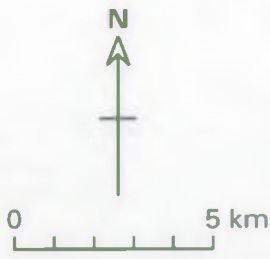
Special Conservation Areas are likely to have their own specific environmental requirements for water quality, water quantity or physical features. Currently no designatory agency has identified environmental targets for any sites and, inevitably, consultation would be required before such standards could be implemented.

Water Quality At sites where water quality is a key factor in the protection of a special ecosystem, appropriate standards will be applied.

Water Quantity The NRA has the task of balancing the needs of the environment, with those of abstractors and other users. An abstraction licensing policy has been developed to ensure that this is carried out consistently and effectively for all new abstractions.



MAP 14. CONSERVATION OF NATURE, LANDSCAPE AND HERITAGE AND BASIC AMENITY



KEY	
.....	Catchment Boundary
— (thick blue)	Main River
— (thin blue)	Minor Tributary
— (dashed orange)	Gower Heritage Coast
■ (green)	National Trust Land
● (green)	Local Nature Reserve
— (dashed orange)	Riverine Related Footpath
▨ (diagonal hatching)	Brecon Beacons National Park
▨ (diagonal hatching)	Gower Area of Outstanding Natural Beauty
1	Pembrey Country Park
2	Wildfowl and Wetland Trust
3	Upper Lliedi Bird Reserve

4.8 CONSERVATION OF NATURE, LANDSCAPE AND HERITAGE

General Information

The protection of the aquatic ecosystem and designated sites for nature conservation are covered in the General Ecosystem and Special Ecosystems sections respectively. This section deals with the broader aspects of the conservation of wildlife, landscape and heritage features associated with inland waters but which may be located away from the river corridor.

The landscape and features of conservation or archaeological interest are of great importance in many catchments and may attract large numbers of visitors.

We have a duty to promote and further conservation of flora and fauna while carrying out our business. This includes the protection of water based or associated plants and animals that are so vital to the water environment. We also have to pay regard to any features of natural beauty or interest and must also consider the desirability of improving access to these features.

Exceptionally beautiful landscapes may be protected by being designated as National Parks or as Areas of Outstanding Natural Beauty (AONBs), for which we are an informal consultee.

Sites of historic or heritage interest may be classed as Scheduled Ancient Monuments (SAMs) or as 'listed buildings' which have statutory protection, but can be any feature of interest.

Local Perspective

The Gower Peninsula is designated as an AONB and requires protection from the pressures of the many visitors without reducing its appeal and accessibility.

The National Trust is a major landowner and provides access to large tracts of land on the North Gower. In addition, the north - eastern point of the catchment encompasses part of the Brecon Beacons National Park.

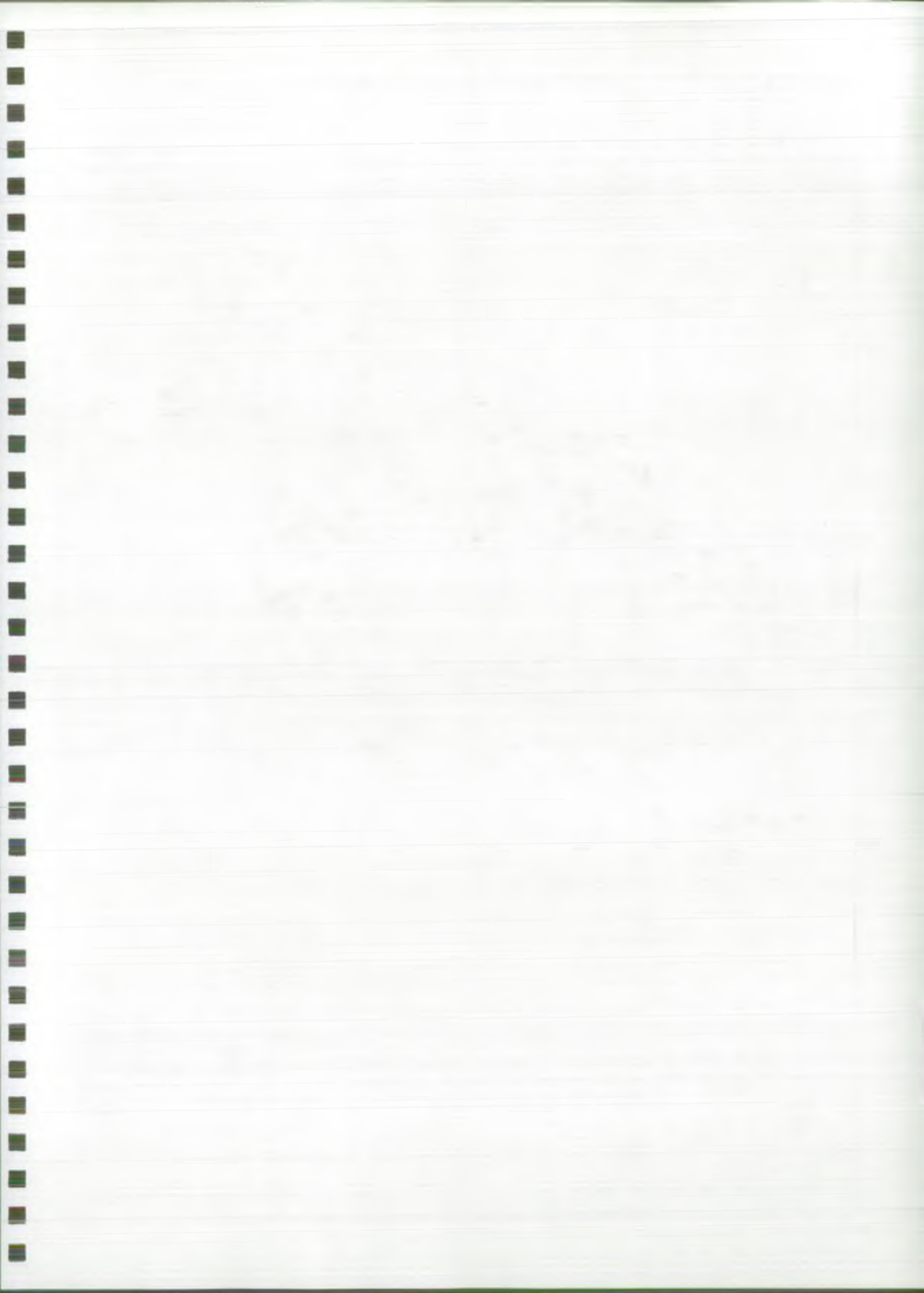
Forty six archaeological sites, designated under the Ancient Monuments and Archaeological Areas Act 1979 have been identified in this catchment. Sites include burial mounds, standing stones and structures which are unlikely to be affected by riverine activity.

Aim

To ensure that wildlife, landscape and heritage features of interest (particularly designated sites) are protected and, where appropriate accessible.

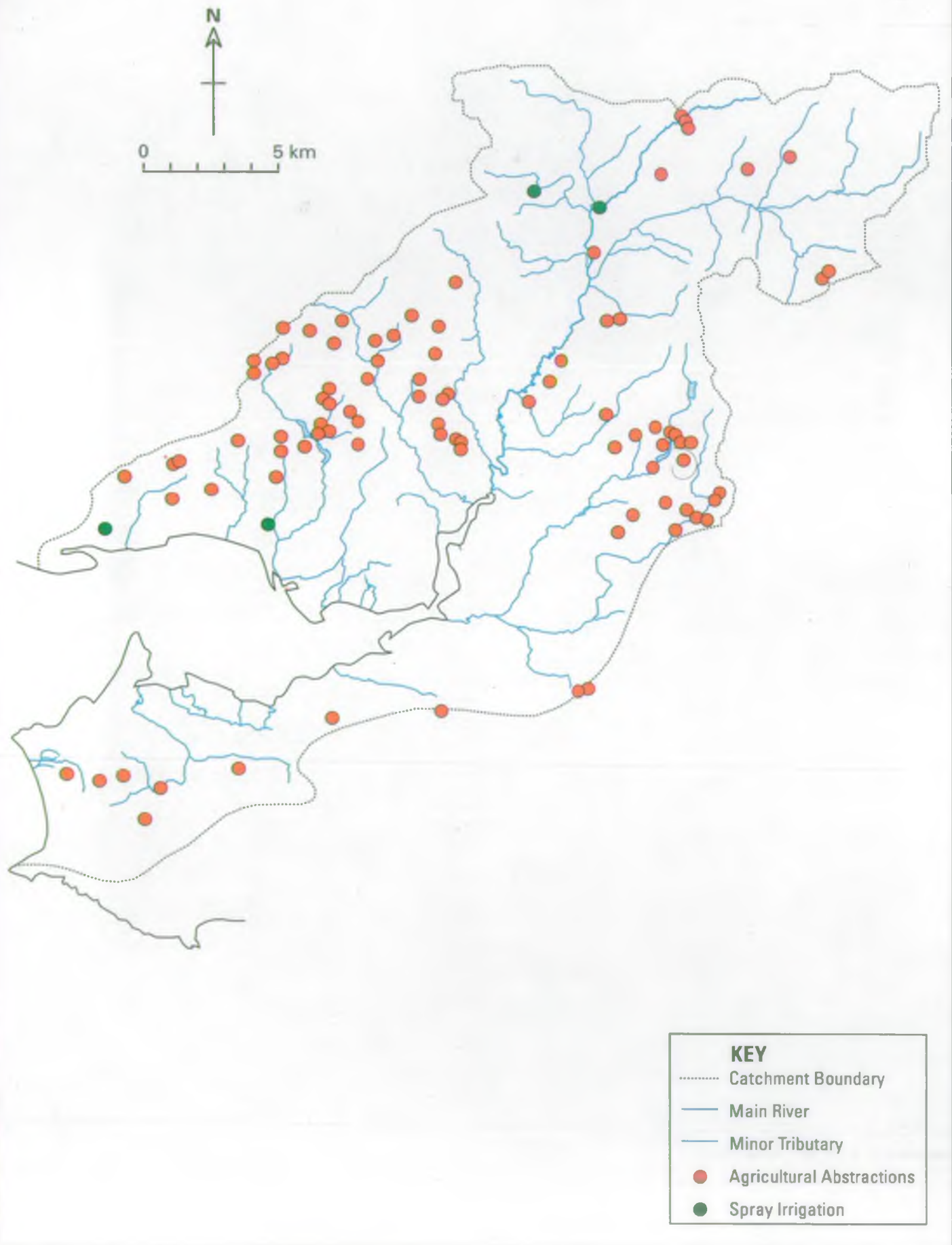
Environmental Requirements:

- Water Quality** Generally there will not be any specific water quality requirements to protect landscape or heritage sites although water around such public places should conform with the standards used to protect the General Ecosystem Use (Section 4.6).
- Water Quantity** The NRA has the task of balancing the needs of the environment, with those of abstractors and other users. An abstraction licensing policy has been developed to ensure that this is carried out consistently and effectively for all new abstractions.
- Physical Features** Physical features that give rise to natural beauty should be protected.
- Sites and buildings of interest should, where cost-effective, be protected from damage by flooding and/or drought.



MAP 15.

AGRICULTURAL ABSTRACTION



4.9 ABSTRACTION

General Information

The removal of water from streams, rivers or groundwater by man is termed **abstraction**. The various uses to which the water is put are all grouped under this general heading. Abstractions are controlled by licences granted under the Water Resources Act 1991. The abstraction licensing process ensures that we can 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 (not more than 20 cubic metres a day) general agricultural uses from surface water (excluding spray irrigation) - see table in Appendix 2. Also, large areas of North and West Wales are exempted from the licensing requirement for abstractions from groundwater (wells and boreholes), regardless of use. There are a number of other specific types of abstraction (e.g. firefighting) which are exempt from the need for a licence. The requirement for an abstraction licence is shown in Appendix 2.

All abstraction licences specify maximum volumes that the licence holder may take, and many contain conditions to protect the environment and other abstractors. The exceptions are licences granted as Licences of Right in 1965, or "Licences of Entitlement" in 1990 where the legislation did not permit us, or our predecessors, to restrict pre-existing abstractions.

In considering applications for new licences, we must ensure that there is no derogation of existing abstractors without their agreement, and that the aquatic environment and associated habitats are properly safeguarded. We do not guarantee that the authorised volume will be available, nor that the water will be fit for the purpose for which it will be used.

We have a duty to protect the quality of water resources and will specify zones or areas around sources that seek to control certain potentially polluting activities. The Groundwater Protection Policy (Appendix 1) forms the basis for our activities relating to groundwater. For surface waters we can apply to the Secretary of State to designate protection zones upstream of major abstractions. In such zones, risk assessment could identify whether certain chemicals should be prohibited and/or safety procedures improved so that the abstractions downstream are protected.

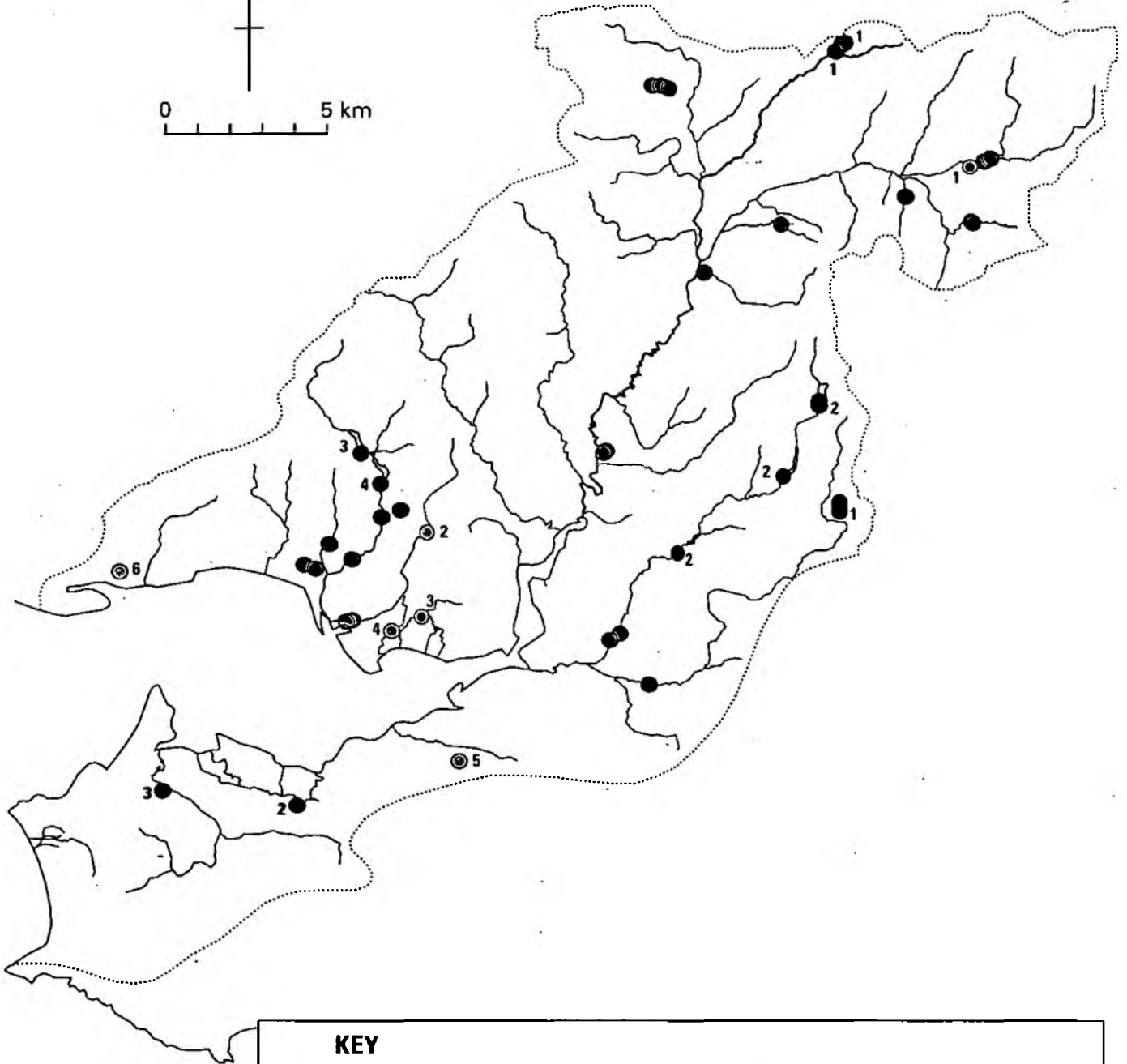
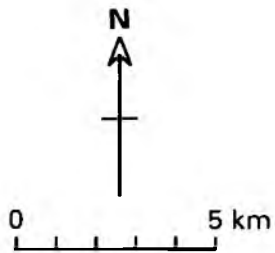
Certain types of abstraction have specific issues associated with them, as follows:

Private and Public Water Supply

Public water supplies are mainly taken from surface waters - rivers, streams and reservoirs - but groundwater sources can be important on a local

MAP 16.

OTHER ABSTRACTIONS



KEY		
.....	Catchment Boundary	● Fish Farm
—	Main River	● Potable Water Supply:
—	Minor Tributary	● Industrial
●	1 Llygad Llwrch	● Recreation
●	2 Upper and Lower Lliw	1 Brynamman
●	3 Upper Lliedi	2 Dafen (Pond)
●	4 Cwm Lliedi	3 Machynys Wildlife Centre
●	1 Brecon Beacons Natural Water	4 Llanell RFC
●	2 Gower Spring Water	5 Fishing Lakes, Llanrhidian
●	3 Cheriton	6 Ashburnam G.C.
●	1 Maesgwyn	
●	2 Lliw Mill	
●	Water Bottling:	

N.B. There may be more than one abstraction point per licence

scale. Private supplies are generally derived from springs and boreholes and their quality is monitored by the Local Environmental Health Officer.

The quality of the raw water, nor that of the delivered, treated water is not our responsibility. However, we do have a duty to protect water quality and will specify protection zones around groundwater sources, that seek to control certain potentially polluting activities. The Groundwater Protection Policy (Appendix 1) forms the basis for our activities in this area.

Spray Irrigation

Spray irrigation is a high impact use of a water resource and as such is more strictly controlled than other types of abstraction. This is because it takes place during the driest times of year when flows are lowest, and little or no water is returned to the river after use. It is, therefore potentially damaging to the water environment. We encourage winter abstraction into storage and consequently set winter abstraction charges at only one-tenth of those for summer abstraction.

Fish Farming

A fish farm is usually a series of off-stream reservoirs in which fish are reared. This can severely affect a watercourse by diverting a large proportion of the flow through the farm. Although all the water is returned downstream, this does mean that a length of the river is reduced in flow. The requirement for an adequate residual flow to protect the river can restrict the viability of a fish farm.

Water Transfer

Water is not always used in the same place as it is abstracted from. It may be transferred elsewhere, within or outside the catchment. Transfers clearly represent a net loss of water to the immediate area and so their impact is generally mitigated by the release of regulation or compensation water during period of low flows. All transfers are subject to abstraction licences.

Industry

Industrial uses of water range from those where water loss is low - such as mineral washing, to those with high loss - such as evaporative cooling. Most large industrial abstractions take water directly from surface and groundwater, but supplies from the public mains may supply water where quality is important.

HydroPower

The energy of flowing water can be used to generate electricity, or to provide the power to drive millwheels. Both uses are growing in popularity in the search for sources of renewable energy, and as old mills are restored. However, the very large volumes of water diverted away from the river can have a significant effect on the in-river flora and fauna and other users of the watercourse, particularly where the points of abstraction and return are remote from each other.

All hydropower abstractions require an abstraction licence.

Use of water for hydropower can result in appreciable changes in the flow

regime which can have a large impact on the downstream channel and its flora and fauna.

Amenity

There is an increasing demand for water to supply a wide range of amenity ponds and lakes to meet needs as diverse as nature conservation and water sports. Water for these ponds and lakes can be taken from ground or surface water supplies and is subject to the normal abstraction licensing procedure.

There may also be a requirement for a discharge and/or land drainage consent.

Ponds created by the damming of a watercourse will generally require an impounding licence.

Many amenity ponds are constructed in flood plain areas and are potentially of concern. We will seek to ensure that such developments and associated works do not affect the natural river regime.

To stop the indiscriminate spread of alien fish species and the spread of disease, all stocking of fish into amenity ponds is subject to our normal authorisation procedures.

Local Perspective

Potable Supply

Dŵr Cymru Welsh Water (DCWW) hold four abstraction licences for sources in the catchment:

- i) Llygad Llŵchwr where the source of the Loughor issues from a limestone cave. Water is piped from here to Bryncoch water treatment works (WTW) to supply the Ammanford area.
- ii) Upper and Lower Lliw reservoirs. These reservoirs include water piped from Nantgaredig in the Twyi catchment and supply Felindre WTW, where it receives a minimum of A2 treatment (normal physical treatment, chemical treatment and disinfection as defined within the EC Surface Waters Directive). This WTW is the focal point for distribution of most of the potable water for the area.
- iii) Upper and Cwm Lliedi reservoirs are each covered by an abstraction & iv) licence. Since Felinfoel WTW was taken out of use in 1994 these reservoirs are both being used to provide storage to support raw water supplies for industrial use in the Llanelli area, the major user being the British Steel Trostre Works.

The total annual quantity authorised by these licences is some 23,868Ml which is supplemented by water from Nantgaredig.

Agriculture

There are 87 licences held for agricultural abstraction in the area although only

four of these authorise spray irrigation (for nurseries). The vast majority relate to modest abstractions from wells for general agricultural use such as stock watering. These abstractions are spread throughout the rural area and their large number reflects the general availability of groundwater as a source of supply.

Industry

There are fourteen abstractions authorised for purposes that fall in the industrial category ranging from evaporative cooling to wheel washing. The decline in the coal industry in the area is reflected by the fact that only four of these fourteen licences are associated with that activity. There are four licences for water bottling, two held by Brecon Beacons Natural Water near the source of the Loughor and two smaller sites on the Gower. The total authorised quantity for industrial use is 6209M1/a, about 70% of this being for the former Duport Steel Works site for which the licence is currently being retained by Llanelli Borough Council.

Fish Farming

There are two authorised abstractions for fish farming in the catchment. Maesgwyn Trout farm at Rhyd-y-Pandy is licensed to abstract a total of 1.36M1/day (increasing to 1.81M1/day in winter) from three points on an unnamed stream forming a tributary of the Llan.

The Lliw Mill Trout Farm on the Lliw is authorised to abstract 40M1/day. The availability of water in the river is influenced by DCWW operations at the Lliw Reservoirs where a compensation flow of 4.2M1/day must be maintained below the reservoirs when this quantity is not available over the spillway.

In both cases the majority of the abstracted water is returned to source so that the impact of the abstraction on water quantity is restricted to the stream between the inflow and outflow. At both sites the abstractions are restricted to 50% of the water available at any time either by a restriction in the abstraction licence or discharge consent.

Amenity

There are six licences in the catchment authorising abstractions for a diverse range of recreational and amenity purposes. These include irrigation of both Llanelli RFC ground and Ashburnam Golf Club; Machynys Wildlife Centre; a conservation pond on the Dafen; fishing lakes near Llanrhidian; and a supply to Brynamman swimming pool. The total authorised abstraction for these activities is 431M1/a.

Aims

To manage water resources so as to safeguard licensed and exempt abstractions and the environment. This includes the active enforcement of abstractions.

To encourage abstractions to be made as far downstream as possible and discharges to be made as close to the point of abstraction as is practicable.

To encourage efficient water use and to optimise re-use of water.

To plan for the sustainable development of water resources, developing criteria to assess the reasonable needs of abstractors and the environment.

Agricultural/Spray Irrigation

To minimise the impact on summer flows of spray irrigation and other forms of net abstraction.

To encourage winter storage abstraction for use in summer.

HydroPower

HydroPower developments that restrict the ability to use upstream water resources will be opposed unless the licence authorising the abstraction is subject to an agreed volume of derogation and a time limit.

Environmental Requirements:

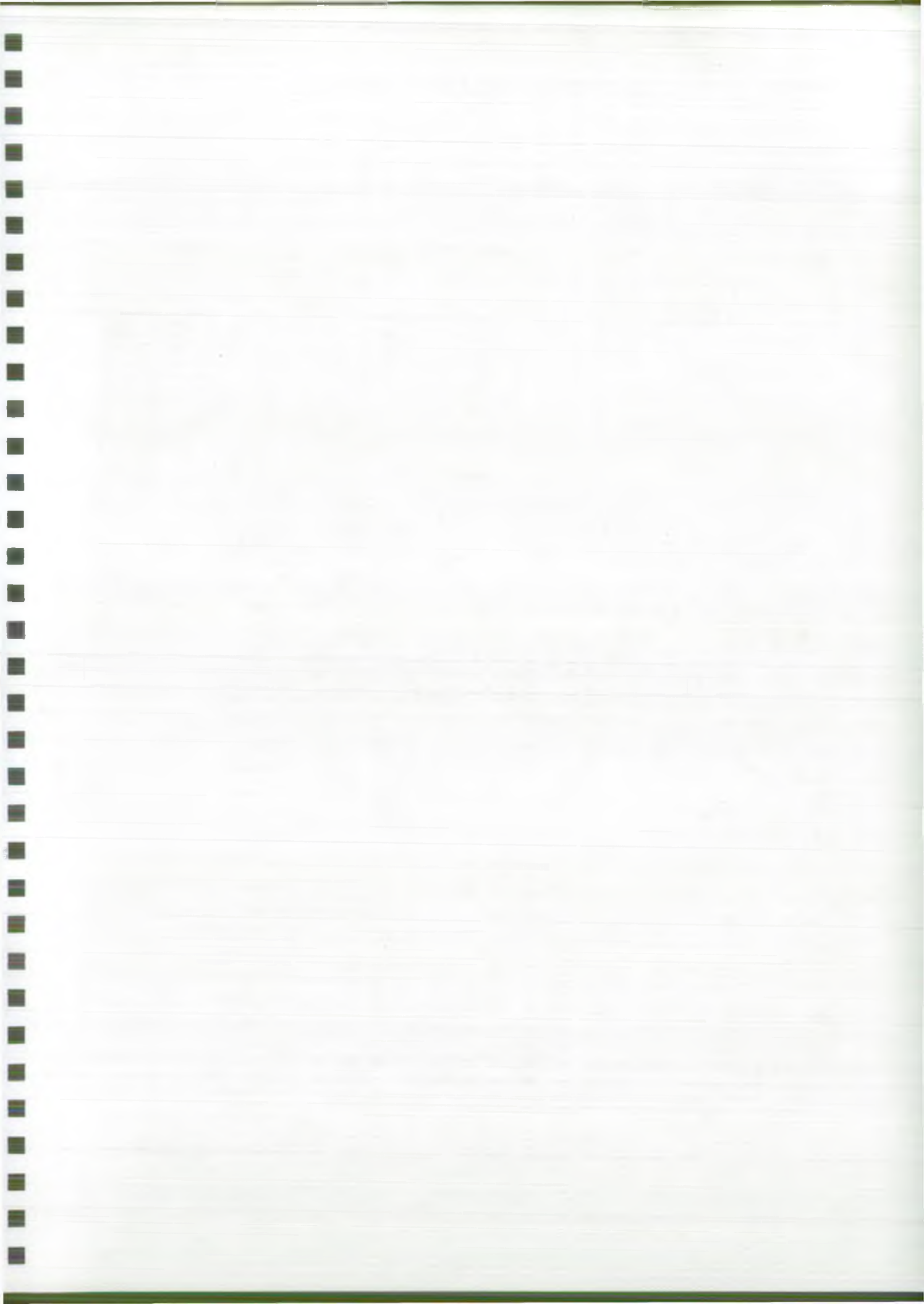
Water Quantity

The NRA has the task of balancing the needs of the environment, with those of abstractors and other users. An abstraction licensing policy has been developed to ensure that this is carried out consistently and effectively for all new abstractions.

Water Quality

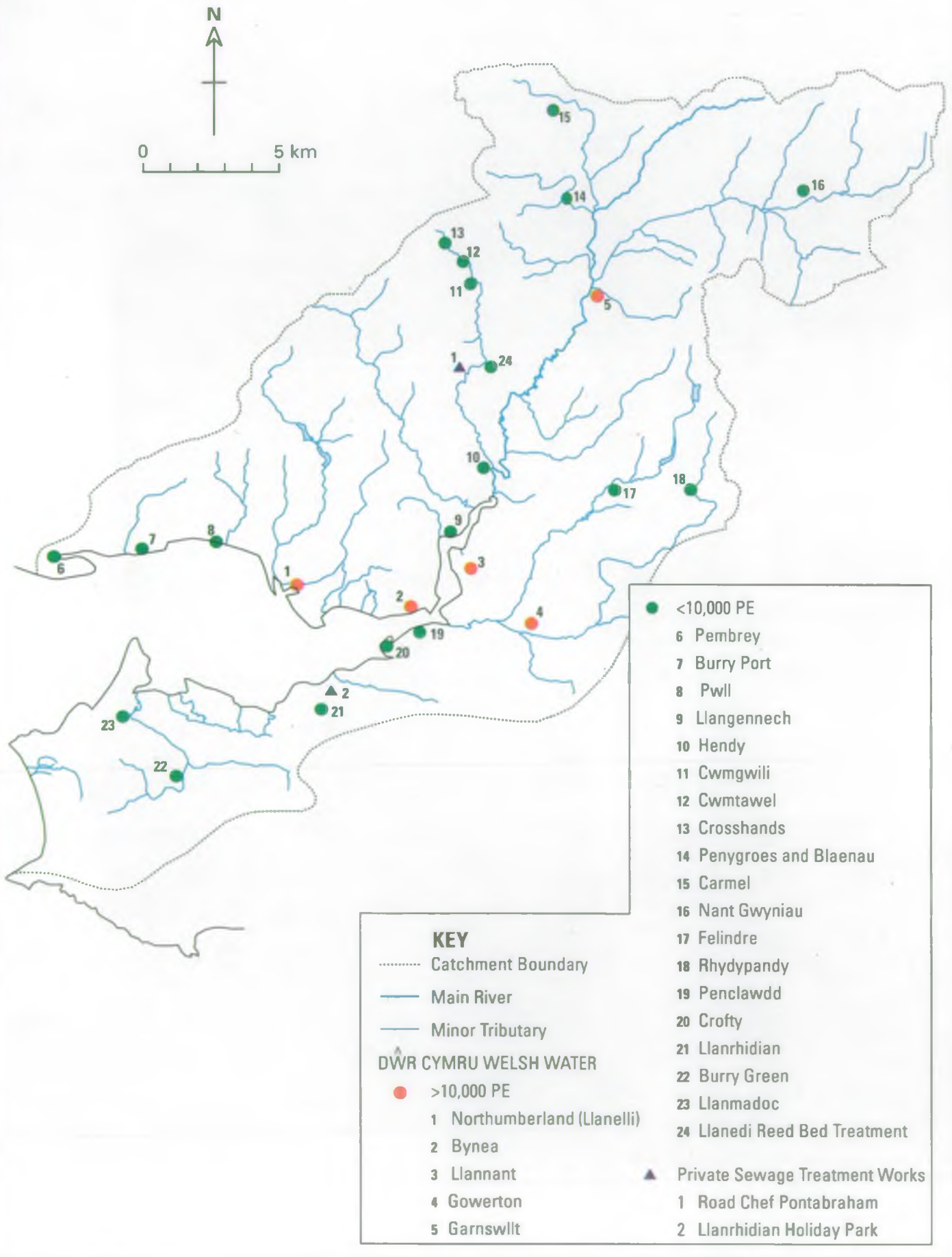
There should be no deterioration in water quality, below the point of abstraction, due to reduced dilution of authorised discharges.

Waters abstracted for potable supply should conform with the relevant standards of the EC Surface Waters Directive.



MAP 17.

SEWAGE EFFLUENT DISPOSAL



KEY

- Catchment Boundary
- Main River
- Minor Tributary
- ▲ DWR CYMRU WELSH WATER

- >10,000 PE
- 1 Northumberland (Llanelli)
- 2 Bynea
- 3 Llannant
- 4 Gowerton
- 5 Garnswllt

- <10,000 PE
- 6 Pembrey
- 7 Burry Port
- 8 Pwll
- 9 Llangennech
- 10 Hendy
- 11 Cwmgwili
- 12 Cwmtawel
- 13 Crosshands
- 14 Penygroes and Blaenau
- 15 Carmel
- 16 Nant Gwyniau
- 17 Felindre
- 18 Rhydypanyd
- 19 Penclawdd
- 20 Crofty
- 21 Llanrhidian
- 22 Burry Green
- 23 Llanmadoc
- 24 Llanedi Reed Bed Treatment
- ▲ Private Sewage Treatment Works
- 1 Road Chef Pontabraham
- 2 Llanrhidian Holiday Park

4.10 SEWAGE EFFLUENT DISPOSAL

General Information

In Wales most sewage effluent is discharged into freshwaters having first been treated in a sewage treatment works (STW) or smaller facility such as a septic tank. However, some untreated sewage is occasionally discharged into rivers from overflows on the sewerage system. The overflows act as safety valves to stop the treatment works being overloaded or the sewerage system damaged and also to prevent flooding of property. They are designed to operate only under storm conditions when river flows are high. We regulate all these types of discharge and monitor compliance with their consents. In order to protect the water environment these consents may contain conditions that variously specify the quantity, quality or circumstances of effluent discharge. In Wales Dŵr Cymru Welsh Water handles the bulk of sewage effluent discharged to freshwaters, although the greater number of STWs are privately owned.

Coastal sewage discharges which serve the majority of the population of Wales, are also generally owned by Dŵr Cymru Welsh Water although at present few of them receive the level of treatment associated with freshwater discharges.

In Welsh Region, the continuing improvements in sewage effluent treatment and disposal facilities feature highly in Dŵr Cymru Welsh Water's second Asset Management Plan (AMP2), which has been produced in close liaison with us. This plan specifies the capital investment required for Dŵr Cymru Welsh Water's assets (mainly to ensure compliance with the EC Urban Wastewater Treatment Directive). Consequently, we have, over the past two years, assessed the environmental impact of every Dŵr Cymru Welsh Water (DCWW) owned STW discharge and those from Combined Sewer Overflows (CSOs) in order to provide a basis for establishing investment priorities. Any sewage effluent related issues identified within this CMP will be considered within the agreed AMP2 programme.

Local Perspective

Most of the sewage effluent collection and disposal within the catchment is undertaken by DCWW, currently operating 24 STWs, including 8 discharging to freshwater and 16 discharging to the estuary. The largest discharges occur from the Llanelli outfall (population equivalent 28,000) and Gowerton STW (population equivalent 54,000). Further works at Garnswllt, Llannant and Bynea, each serve populations greater than 10,000. All the DCWW STWs within the catchment provide secondary treatment facilities, with the exception of Burry Port, Pwll, Llanelli, Bynea and Hendy where treatment consists of primary settlement only. Sludge from Llanelli STW is discharged on the early ebb tide.

The current DCWW investment plan for the period 1995-2000 (AMP2)

includes major schemes within the catchment. Construction work is currently underway on a new STW at Bynea to provide secondary treatment and disinfection using ultra violet light. This STW will be commissioned in 1996 and will replace the existing works and discharges at Pwll, Burry Port, Llanelli and Bynea.

Investment is also planned to improve treatment levels at Garnswllt, Gowerton and Cross Hands during this period. On completion of the 1995-2000 programme, only the discharge at Hendy will not receive secondary treatment, although this is planned for early in the AMP3 (2000-2005) programme. Overall, the planned programme of improvements will provide major benefits for water quality, especially downstream of both Garnswllt STW and Cross Hands STW.

The middle and lower stretches of the Loughor and the Loughor Estuary have been identified as candidate "sensitive" waters under the EC Urban Wastewater Treatment Directive. Monitoring is being undertaken to determine if there is evidence of, or potential for, eutrophication within the river and estuary. Should such evidence be obtained, "qualifying discharges" (those serving populations greater than 10,000) would require tertiary treatment to remove nutrients within 7 years of the review date in 1997.

There are a number of CSOs within the catchment that cause water quality problems, particularly in Capel Hendre, Aman Valley and Fforestfach, Swansea. A scheme is underway in Capel Hendre, which will remove two out of the three existing overflows and includes abandonment of Wernos pumping station. This should greatly improve water quality in the Fferws Brook.

Intermittent water quality problems also arise from private pumping stations at new housing developments and from miss-connections of foul drainage to surface water systems. We work with local authorities when remedial actions are to be undertaken in such cases.

Aims

To prevent pollution that would affect other uses of water by controlling the disposal of treated and untreated sewage effluent and sludge.

To protect the quality and volume of groundwaters by implementing the NRA's Groundwater Protection Policy.

The NRA would generally seek to ensure that discharges are made as close as possible to the point of abstraction.

Environmental Requirements:

Water Quality Discharges should comply with all conditions stated within discharge consents. This will be enforced by the NRA.

There should be no significant deterioration in the quality of waters receiving discharges, beyond that assumed when setting the discharge consent.

Water Quantity Consent conditions will be derived taking into account the upstream dilution available under average and dry weather flow conditions.

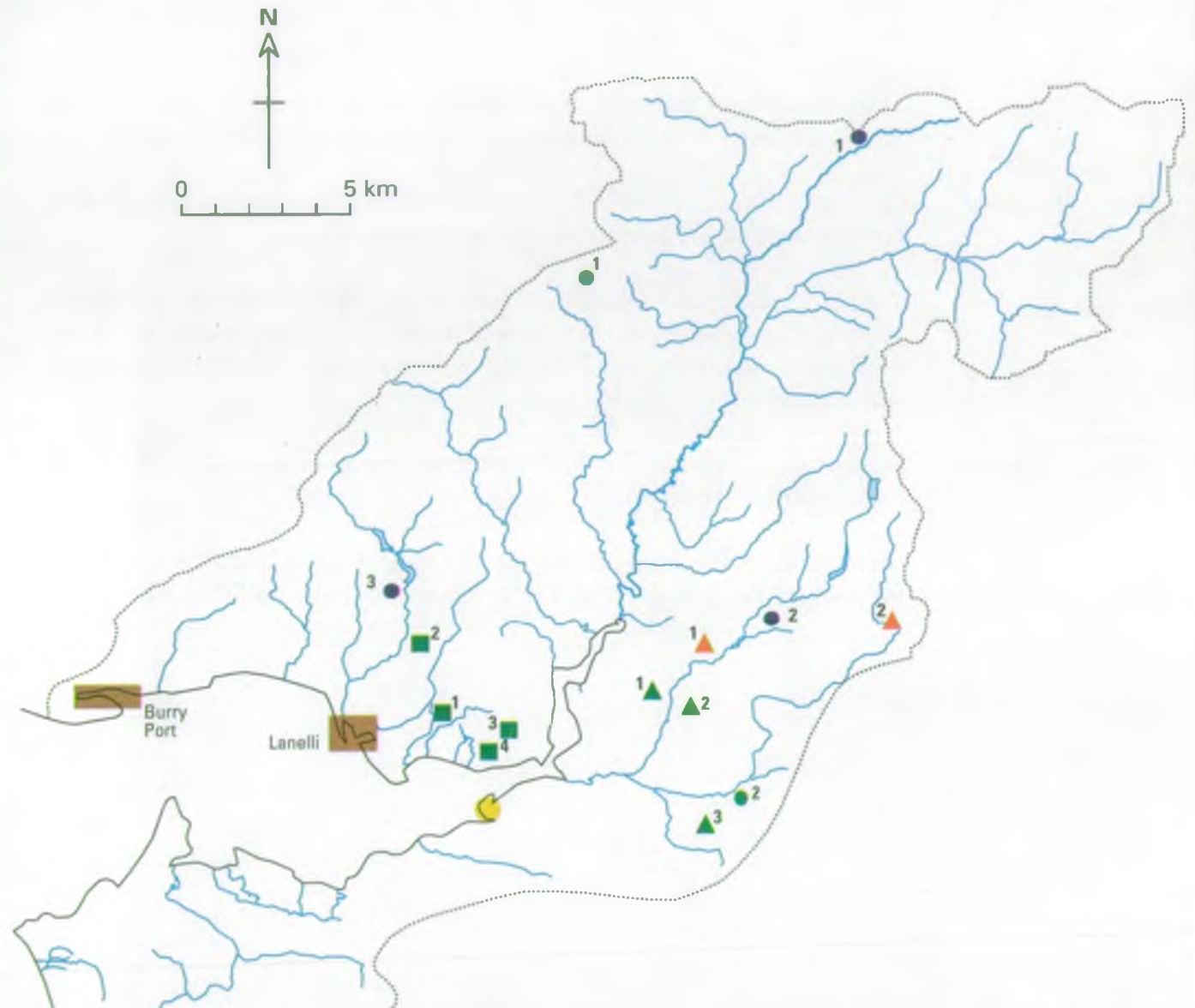
The NRA has the task of balancing the needs of the environment, with those of abstractors and other users. An abstraction licensing policy has been developed to ensure that this is carried out consistently and effectively for all new abstractions.

Physical Features No discharge of sewage from overflows should occur at sewer flows less than those specified in consents.

No reduction in the quality of the physical habitat should occur as a result of the discharge of sewage effluent or construction of the outfall works.

MAP 18 .

INDUSTRIAL EFFLUENT DISPOSAL



KEY	
-----	Catchment Boundary
—	Main River
—	Minor Tributary
■	Industry
●	Cockle Processing Discharges
▲	Fish Farms
1	Lliw Mill Trout Farm, Pontlliw
2	Maesgwyn Trout Farm, Rhydypany
■	Dock Areas
1	British Steel, Trostre (tin plate)
2	Calsonic (Llanelli Radiators) Ltd.
3	Huntsman Corporation (UK) Ltd.
4	Taybrite, Bynea
▲	Water Treatment Works
1	Bryncoch (Loughor)
2	Felindre (Lliw)
3	Felinfoel (disused 1994)
▲	Cooling Water / Site drainage
1	British Steel, Bryngwyn, Gorseinon
2	3M's Gorseinon
3	Alcoa, Waunarlwyd (Manufacturing) UK Ltd
●	Industrial Estates, Site Drainage
1	Crosshands, Llanelli
2	Fforestfach, Swansea

4.11 INDUSTRIAL EFFLUENT DISPOSAL

General Information

In many places it is necessary to dispose of liquid wastes from industry into fresh and coastal waters. However, the material discharged can be highly polluting and close control is therefore vital if the water environment is to be protected.

We use a system of 'consents to discharge' to control pollution from industrial effluents, at most sites. However, where a site is subject to Integrated Pollution Control (IPC) any discharges will be authorised by Her Majesty's Inspectorate of Pollution (HMIP), in close consultation with the NRA. Within this framework we will seek to ensure that any authorisation issued is consistent with protecting the Uses of the receiving water and also the broader commitment to the reduction of dangerous materials in the environment. Where pollution prevention measures are stated by HMIP these must also be consistent with our pollution prevention policy.

Trade effluent is discharged to sewers with the permission of the sewerage undertaker, Dŵr Cymru Welsh Water (DCWW), and is then subject to the sewage effluent treatment and disposal controls outlined in Section 4.10.

Local Perspective

There are four main industrial effluent discharges in the catchment, arising from: British Steel Trostre, Calsonic (Llanelli Radiators) Ltd, Huntsman Corporation (Llanelli Chemical Plant) and Taybrite.

The British Steel plc, Trostre tinplate works has two discharges to the tidal Dafen Pill, both controlled by discharge consents. The main discharge from the plant consists of treated final effluent and specific limits are applied within the discharge consent for dissolved iron and chromium, total chromium, free phenols and oil and grease. Historically, sludge from the treatment plant was routinely discharged to the estuary under favourable tidal conditions. This ceased in April 1993 and is now authorised only under emergency conditions. It is intended that eventually, no discharges of sludge will be permitted under any circumstances. The commissioning of a chrome recovery plant in 1986 and the ending of routine sludge discharges have substantially reduced the loadings of metals, in particular of chromium, with corresponding benefits for water and aesthetic quality in the estuary.

The discharge of effluent to the Dafen from the Calsonic site has a substantial impact on water quality, particularly in relation to levels of copper. Negotiations are continuing with the company to ensure improvements are implemented.

The Huntsman Corporation (UK) Ltd, Llanelli Chemical Plant, Bynea is authorised by HMIP for a discharge to a tributary of the Loughor Estuary.

Additional treatment methods are currently being considered. The Taybrite plant at Bynea is also authorised by HMIP and discharges via a tributary to the estuary.

Other significant industrial sites (3Ms, Alcoa and BSC Bryngwyn) have consents to discharge cooling water and site drainage, where there may be a risk of contamination of surface waters. These generally pose a less significant risk to water quality. There are also two large industrial estates/business parks at Cross Hands and Fforestfach and numerous smaller sites throughout the catchment. These can pose a risk to water quality from contaminated site drainage and there is a history of such problems.

Discharges of process water are made from cockle processing units on North Gower into tidal pills in the estuary. There are also two fish farms within the catchment that rear fish both for the table and for restocking. Most of these discharges do not currently cause any water quality problems.

Discharges of treated filter backwash water are made from the DCWW water treatment works at Bryncoch and Felindre, Swansea. Sludge from the treatment process at Felindre is disposed of to land, whilst at Bryncoch it is recovered for use in brick manufacturing.

A long history of smelting and tin-plating in the area has left a legacy of contaminated land. This presents potential risks to water quality, particularly during any redevelopment. Reclamation schemes to address some of these problems are currently in progress in and around Llanelli.

Aims

To control the discharge of liquid industrial waste to prevent pollution that would affect other Uses of the water.

Environmental Requirements:

Water Quality Discharges should comply with all conditions stated within discharge consents. This will be enforced by the NRA.

There should be no significant deterioration in the quality of waters receiving discharges, beyond that assumed when setting the discharge consent.

Water Quantity Consent conditions will be derived taking into account the upstream dilution available under average and dry weather flow conditions.

The NRA has the task of balancing the needs of the environment, with those of abstractors and other users. An abstraction licensing policy has been developed to ensure that this is carried out consistently and effectively for all new abstractions.

Physical Features No alterations should be made to the river channel which would reduce the mixing of the effluent and receiving water.

4.12 BASIC AMENITY

General Information Basic amenity relates to those activities that are principally land based but could be by their nature, attract people to the river environment. Examples include walking, picnicking and bird watching. The main areas of concern are therefore the general aesthetic acceptability of the river corridor, access and public safety.

Local Perspective Facilities for the general public are largely found in the southern parts of the catchment and along the North Gower Area of Outstanding Natural Beauty. In addition to the permanent residents, large numbers of holiday makers visit the peninsula, attracted by accessible sandy beaches and the scenic beauty.

There are facilities for birdwatchers and conservationists at the Wildfowl and Wetlands Trust reserve at Penclacwydd, which comprises of a series of protected aquatic and marshy habitats alongside the estuary, and at the Upper Lliedi Reservoir where a bird reserve has been developed.

Walkers and picnickers are catered for at several locations including the Furnace Pond, Lliw Valley and Cwm Lliedi Reservoirs near to Llanelli and the Forest Walk in the Llan Valley at Penllergaer, as well as by the network of public footpaths and bridleways. Public access to many areas of the river system is restricted due to the lack of public footpaths.

Aims To maintain the watercourse so that the public enjoyment of bankside environment is not impaired.

To provide safe and easy access to the waterside without unreasonably constraining other Uses.

Environmental Requirements:

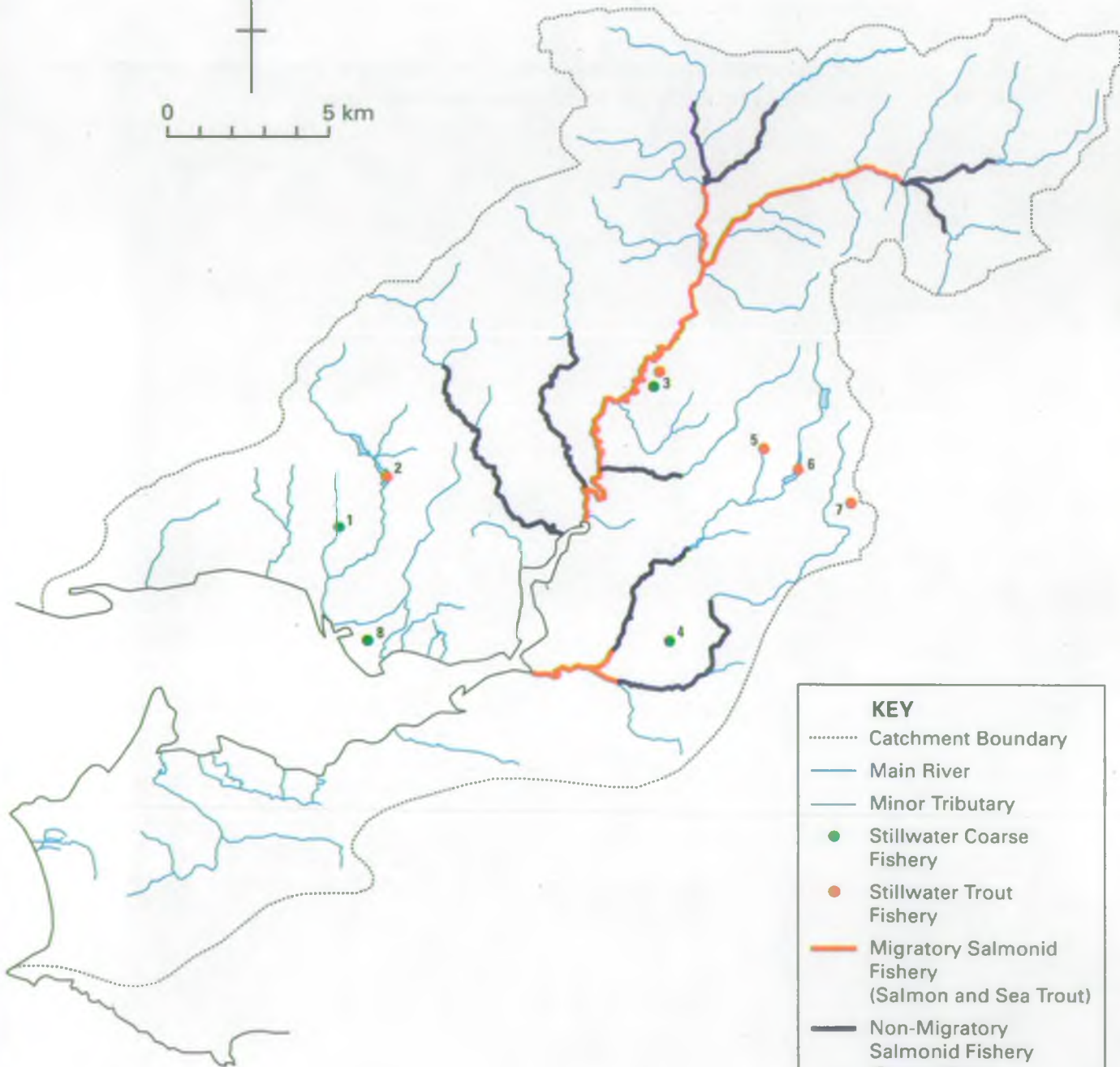
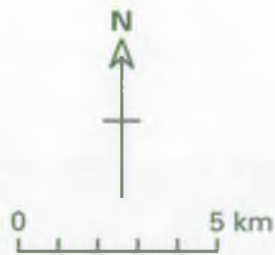
Water Quality Water quality should be maintained at a level appropriate to prevent aesthetic nuisance.

Water Quantity The NRA has the task of balancing the needs of the environment, with those of abstractors and other users. An abstraction licensing policy has been developed to ensure that this is carried out consistently and effectively for all new abstractions.

Physical Features An appropriate network of riverside paths and access points should be maintained and, where appropriate, promoted.

The development of recreational sites should be promoted at suitable locations as opportunities arise.

Development of recreational uses of the catchment should take account their potential impact on the environment and other uses.



- KEY**
- Catchment Boundary
 - Main River
 - Minor Tributary
 - Stillwater Coarse Fishery
 - Stillwater Trout Fishery
 - Migratory Salmonid Fishery (Salmon and Sea Trout)
 - Non-Migratory Salmonid Fishery (Brown Trout)
- STILLWATERS:**
- 1 Furnace Pond
 - 2 Lledi Reservoirs
 - 3 Whitesprings Fishery
 - 4 Penllergaer Pond
 - 5 Felindre Fishery
 - 6 Lliw Reservoirs
 - 7 Maesgwyn Fishery
 - 8 Machynys Pond

4.13 ANGLING

General Information

This section deals with the recreational activity of fishing with rod and line, rather than the protection of fish stocks. The latter are dealt with in the Fisheries section.

In many ways the requirements for angling are very similar to those for the basic amenity use. However, we do have formal responsibility towards angling, and issue rod licences that are a legal requirement for fishing for any freshwater fish. The income generated by licence sales contributes to fisheries management costs.

Traditionally, in Wales, game fishing for salmon and trout has been the predominant form of freshwater angling, although coarse fishing for other freshwater species is locally popular in many areas. Angling for sea fish takes place at many sites covered by Catchment Management Plans. However, we have neither control of, nor responsibility for, sea angling and it is not covered specifically.

Local Perspective

Fishing on the Loughor and its tributaries is controlled by four angling bodies:

- Pontardulais and District Angling Association,
- Ammanford and District Angling Association,
- Clwb Godre Mynydd Ddu Angling Association
- Gwaun Cae Gurwen Angling Association

The anglers fish in the early season for brown trout, stocks of which are supplemented annually by the stocking of farmed fish. Later in the season, salmon and sea trout are the main species fished for.

A similar pattern to the above occurs on the Lliw and Llan where much of the fishing is controlled by the Llangennech Angling Association.

Disturbance of the local riverine environment during engineering works can lead to discolouration of water and a subsequent loss of fishing value for local anglers.

On the lower meandering reaches of the Loughor, natural riverine erosion processes result in changes in the river course and perceived loss of land and fishing by angling clubs and riparian owners. The wishes of these groups to reduce the level of erosion has caused conflict with conservation interests who want habitats associated with a meandering river, such as ox-bow lakes and sand cliffs, to develop naturally.

Several stillwater fisheries exist which cater for both trout and coarse anglers and these include:

Whitesprings Fishery:	Trout & Coarse
Furnace, Castle & Machynys Ponds:	Coarse
Lliw Valley Reservoirs:	Trout
Cwm Lliedi Reservoirs:	Trout
Felindre Fishery:	Trout
Maesgwyn Fishery:	Trout
Penllergaer Pond:	Coarse

Aim To ensure that the water environment can sustain angling at least at its current distribution and quality.

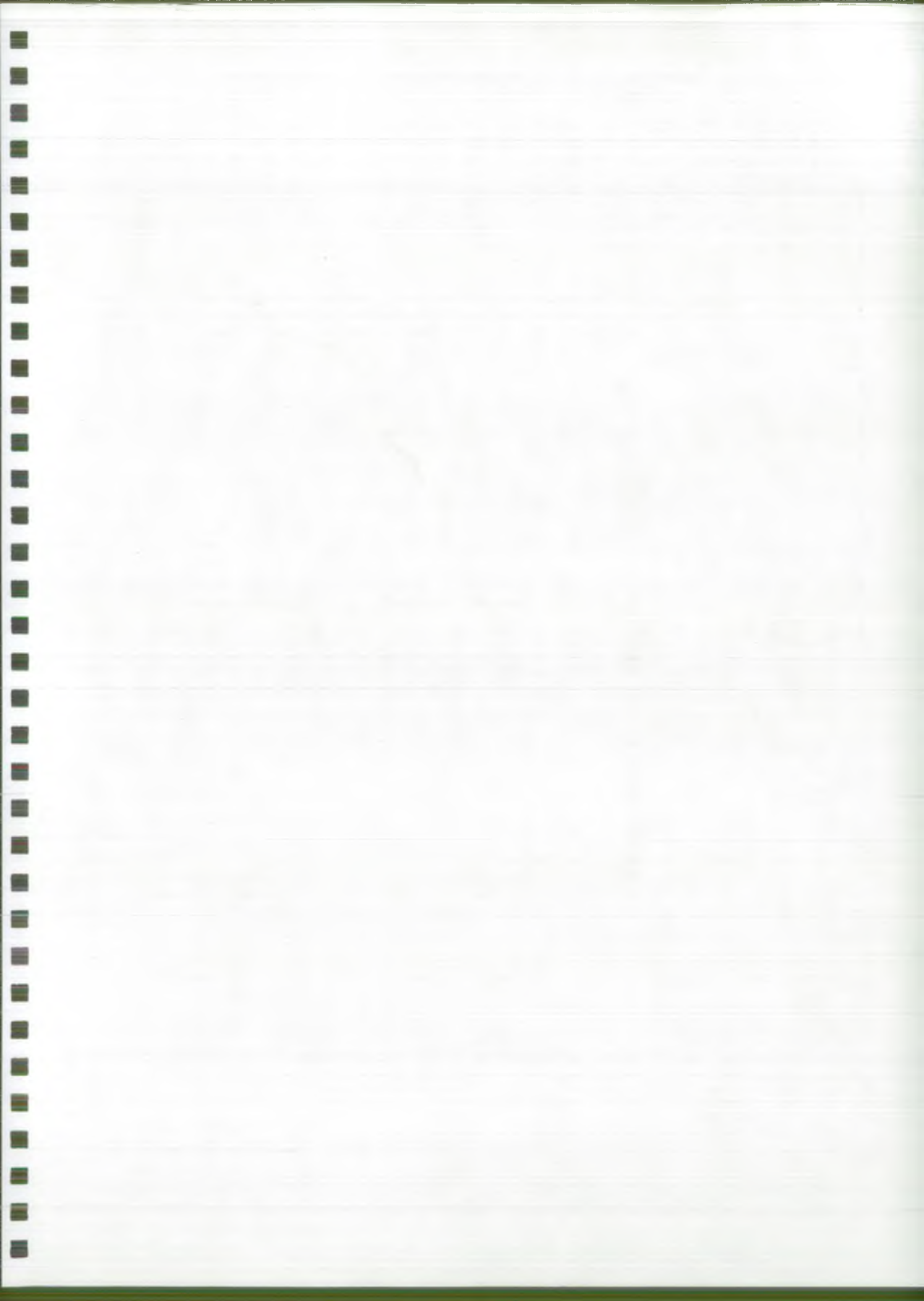
Environmental Requirements:

Water Quality Water quality should be maintained at a level appropriate to prevent aesthetic nuisance.

Water Quantity The NRA has the task of balancing the needs of the environment, with those of abstractors and other users. An abstraction licensing policy has been developed to ensure that this is carried out consistently and effectively for all new abstractions.

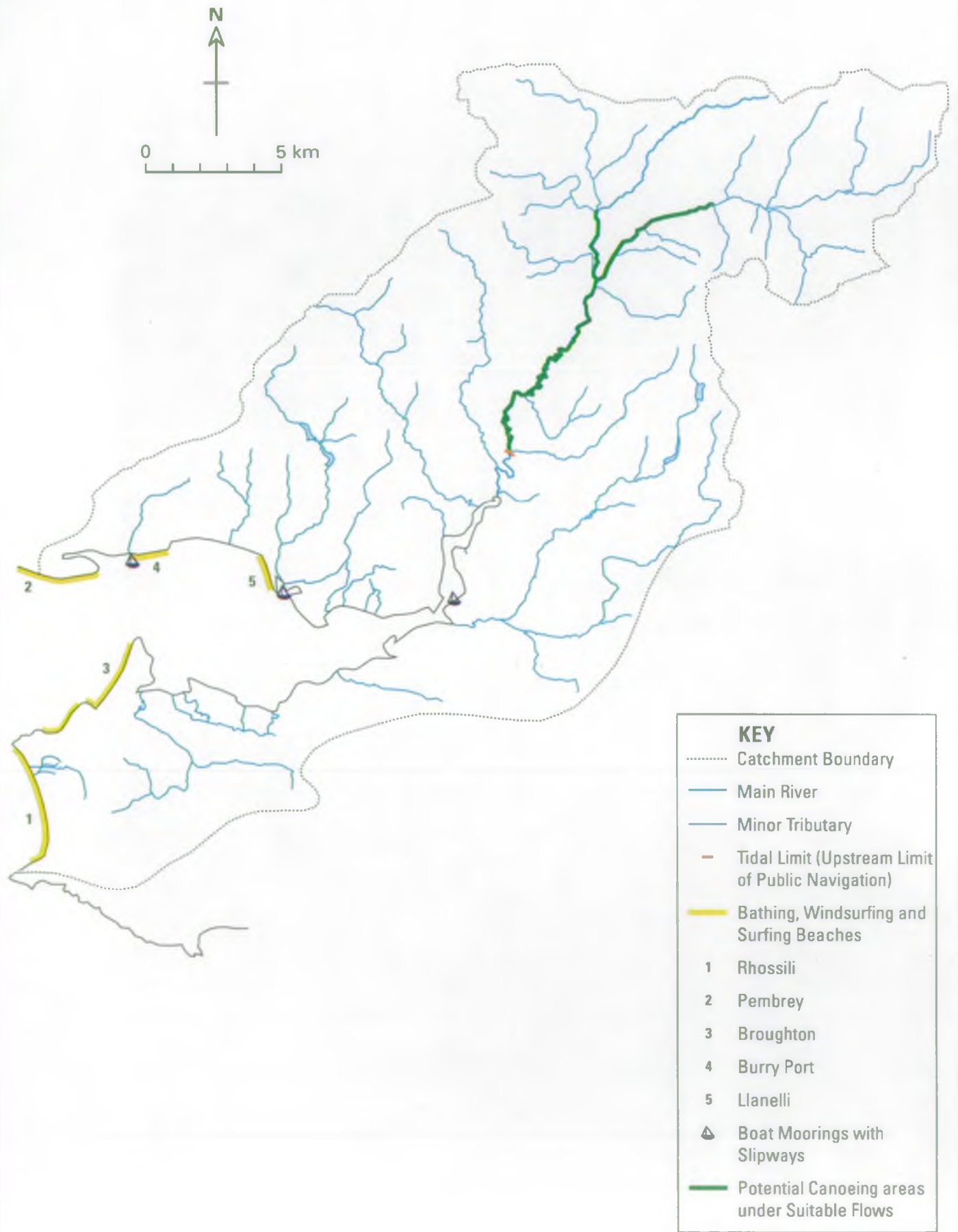
Physical Features Safe access to and from the waterside should be promoted.

The waterside features required for angling should be maintained and developed.



MAP 20.

WATER SPORTS, NAVIGATION AND BOATING



4.14 WATER SPORTS ACTIVITY

General Information Waters used for sports and recreation fall into two broad categories; Identified Bathing waters and Water Contact/Recreational Use waters. Each category is treated separately below.

It is possible that in the future this Use will be included within the proposed scheme of Water Quality Objectives being developed by the DoE.

Identified Bathing Waters To be identified by the Department of The Environment (DoE)/Welsh Office (WO) as falling within the terms of the EC Bathing Waters Directive (76/160/EEC), several criteria are taken into consideration including: high numbers of bathers, first aid facilities, life guards and toilets. Identified waters are required to achieve the standards in the EC Directive and are sampled according to the DoE/WO guidelines during the bathing season (May to September inclusive). In Wales, these are exclusively saline waters.

Water Contact/Recreational Use Waters All waters where water sports occur, other than identified bathing waters, fall into this second category. These could include rivers, stillwaters, estuaries and coastal water and may support activities such as canoeing or water skiing where total immersion is likely, or other non-immersion based recreation. Bathing may also take place. It should be noted that we do not recommend bathing in freshwaters.

Local Perspective The most popular bathing beaches are at Rhossili and Pembrey, both EC Identified Bathing Waters. Bathing also occurs at Broughton, Llanelli and Burry Port, but these beaches have not been identified as falling within the scope of the Directive; the standards applied therein do not therefore apply to these beaches.

Coastal water sports such as surfing and windsurfing take place at the major bathing areas of the Gower peninsula including Rhossili and Broughton beaches.

Access to the sea for waterskiing and jetskiing is restricted to suitable launching sites and particular tidal conditions. The main slipways are located at Burry Port Harbour, Llanelli and Loughor.

There is no public right of navigation upstream of the tidal limit on any of the rivers within the plan area and any access to the river for canoeing purposes must be agreed with both riparian owners and holders of the fishing rights. At present no such agreements exist and thus canoeing activity is restricted to the tidal areas and still waters where permitted.

Aim To ensure that the catchment is maintained to an appropriate standard to support bathing in Identified Waters, and other water sports to at least their current levels of use at existing locations.

Environmental Requirements:

Bathing in Identified Waters

Water Quality At Identified Bathing Waters, water quality should conform with the standards contained within the EC Bathing Waters Directive and the standards contained in the EC Dangerous Substances Directive.

Physical Features Promotion of safe and easy access to and from Identified Bathing Waters.

Water Contact/Recreational Use Waters

Water Quality Where marine waters are used for immersion sports, including bathing, we are guided on appropriate standards to protect public health by MAFF and local Environmental Health departments. We are unable to set bacteriological standards in CMPs for freshwaters where immersion sports or bathing take place, but waters should comply with the requirements of the EC Dangerous Substances Directive.

Water Quantity The NRA has the task of balancing the needs of the environment, with those of abstractors and other users. An abstraction licensing policy has been developed to ensure that this is carried out consistently and effectively for all new abstractions.

Physical Features To protect and, when possible, improve access to contact/recreation waters.

4.15 NAVIGATION AND BOATING

General Information

Navigation is considered to be the use of pleasure and commercial craft in waters that fall under our general control, where a right of navigation exists. This includes the maintenance of navigation aids (such as buoys, perches and marks) which are required for the safe passage of vessels.

In Wales the navigation authority is usually the local port or harbour authority who will liaise with us. However, in the Dee estuary we are the navigation authority. Elsewhere in tidal waters we have neither control over, nor responsibility for navigation.

While we are not the navigation authority for either of the two freshwater rights of navigation that exist in Wales we may under certain circumstances introduce byelaws to control navigational use of a river. We must also pay regard to the needs of those rights of navigation that do exist.

Boating is regarded as the use of boats for pleasure, rather than commercial purposes, and includes rowing, sailing and powered boats where no significant water contact is involved. Where no right of navigation exists, access to and use of the water is by formal or informal agreement of the land/fishery owners and our concern is principally for the participants' enjoyment of the activity.

Local Perspective

No public right of navigation exists upstream of the tidal limits of the rivers within the catchment.

Recreational boating in the form of sailing, angling and waterskiing takes place from Loughor Boat Club, Burry Port Harbour and Llanelli where permanent moorings exist for pleasure craft and working vessels.

The use of boats is restricted by the large tidal range resulting in limited launching and landing opportunities during high tidal states. The waters of the Burry Inlet can be particularly dangerous due to the tidal surges and shifting sand banks.

Aims

To ensure that waters in the catchment can support boating and related activities to at least their current levels of use at existing locations, provided there is no detriment to other uses.

To encourage and support canoe access agreements on the Loughor.

Ensure that works to the river channel do not prejudice these activities as far as is practicable.

Environmental Requirements:

- Water Quality** Water quality should be maintained at a level appropriate to prevent aesthetic nuisance.
- Water Quantity** The NRA has the task of balancing the needs of the environment, with those of abstractors and other users. An abstraction licensing policy has been developed to ensure that this is carried out consistently and effectively for all new abstractions.
- Physical Features** Where waters under the control of the NRA are used for navigation no obstruction to the passage of vessels should be created.
- Any maintenance of navigation channels or aids to navigation should take into account other uses of the water.
- Areas used for boating should be protected from development that would constrain this use.
- The encouragement and promotion of safe access points for boating, where appropriate.
- Features required for navigation or boating should be maintained and enhanced where appropriate. This would include adequate freeboard and freedom from obstructions.

4.16 AGRICULTURAL ACTIVITY

General Information

The processes and by-products of agriculture are a major potential threat to the water environment, especially in more intensively farmed areas. Our key areas of concern include:-

- pollution by animal and other agricultural wastes;
- contamination of groundwater and surface waters by fertilisers and other agro-chemicals;
- the effects of land drainage on water tables and water courses;
- the impact of uncontrolled stock grazing on river banks.

Where there is a specific discharge of effluent from a farm site this will be dealt with via the general discharge consenting process described in the discharge uses sections. However, the highly polluting nature of agricultural waste normally precludes this option and our approach is aimed at control at source by minimising the volumes of effluent produced and stored. Often it is background pollution caused by large numbers of diffuse discharges that causes the most significant impact and these are of greater concern to us. Consequently we have worked closely with farming organisations to develop waste handling guidelines that seek to control this type of pollution. The Authority can also enforce legal minimum standards for new silage, slurry and agricultural fuel oil installations. In key areas our programme of farm visits helps to alert farmers to potential and existing problems.

We issue codes of practice for the use of fertilisers, herbicides and pesticides, to protect the water environment and, in certain places (Nitrate Sensitive Areas), may control the application of fertilisers to protect groundwater supplies.

Farmers are encouraged to fence riverbanks to prevent uncontrolled access by stock. Cattle and sheep can severely damage riverbanks in a way that can lead to channel instability, increased flood risk and a marked reduction in the fisheries and conservation value of the river.

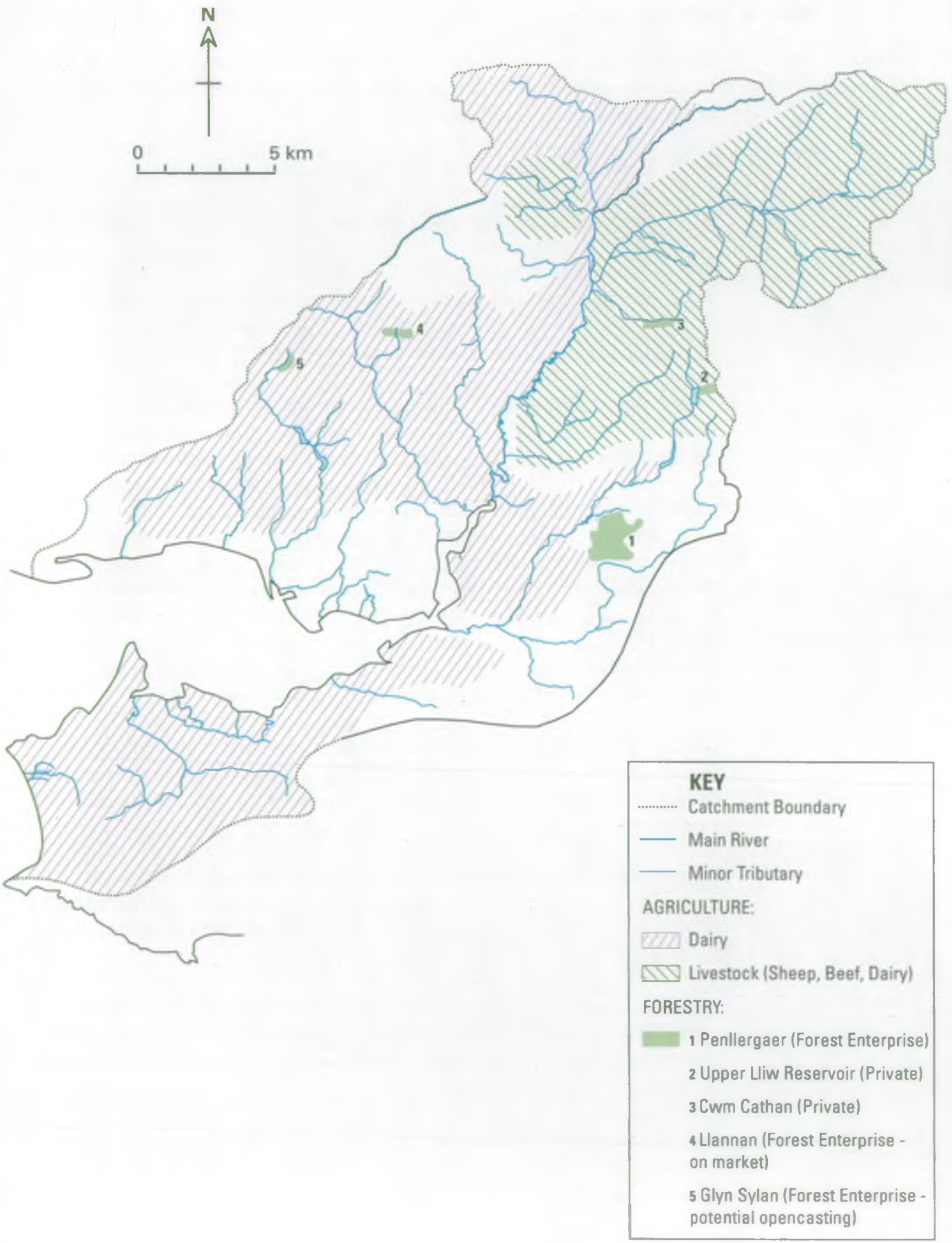
Fish farming can severely affect a watercourse by diverting a large proportion of the flow through the farm, leaving a length of the river reduced in flow. The requirement for an adequate residual flow can restrict the viability of a fish farm.

Local Perspective

Agricultural activity is widespread throughout the catchment, although generally, larger dairy units are found to the west and North Gower, with

MAP 21.

AGRICULTURE AND FORESTRY



mixed livestock farming in the east. Dairy farming presents the greatest pollution risks, generating large quantities of waste requiring safe storage and disposal. A programme of farm inspections, aimed at identifying pollution prevention measures that can be undertaken to reduce risk, has been instigated, starting in the Lliedi sub-catchment. Sheep, beef and mixed farming pose lower risks to water quality, although the use and disposal of sheep dips and other pesticides may present significant risks to surface and groundwater quality.

Agricultural land is used within the catchment for surface spreading or injection of sewage cake or sludge, as well as agricultural wastes such as slurry and manure. These activities need to be carefully monitored and controlled to protect surface and groundwater quality. There are two important groundwater source protection zones within the catchment, at the headwaters of the Loughor and an area on North Gower linked to Parkmill, South Gower. Additional restrictions apply to land application of wastes in these areas.

Aims To protect the water environment from the potential adverse effects of agricultural activity.

To protect the quality and volume of groundwater by implementing the NRA's Groundwater Protection Policy.

Environmental Requirements:

Water Quality Discharges should comply with all the conditions stated within the discharge consent. This will be enforced by the NRA.

The codes of practice for the handling and use of Pesticides, Herbicides and Fertilisers should be strictly followed.

Where applicable, the management practices set out for Nitrate Sensitive Areas should be strictly followed.

The Code of Good Agricultural Practice for the Protection of Water should be complied with, as should the Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) Regulations 1991.

Agricultural activities must be designed and managed to prevent liquid effluent from adversely affecting the quality of surface and groundwaters.

Water Quantity The NRA has the task of balancing the needs of the environment, with those of abstractors and other users. An abstraction licensing policy has been developed to ensure that this is carried out consistently and effectively for all new abstractions.

Physical Features Land drainage activity should not adversely affect the fishery and conservation value of rivers.

Agricultural processes should not lead to a reduction in the quality of physical habitats of fishery and conservation value nor increase river instability or flood risk.

4.17 FORESTRY

General Information

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

While we have duties and powers 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.

We are currently consulted on a non-statutory basis on applications for new planting under the Woodland Grant Scheme (where considered necessary by the Forestry Authority) and in relation to acid sensitive areas documented in the Forest and Water Guidelines. However, we are seeking improved national links with the Forestry Authority to achieve a consistent and effective approach to the general environmental assessment of forestry schemes and operations, including felling and restocking.

To ensure that the water environment is properly considered, we will continue to liaise with Local Authorities, the Forestry Authority and local forest managers about the production of Indicative Forest Strategies, and general forest management issues.

Local Perspective

There are a few small plantations within the catchment. Forest Enterprise own and manage two small sites in the west and Penllergaer Forest, Swansea in the east. At Penllergaer, the first phase of felling has been completed and it is unlikely that further felling will take place for 30 years. There are privately owned plantations at Cwm Cathan, Upper Lliw Reservoir and Valley Woods, south of Penllergaer on the Lliw. No water quality issues are envisaged from the management of these plantations within the life of this Plan.

The Forestry Authority has an initiative for the Aman Valley which has been identified as an area requiring landscape improvement. There is also potential for afforestation of colliery spoil and reclaimed opencast land within the catchment.

Aims

To protect the water environment from the potentially negative effects of forestry activities.

To encourage forestry practices that improve the water environment.

Environmental Requirements:

The Forests and Water Guidelines should be followed.

4.18 COMMERCIAL HARVESTING OF SEA FISH AND SHELLFISH

General Information Commercial fishing for sea fish and shellfish is controlled by a variety of laws and EC Directives. The NRA has some responsibility for each type of fishery although we often share this with others, such as Local Authorities, Sea Fisheries Committees and the Ministry of Agriculture, Fisheries and Food (Welsh Office Agriculture Department, in Wales).

Sea Fisheries Sea fisheries are regulated by local Sea Fisheries Committees who control fishing sites and methods using bylaws that are drawn-up, where appropriate, in consultation with us.

In Wales the Welsh Office monitors fish stocks and catches and is responsible for the registration of fishing vessels and enforcement of quotas.

Environmental Health Departments monitor the health and quality of fish flesh.

While we have responsibilities in some coastal waters our main concern is the protection of migrating salmon and sea trout, although in some places we have powers (by agreement with local Sea Fisheries Committees) to enforce the protection of bass stocks in coastal waters.

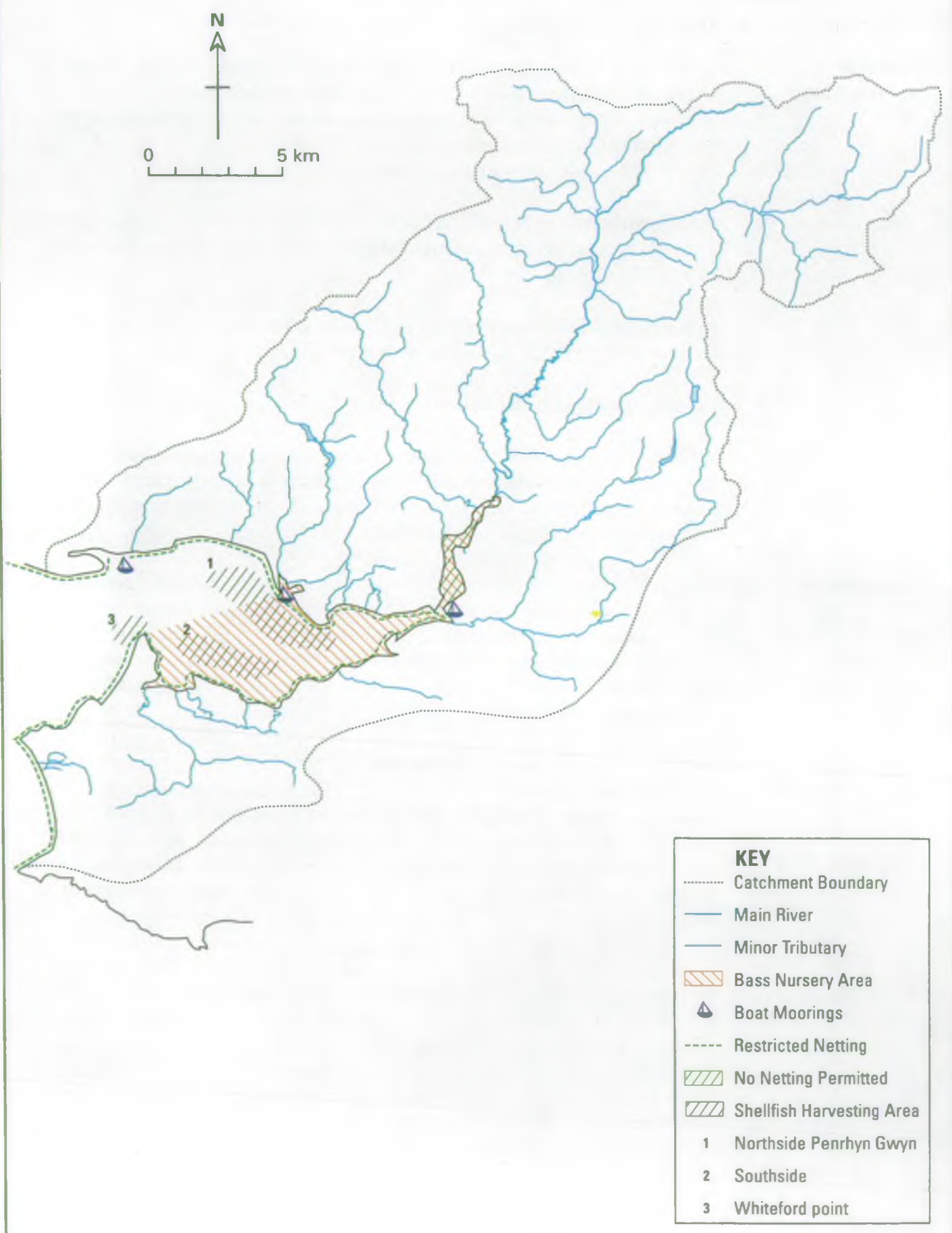
Shellfisheries Like sea fisheries, shellfisheries (not including crabs, lobsters and other crustacea) are regulated by several different authorities, including the NRA. The shellfish are protected by the provisions of the EC Shellfish Waters Directive that allows us to protect and monitor water quality in designated shellfisheries. However, the Menai Strait is the only commercial shellfishery in Wales that has been designated under this Directive.

Shellfish are known to concentrate materials such as toxic algae, metals and pathogenic bacteria which can be harmful to people who eat them. Thus the quality of shellfish harvested for sale for human consumption is protected by the EC Shellfish Hygiene Directive that is administered by environmental health departments and MAFF (Welsh Office Agriculture Department, in Wales). So far about 30 sites in Wales have been designated under this directive.

Local Perspective The historic shellfish industry within the Burry Inlet is one of the most important in the UK, with many people being employed in harvesting activities alone. The exploitation of stocks is controlled by the South Wales Sea Fisheries Committee who issue licences and quotas for the cockle collection. Commercial exploitation occurs on the following beds: Northside Penrhyn Gwyn, Southside and Whiteford Point. The business involves the collection of shellfish (cockles and mussels) by rakers, the cleaning and processing of the

MAP 22.

SEA FISHERY



- KEY**
- Catchment Boundary
 - Main River
 - Minor Tributary
 - ▨ Bass Nursery Area
 - ▲ Boat Moorings
 - - - - Restricted Netting
 - ▨ No Netting Permitted
 - ▨ Shellfish Harvesting Area
 - 1 Northside Penrhyn Gwyn
 - 2 Southside
 - 3 Whiteford point

fish in nearby washeries and the marketing both locally and further afield.

Immature mussels were recently transferred from the Inlet to the Wash in East Anglia in order to develop depleted stocks in that area.

No commercial salmon and trout fishery exists within the plan area and the netting for sea fish is restricted by NRA and South Wales Sea Fisheries Committee (SWSFC) byelaws. These byelaws are aimed at enabling the legitimate harvesting of sea fish species whilst maintaining protection for migrating salmon and sea trout.

The main sea fish sought by inshore operating boats are bass with large numbers being caught on rod and line as opposed to the more traditional method of netting. The Burry Inlet has been designated by MAFF as a bass nursery area in order to protect stocks and for this reason, boat fishing for bass is seasonally restricted and a minimum size limit applied (36cm).

Aims

To maintain and where possible enhance, marine and shellfisheries.

To protect migrating salmon and sea trout from interference by marine fishing activities.

Environmental Requirements:

Marine Fisheries

Water Quality

Discharges to coastal waters should be controlled to meet the requirements of the EC Dangerous Substances Directive.

Physical Features

Marine fishing activities should not interfere with the migration of salmon or sea trout.

The physical marine environment should not be altered in a manner that would affect migratory fish stocks.

To enforce statutory measures that protect bass and other sea fish stocks, where appropriate.

Shellfisheries

Water Quality

Discharges to coastal waters should be controlled to meet the requirements of the EC Dangerous Substances Directive.

Water quality at shellfisheries designated under the EC Shellfish Waters Directive should comply with the appropriate standards. The Shellfish Hygiene Directive has no associated target classes and therefore no Environmental Requirements can be set.

Where a recognised commercial shellfishery has not been officially designated under the EC Shellfish Waters Directive, we will, for the purpose of setting informal targets for Catchment Management Plans, be guided by the provisions of that directive.

Water Quantity

The NRA has the task of balancing the needs of the environment, with those of abstractors and other users. An abstraction licensing policy has been developed to ensure that this is carried out consistently and effectively for all new abstractions.

4.19 FISH FARMING

General Information

Fish farming has especially close links with the water environment and requires large volumes of clean water that are later discharged as effluent. Consequently, there is a large potential for adverse environmental impact. Thus all fish farms must be registered with the Welsh Office and we issue licences to abstract and consents to discharge effluent for freshwater fish farms (marine farms may require a consent to discharge, depending upon circumstances). Careful management of fish farms is required by all involved to control the impact and our particular concern is to prevent the spread of disease, alien species or strains of fish to wild stocks and to maintain free passage for upstream and downstream migrating wild fish.

Fish farming can severely affect a watercourse by diverting a large proportion of the flow through the farm, leaving a length of the river reduced in flow. This requirement for an adequate residual flow can be a factor that restricts the viability of a fish farm at some locations.

Local Perspective

Trout farms are sited at Pontlliw (Lliw Mill) and Rhyd-y-Pandy (Maesgwyn)

Three of the stillwater trout fisheries, namely Maesgwyn, Felindre and Whitesprings have 'growing on' facilities in order to produce large fish to satisfy angler demand.

Aims

To control fish farming activity to protect wild fish stocks and other uses of the water environment.

To manage the quality and volume of watercourses so as to safeguard licensed and exempt abstractions and the environment. This includes the active enforcement of abstractions.

The NRA will encourage abstractions to be made as far downstream in a river as possible and discharges to be made as close to the point of abstraction as is practicable.

Environmental Requirements:

Water Quality Discharges should comply with all conditions stated within the discharge consent. This will be enforced by the NRA.

There should be no significant deterioration in the quality of waters receiving discharges, beyond that assumed when setting the discharge consent.

Water Quantity The NRA has the task of balancing the needs of the environment, with those of abstractors and other users. An abstraction licensing policy has been developed to ensure that this is carried out consistently and effectively for all new abstractions.

All conditions stated on the abstraction licence must be complied with; this will be enforced by the NRA.

Physical Features That suitable provision should be made to prevent the escape of stock to the wild and the trapping of wild stock within the farm. Where appropriate this will be enforced by the NRA. Similarly provision should be made to prevent the spread of diseases and alien species.

4.20 MINERAL EXTRACTION

General Information

Mineral extraction can affect surface and groundwaters in a wide variety of ways. Discharges from active quarries and mines can contain toxic and suspended materials that are harmful to aquatic life and are subject to the normal discharge consenting procedure described in the Discharge Uses section. However, discharges from abandoned mines are not adequately controlled by the law and may cause locally severe problems.

The exploitation of minerals can have major impact on water resources by altering groundwater flows and hence affecting streamflows. The removal of material from above the water table reduces the opportunity for natural filtering and attenuation of pollutants, which will consequently enter groundwater more readily. Summer springflows can be reduced as a result of the loss of the water storage capacity of the mineral that has been removed. Reclamation with impermeable materials will increase run-off and reduce the recharge of groundwaters by rainfall.

Open cast mining can be of particular concern to us. These mines can also affect the fishery and conservation value of long lengths of diverted river as well as groundwater quality and quantity.

Gravel extraction may take place from the river channel or floodplains and is controlled by planning law, but may also require a land drainage consent from the NRA. If works are not properly managed, the river channel can be seriously damaged by gravel removal.

In some areas land reclamation schemes may cause renewed problems as toxic metals are exposed or fine solids run off into watercourses. Consequently, we license and monitor such discharges.

All mineral workings are subject to general planning control and we are consultees on such applications and consider each application on a case by case basis.

Local Perspective

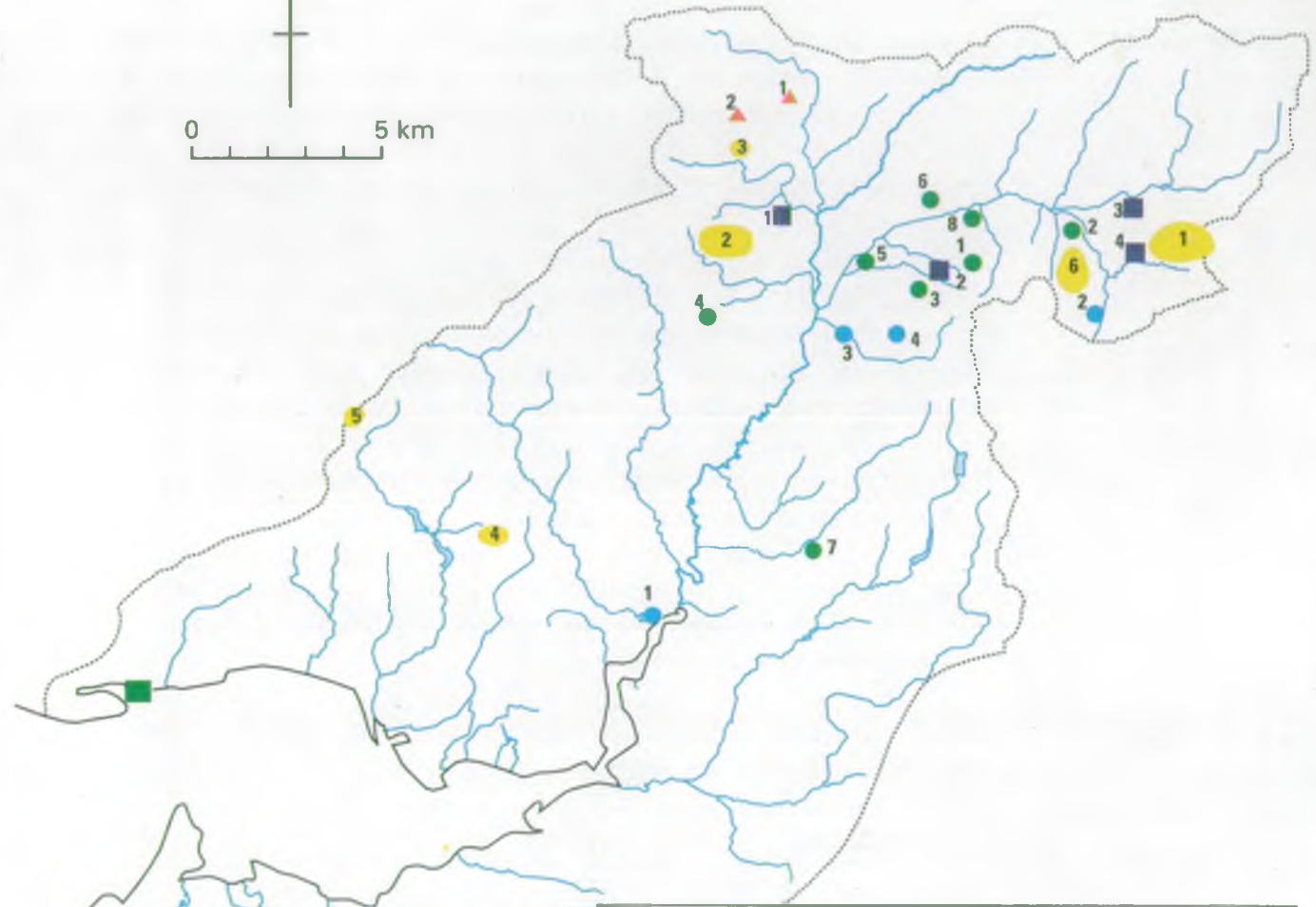
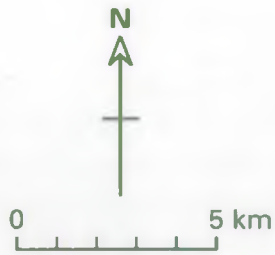
Coal

The middle to upper reaches of the catchment lie within the South Wales Coalfield which has been actively mined for over 300 years. There are a number of active, private deep mines and washeries within the catchment, mainly located in the Aman Valley. Discharges of treated minewater and site drainage from these sites are controlled by discharge consents.

Opencast coal extraction gathered pace in the mid 1970's and sites are currently being worked at East Pit, Brynamman and Gilfach Iago, Saron. A

MAP 23.

MINERAL EXTRACTION



.....	Catchment Boundary	■	Washeries:
—	Main River	1	Penllwynhelyg
—	Minor Tributary	2	Glyncywarch
■	Opencast Sites:	3	Forge
1	East Pit	4	Gwaun-Cae-Gurwen
2	Gilfach Iago	●	Significant Abandoned Mines:
3	Tir Dafydd - Proposed	1	Brynlliw (Morlais)
4	Porth Dafen - Proposed	2	Gors
5	Cyn Heidre - Proposed Reclamation	3	Tan-Y-Garn
6	Garnant-Reclamation	4	Blaenant Cadno
●	Collieries:	▲	Quarries:
1	Waunhir	1	Cilyrhychen Limestone
2	Blaengrenig	2	Allt-Y-Garn Silica
3	Llwyn-Yr-Onen	■	Llanelli Sand Dredging
4	Lindsay		
5	Betws		
6	Abernant		
7	Craig Merthyr		
8	Ystrad		

proposed development at Tir Dafydd, Llandybie is currently subject to a planning appeal. Consideration is being given to a proposal for opencasting at Porth Dafen, Llanelli.

A reclamation scheme is nearing completion at Garnant. Dinefwr Borough Council is developing a golf course and amenity area on part of the site. Proposals for reclamation of Cyn Heidre, Pontyates include opening a small drift mine, which may lead to a requirement for a discharge to the Lledi. A washery tip at Tir-y-dail has been left in a state of partial reclamation, following the bankruptcy of the development company.

Acidic drainage from abandoned mine workings occurs throughout the catchment. Minewater from Brynlliw Colliery, Llangennech, abandoned in the early 1980's, receives very low (1:1) dilution during dry weather, resulting in an impact on water quality and fisheries for 1 km of the Morlais downstream to the confluence with the Loughor. Drainage from former collieries, such as Graig Merthyr, Pontardulais, may contribute to this discharge. Small streams, such as the Cathan, Garnswllt and the Nant Gors, Cwm Gors also receive discharges which have followed mine closures.

Other Minerals

There is a large limestone quarry at Cilyrhychen, Llandybie from which a discharge of site drainage occurs to the Marlais. Silica quarrying has recently taken place, and may resume, at Allt-y-garn Quarry, also near Llandybie. This site may discharge to the Gwenlais or the Lash. Sand is dredged from the estuary at Burry Port.

Aims

To ensure that mineral extraction and associated activity, including land reclamation, does not adversely affect the water environment.

To protect the quality and volume of groundwaters by implementing the NRA's Groundwater Protection Policy.

Environmental Requirements:

Water Quality All consented discharges must comply with the conditions stated within the consent. This will be enforced by the NRA.

There should be no significant deterioration in the quality of waters receiving discharges beyond that assumed when setting the discharge consent.

Measures must be taken to prevent diffuse pollution that may arise from rainfall run-off.

Water Quantity Mineral working and land reclamation should not have an adverse effect on surface and groundwater resources or the rights of licensed water abstractors.

Physical Features Mineral working, land reclamation and associated activity should not reduce the quality of the physical habitats available in the water environment.

The aesthetic quality of restored landscapes should be in keeping with the overall nature of the catchment and reflect the local needs for amenity and recreation.

5.0 CATCHMENT TARGETS

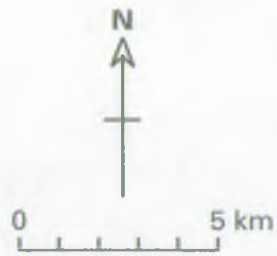
In this section we set targets for:-

- Water Quality
- Water Quantity
- Physical Features

These targets reflect the needs of the Uses identified for any area of the catchment and are set using the guiding principles of:-

- Sustainable development
- Environmental capacity

MAP 24. WATER QUALITY TARGETS - RIVER ECOSYSTEM



KEY

- Catchment Boundary
- INTERIM OBJECTIVES**
- RIVER ECOSYSTEM CLASS:**
- 1 (thick dark blue line)
- 2 (bright blue line)
- 3 (green line)
- Unclassified (thin black line)

5.1 WATER QUALITY TARGETS

General

Section 4 of this report identified the many Uses to which the Loughor catchment is put, and the appropriate water quality requirements of each Use. These requirements provide the basis for setting targets to ensure the protection of legitimate Uses.

Targets are commonly derived from water quality standards contained in relevant EC Directives such as those concerning Dangerous Substances, Freshwater Fisheries and Bathing Waters. These targets are applied on a statutory basis in certain parts of the catchment. Elsewhere we may informally apply standards contained within appropriate EC Directive to provide planning targets for the protection of legitimate Uses.

SWQOs

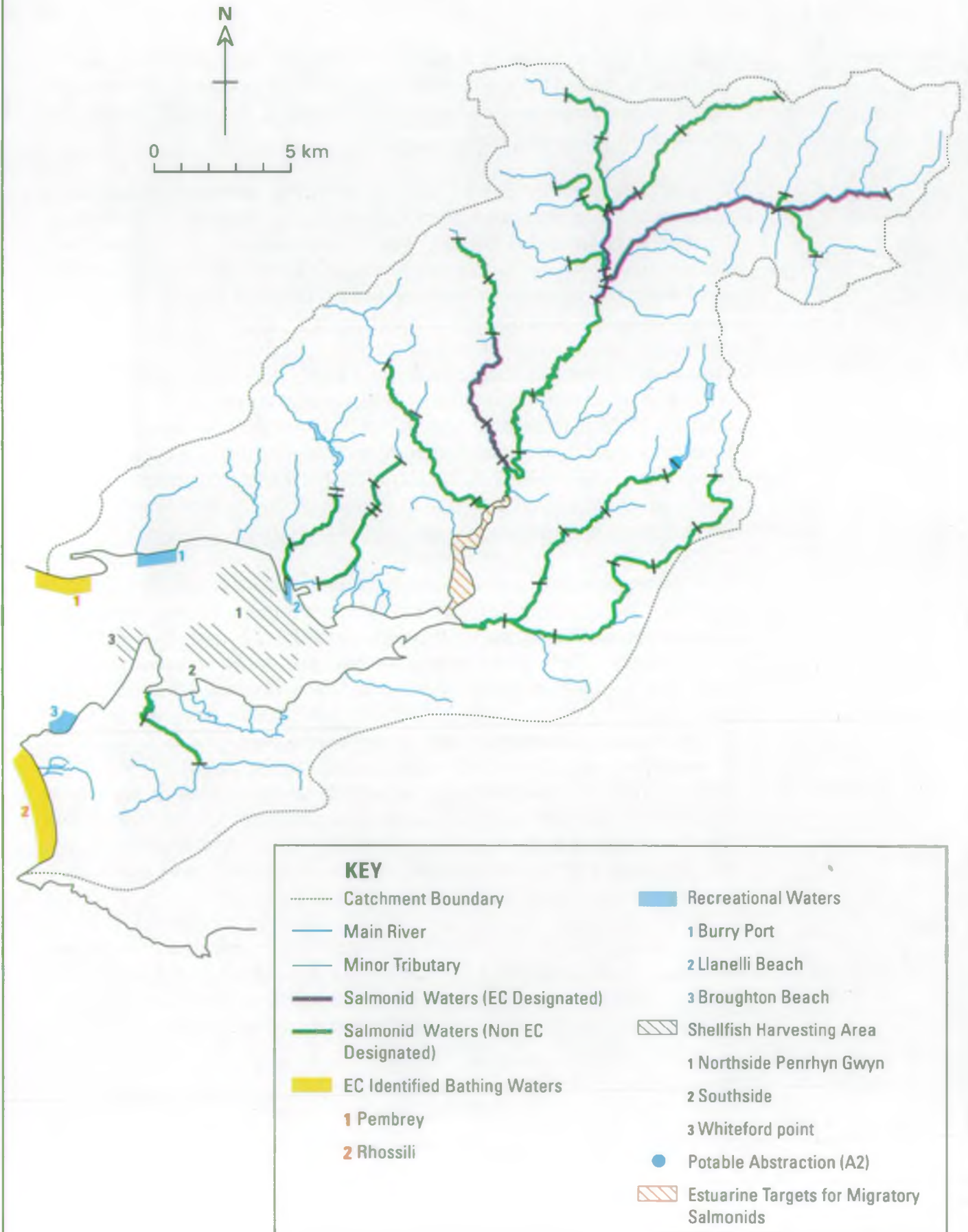
Provision for setting Statutory Water Quality Objectives (SWQOs) in controlled waters was made under the Water Resources Act (1991). The scheme is based on recognised Uses to which a river may be put and includes River Ecosystem, Potable Abstraction, Agricultural/Industrial Abstraction and Watersports. At present only standards for the River Ecosystem Use have been formally developed and were introduced by the Surface Waters (River Ecosystem) (Classification) Regulations 1994.

The Government is currently conducting a pilot implementation of SWQOs following which it is hoped they will be applied more widely. Until then objectives proposed using the River Ecosystem (RE) scheme in this CMP will remain informal. They will however, form the basis of our approach to water quality management (replacing the National Water Council scheme). In this CMP we propose two RE objectives for each river stretch. The first, or long-term objective, represents our aspiration for water quality. Attaining this level of quality may not always be possible during the lifespan of a CMP (5-10 years) therefore we also propose a second RE objective. This reflects what improvements in water quality are achievable during the CMP's lifespan and therefore represents an interim objective which will be reviewed periodically. It is these interim objectives which will be given a statutory basis when and if implementation of the SWQO scheme proceeds.

Where Uses are not supported by formal water quality standards we may set informal targets to protect a particular Use. These then provide additional water quality planning targets. Such standards have been developed for example to protect migratory salmonid fish in estuarine waters.

MAP 25.

WATER QUALITY TARGETS - GENERAL



KEY

----- Catchment Boundary

— Main River

— Minor Tributary

— Salmonid Waters (EC Designated)

— Salmonid Waters (Non EC Designated)

■ EC Identified Bathing Waters

1 Pembrey

2 Rhossili

■ Recreational Waters

1 Burry Port

2 Llanelli Beach

3 Broughton Beach

▨ Shellfish Harvesting Area

1 Northside Penrhyn Gwyn

2 Southside

3 Whiteford point

● Potable Abstraction (A2)

▨ Estuarine Targets for Migratory Salmonids

Local Perspective The catchment allows for a wide range of uses with water quality requirements and the following targets have been set for the catchment in order to support these uses.

Long Term River Quality Objectives (LTRQO's) of RE Class 1 and RE Class 2 are proposed for the classified river length of the Loughor catchment. This reflects our intention that the catchment should be capable of supporting a healthy river ecosystem and a thriving salmonid fish population. The exception to this is in the lower stretches of the Dafen. Here, a LTRQO of RE Class 3 will be set.

In addition to the above targets, standards specified in the EC Freshwater Fish Directive (78/659/EEC) have been set as targets for the main Loughor, the Aman and the Gwili, all of which are EC designated fisheries. Most of the catchment, including the Llan, Lliw and the Morlais, is also capable of supporting a healthy salmonid fishery and although not formally designated under the EC Freshwater Fish Directive, the standards therein have been set as informal targets for these rivers. In order to protect the migration of salmonid fish, water quality standards, derived from NRA policy, will be applied to the upper estuary between the Loughor road bridge and Pontardulais road bridge.

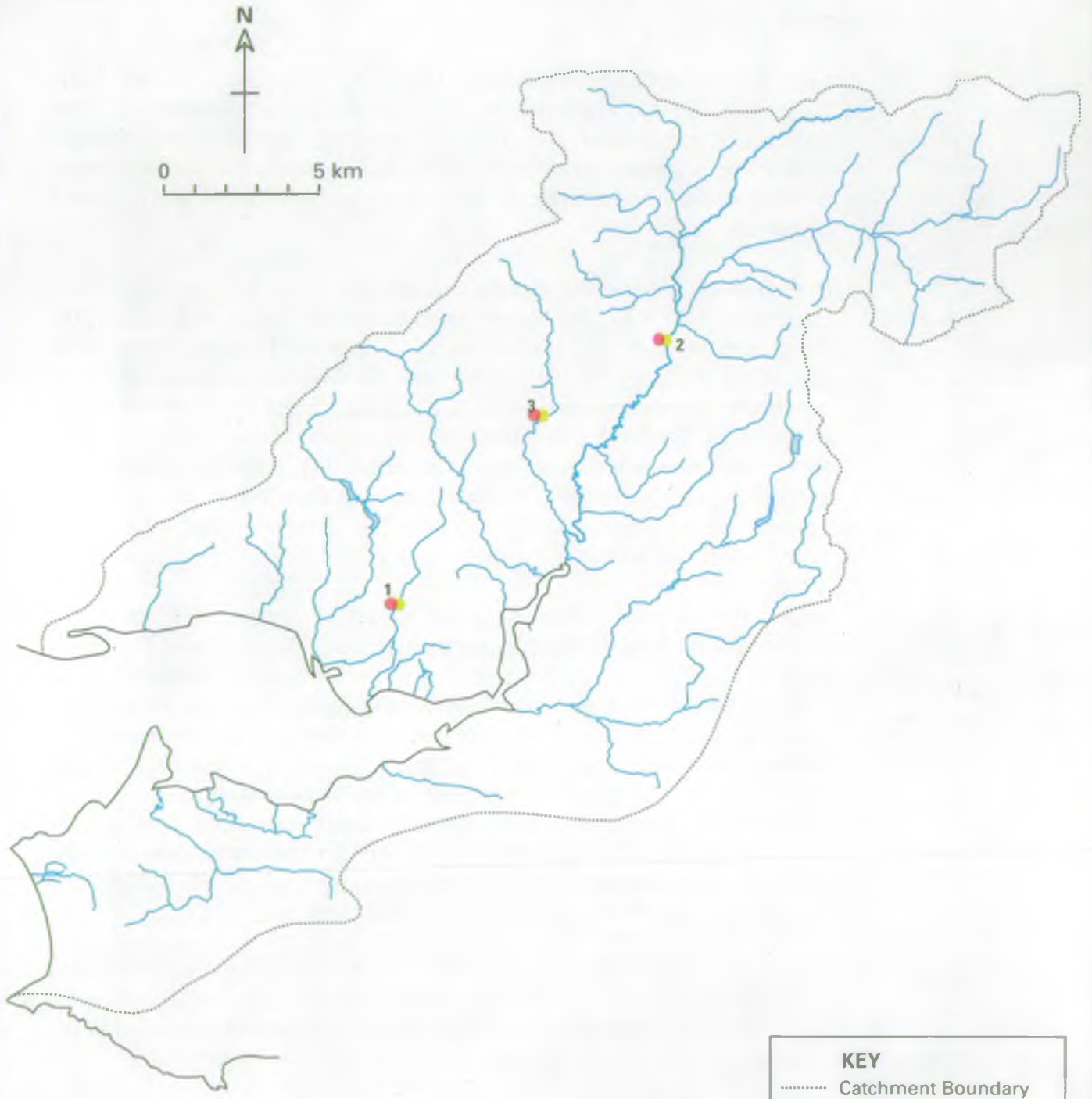
Raw water for public drinking water supply is abstracted from supply reservoirs at the head of the Lliw, for treatment at Felindre Water Treatment Works. These reservoirs receive surface water which is abstracted from the Twyi at Nantgaredig, near Carmarthen, and pumped to the Lower Lliw reservoir. The quality required of surface water intended for the abstraction of drinking water is defined by the EC Surface Waters Directive (75/440/EEC). Abstractions are classed A1 to A3 depending on the level of treatment required to achieve drinking water quality standards. Treatment to the level A2 (defined by the Directive) is required for the abstractions from the Loughor catchment and water abstracted from the Tywi at Nantgaredig and subsequently transferred to the Loughor catchment.

There are no shellfisheries designated under the EC Shellfish Waters Directive (79/923/EEC). However, in recognition of the level of commercial exploitation of shellfisheries within the estuary, the standards contained in this Directive will be applied informally as targets to be achieved.

Rhossili and Pembrey are identified beaches under the EC Bathing Waters Directive (76/160/EEC) and the quality standards stated therein are set as targets. Considerable bathing and water sports activity takes place at Llanelli and Burry Port. Although neither beach is an EC identified beach, the water quality standards in the Directive are to be applied informally for the purposes of this plan.

MAP 26.

WATER QUANTITY TARGETS



KEY		
.....	Catchment Boundary	
—	Main River	
—	Minor Tributary	
●	Water Quantity Targets	
NATURALISED 95 PERCENTILE FLOW		
1	Dafen	1.64
2	Loughor	0.86
3	Gwili	0.12
Megalitres per day		

5.2 WATER QUANTITY TARGETS

General

The implementation of the Water Resources Act 1963 required almost all types of abstraction to be authorised by a licence. Pre-existing abstractions had to be granted a Licence of Right in 1965 that reflected the historical abstraction regime and could not take into account its impact. Subsequently, licences have been granted only if they do not adversely affect existing abstractors and the environment, or if conditions can be imposed which restrict their impact.

We take a precautionary approach to the granting of new licences, and will only grant them if we are confident that the available resources are able to sustain the proposed abstraction in the long term without harm to the environment or existing abstractors. We also regularly monitor the compliance of abstractors with licence conditions and enforce them as necessary.

We will adopt an abstraction licensing policy that will allow us to consider, in a structured way, the environmental needs of the river system and to balance these with the needs of abstractors. The policy will permit a review of the volume of existing abstractions in the catchment.

A methodology for the assessment and prioritisation of rivers that suffer artificially reduced flows is already in use. In Welsh Region we will use Catchment Management Plans to assist this process.

We will seek to balance the needs of existing and potential abstractors with those of the environment.

We have powers to limit abstraction and take other conservation measures in periods of drought.

Flow Requirements

To prosper, the natural river ecosystem requires a certain flow, minimum flow or pattern of flows. While research towards identifying these specific needs is underway, an interim minimum flow has been set. On most rivers this is equivalent to the flow that would, on average, be exceeded for 95% of the time (Q95). Although new abstractions would not generally be permitted to cause flows to drop below this level, rivers will naturally fall below it, from time to time.

Water Level Requirements

At some designated wetland conservation sites we will agree Water Level Management Plans with the Countryside Council for Wales, to manage water levels to meet the needs of the protected ecosystem.

Local Perspective

The Lliw reservoirs and Felindre Water Treatment Works are key components of the potable water supply system for the catchment and the heavily populated areas to the east. Tywi water, abstracted at Nantgaredig, is transferred into the catchment and any increased demand is likely to be met through this or other water from outside as the Lliw and Llygad Llchwyr sources are both heavily utilised in relation to their licensed quantities. The Lliedi reservoirs are used for raw water supply, principally to British Steels Trostre Works. Each of these licensed supplies is protected by the Water Resources Act 1991, making issuing of further licences for net abstractions within their catchments unlikely without the agreement of Dŵr Cymru Welsh Water. We should not issue a licence that would affect an existing water user without that user's agreement.

Water quality problems identified in the catchment make it especially important that water quantity available for the dilution of existing effluent is protected, particularly during dry weather. Specific sites where flows should be protected are:

- the Dafen on the outskirts of Llanelli
- the Loughor upstream of Garnswllt STW
- the Gwili at Pont Abraham.

Despite the decline in the mining industry there is still interest in mineral winning in the catchment. Opencast working often entails pumping of groundwater to render sites workable. This type of abstraction is not licensable under the Water Resources Act, although we seek to regulate it via consultation with the planning authorities. Although the water is not lost from the catchment this dewatering can have significant effects on groundwater levels locally if unregulated. Our target is to maintain existing levels of source availability to users and water features whilst the work is in progress and after reinstatement.

A policy for assessing in-river needs for watercourses within this catchment is being developed and should be implemented during the life of this plan. Prior to its implementation the natural 95 percentile flows have been calculated to give an indication of the flows that should be targets for protection when considering abstraction licence applications.

MAP 27.

FLOOD DEFENCE TARGETS



5.3 PHYSICAL FEATURES TARGETS

General

Many Uses are affected by the physical characteristics or features of the river and this is especially true of Uses related to wildlife and its conservation. The habitat requirements of the wildlife associated with rivers are too complex to allow simple targets to be set, even if such habitats could be effectively measured. Consequently until such a time as quantitative physical targets can be set, Catchment Plans will adopt the general theme that the abundance and diversity of physical features typical of the type of river, should be maintained and where possible, improved. This requires subjective assessment by trained staff. To assist this assessment we are developing a habitat classification system and use related targets for physical features such as spawning and nursery sites for fish.

In a similar manner the physical features requirements of recreational Uses of waters cannot yet be quantified in order to set firm targets, again professional judgement must be used.

Flood Defence targets nearly all relate to physical features and the requirement for the river channel to contain certain specified flows at different points in its length.

Local Perspective

There are many Uses in the catchment which have their own physical features requirements. The following requirements are considered targets for the Loughor catchment:

Flood Defence

Flood Protection

Where economically, technically and environmentally justifiable, the NRA will aim to maintain or improve in a cost effective manner, designated "Main Rivers" to standards of service (SoS) which accord with the following Land Use bands:

CATCHMENT TARGETS

Land Use Band	Typical Description of Reach	Reference SoS - Flood Return Period (Years)	
		Fluvial	Tidal
A	Contains residential and non-residential properties distributed over a significant proportion of its length. Amenity uses may be prominent.	50-100	100-200
B	Reaches containing residential and non-residential property over some or all of the reach length but at lower density than Band A. Intensive agriculture may be present.	25-100	50-200
C	Isolated rural communities at risk with limited number of residential properties. Agricultural interests will be more apparent than in band A and B.	5-50	10-100
D	Isolated properties at risk. Agricultural use will probably be the main use with arable farming a feature.	1-10	2.5-20
E	Very few properties at risk. Agricultural use will be predominant with extensive grass land the main feature.	<2.5	<5
X	No recorded areas at risk of flooding.		

Note: The above standards of service table does not imply an entitlement to the provision of this or any standard but is indicative of the standards considered reasonable for the land use defined.

Water Level Management Plans will be prepared for all sites agreed with the Countryside Council for Wales (CCW).

Regulation and Enforcement

The NRA, in its role as statutory consultee under the planning legislation and by use of its consenting powers under the Water Resources Act (1991) and Land Drainage Act (1994), will:

- Ensure provision of suitable access for maintenance of river/channel and sea/tidal flood defence and for the construction of new defences by the limitation of development within 7 m of the top of the river bank (use of byelaws and planning laws).
- Ensure that obstructions to flow do not result in an increased flood risk (consent under WRA 1991 and LDA 1994).

CATCHMENT TARGETS

- Ensure development on the flood plain is identified and encourage planning authorities to use the planning process to guide development away from these areas (section 105 (2) survey and W.O. Circular 68/92).
- Ensure that there is no increase in flood risk to existing properties as a result of further development either remote/or adjacent to existing development (catchment planning to manage flows and/or loss of flood plain storage).

Flood Warning

Where flood warning schemes are in place, the NRA will aim to provide a two hour warning of commencement of flooding.

Fisheries

Through our operational, regulatory and advisory activities, and particularly in our role as a statutory consultee to the Local Planning Authorities, we will endeavour to ensure that there is:

- suitable habitat for fish breeding with an adequate distribution of potential redd sites and nursery areas.
- unimpeded access for migratory fish through the estuary and river to and from all potential spawning reaches (where appropriate), with adequate holding pools and cover throughout the catchment.
- effective fish screening on all abstractions and discharges (where necessary) to protect wild fish stocks and prevent escapement from fish farms.

Our intention to set specific targets relating to fish stocks and spawning success was recently announced in our published Fisheries Strategy . We will use the results of continuing fisheries monitoring surveys in the catchment to help in the determination of these targets, as well as data collected from rod and net catch returns.

Conservation

Our developmental national habitat classification scheme, together with the results from the ongoing River Corridor Surveys, will assist in setting specific targets for conservation.

Through our operational, regulatory and advisory activities, and particularly in our role as a statutory consultee to the Local Planning Authorities, we will endeavour to ensure that:

CATCHMENT TARGETS

- the current diversity of natural features such as bankside features, wetlands, emergent vegetation, meanders, pools and riffles are maintained in order to conserve river corridors and safeguard landscape quality; improvements are effected and degraded features reinstated where possible. In order to achieve this, water fringe buffer zones should be fenced off wherever possible to protect waterside habitats from damage. Livestock watering points should be clearly defined to protect river banks from degradation.
- for each SSSI and NNR potentially affected by our activities, we will agree a "standard of service" that will maintain, and if possible enhance, the conservation value of the site.
- areas of degraded wetland and riverine habitat are identified and, where possible, restored to a level at which they support a range of species typical of similar habitats elsewhere in the catchment.
- the physical structure of archaeological sites and their settings is maintained and, where possible, enhanced, recognising the interdependence of many of the sites and monuments. Where unavoidable change occurs, the original detail of the site should be carefully recorded.
- the survival and, where necessary, reinstatement of threatened fish populations is promoted. This will include not only rare species (e.g. shad), but also specific local strains of more common native species.
- control of the spread of Japanese knotweed and other alien weeds is undertaken as required under the Wildlife & Countryside Act 1981.

CATCHMENT TARGETS

Recreation

Through our operational, regulatory and advisory activities, and particularly in our role as a statutory consultee to the Local Planning Authorities, we will endeavour to ensure that:

- an appropriate network of riverside paths and access points is maintained and, where appropriate, promoted:
- protection is given to existing recreational sites, and that the development of new sites is promoted at suitable locations, as opportunities arise.
- consideration is given to the design of paths, access points and recreational developments, taking into account, wherever possible, the needs of the infirm and disabled.
- provision is made for both canoe touring and white water canoeing, where appropriate, within the catchment.

APPENDICES



APPENDIX 1**THE GROUNDWATER PROTECTION POLICY**

The preservation of groundwater quality and quantity is a major objective of the NRA. Limiting the risk from pollution and over abstraction must be dealt with in a structured methodical manner.

The NRA has therefore produced a "Policy and Practice for the Protection of Groundwater" which provides advice on the management and protection of groundwater on a sustainable basis. The Welsh Region is implementing this national framework policy for the protection of groundwater which will effectively manage groundwater protection in the Loughor and North Gower Catchment. This new policy deals with the concept of vulnerability and risk to groundwater from a range of human activities. It considers both source and resource protection, together with policy objectives of the NRA with respect to the threat to groundwater from abstraction, physical disturbance of groundwater flows, waste disposal, contaminated land, discharges to underground strata, disposal of sludges to land and diffuse pollution.

The implementation of the policy relies in part on the construction of a series of protection zone maps. Resource protection maps will be produced after consideration of vulnerability of groundwater based on the nature of the strata and type of soil and drift.

The Policy recognises three groundwater 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 a 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.

APPENDIX 2

THE REQUIREMENT FOR AN ABSTRACTION LICENCE

	0 - 5 m ³	5 - 20 m ³	Above 20 m ³
One off, any purpose	No restriction	Consent	Licence
	0 - 5 m ³ /d	5 - 20 m ³ /d	Above 20 m ³ /d
Domestic, to one household	No restriction in most cases		Licence
Agriculture (from surface water)	No restriction for land adjoining watercourse		Licence
Agriculture (from groundwater)	Licence	Licence	Licence
All other purposes	Licence	Licence	Licence

APPENDIX 3

GLOSSARY OF TERMS, UNITS AND ABBREVIATIONS

ABSTRACTION

When someone takes water, either permanently or temporarily, from a source (river, stream, spring, pond, lake or groundwater) they are 'abstracting' the water and they are making an 'abstraction'.

ABSTRACTION LICENCE

Authorisation granted by the NRA to allow the abstraction of water from a source of supply.

ACUTE

Used to describe a sudden dramatic effect, e.g. a major pollution or overnight change in river course. Often used in conjunction with 'chronic' which describes longer term lower level impacts.

ADIT

An almost horizontal shaft into a mine, for access or drainage.

AFFORESTATION

The process of creating a forest where none existed before.

ALGAE

Simple plants which may be floating or attached. They can be microscopic or very large plants but they lack true stems. Like all plants, they are capable of photosynthesis. Algae occur in still and flowing water and are often discussed in the context of Eutrophication (see below).

ALLUVIAL DEPOSITS

Layers of sediment resulting from the activity of rivers. Usually fine material eroded, carried, and eventually deposited by rivers in flatter areas such as flood plains or lake beds.

AMELIORATE

To cause something to get better.

AMMONIA

A chemical which is often found in water as the result of the discharge of sewage effluents. It is one of the chemicals measured to characterise water quality. High levels of ammonia adversely affect the quality and use of water for fisheries and abstractions for potable water supply.

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 above Ordnance Datum.

AQUATIC ENVIRONMENT

The rivers, streams, lakes, ponds, springs and features that depend on natural waters such as bogs, wetlands etc.

AQUIFER (MINOR AQUIFER)

A sub-surface zone or formation of rock which contains exploitable resources of groundwater. Minor aquifers seldom produce large quantities of water but are important for local water supplies and in supplying based flow for rivers.

BASE - FLOW

That part of the river flow that is derived from groundwater sources rather than surface run-off.

BIOACCUMULATION

The accumulation, by living organisms, of materials to concentrations higher than those of the surrounding environment. This is particularly important where poisons are accumulated.

BOD

An abbreviation for Biochemical Oxygen Demand. This is an estimate of the rate at which biological and chemical processes use up the oxygen available in water. It is one of the features that are used to classify water quality

BUFFER ZONE

A strip of land, usually 10-100m wide, at the side of a river which is isolated from the general surrounding land-use and allowed to develop naturally. This provides a number of benefits as well as providing valuable wildlife habitat. These include reduced inputs of silt and some pollutants and protection of river banks from erosion by livestock while allowing the river to respond naturally without undue threat to life or property.

CATCHMENT

The area of land draining to a defined point.

CHRONIC

Used to describe an effect, usually pollution or physical damage, that has gone on for a long time or takes a long time before an impact is seen. Often used in contrast to 'acute' which describes sudden dramatic effects.

CLASSIFICATION/CLASSES

A way of placing waters in categories (classes) according to assessments of water quality based, for example, on measurements of the amount of particular chemicals in the water (especially BOD, dissolved oxygen and ammonia).

COARSE FISH

Freshwater fish other than salmon and trout, many belonging to the carp family (Cyprinids).

CONFLUENCE

The point where two or more streams or rivers meet.

CONSENT

Two types of consent are issued by the NRA:

Discharge Consents are statutory documents issued by the NRA to indicate any limits and conditions on the discharge of an effluent to a controlled water.

Land Drainage Consents authorise works to the beds and banks of a river.

CONTROLLED WATERS

All rivers, lakes, groundwaters, estuaries and costal waters to three nautical miles from the shore.

CULVERT

Artificial channel, pipe or conduit that carries water under a road, canal etc.

CUMECS

Short for cubic metres per second (m³/s). There are 86,400 seconds in a day. This is used to measure river flows.

DANGEROUS SUBSTANCES

Substances defined by the European Commission as in need of special control. This is because they are toxic, accumulate and concentrate in plants and animals, or do not easily break down into less dangerous substances. They are classified as List I or List II.

DEROGATION (Water Quality)

Derogation (i.e. waiving the result) may be applied where water quality fails a target due to natural or man-made conditions that are not readily controllable (e.g. low pH and/or elevated metal concentrations). This approach prevents unnecessary downgrading of waters and also carries the benefit that other, more controllable, aspects of water quality can be protected by the NRA at the target level.

DEROGATION (Water quantity).

A legal term that describes a diminution of the water rights of existing water users due to a new abstraction.

DIFFUSE

Spread out, not associated with a single place or point.

DISSOLVED OXYGEN

The amount of oxygen dissolved in water. Oxygen is vital for life, so this measurement is an important, but highly variable, test of the 'health' of a water. It is one of the features that are used to classify water quality.

ECOSYSTEMS

A group of animals and plants which live together within a certain type of surrounding or habitat (e.g. woodland, pond).

EC DIRECTIVE (Control)

A type of legislation issued by the European Community which is binding on Member States and sets standards and results to be achieved.

ENVIRONMENTALLY SENSITIVE AREA (ESA)

An area where the landscape, wildlife and historic interest are of national importance. Payments are made by Welsh Office to ensure appropriate sensitive land use.

EUTROPHIC/EUTROPHICATION

Terms which describe water which is rich in nutrients or the process of enrichment. At worst, such waters are sometimes beset with unsightly growths of algae which may pose a health risk to humans and livestock.

FAUNA

Animal life.

FLORA

Plant life.

FLUVIAL

Associated with river processes such as flow and erosion.

FRESHET

A naturally or artificially generated increase in river flow after a period of dry weather, having the effect of enhancing water quality and the aquatic environment e.g. through improved levels of dissolved oxygen and flushing of accumulated debris and silt.

FRY

Fish which are less than 1 year old.

GAUGING STATION

A site where the flow of a river is measured. Sometimes a weir is used to assist the measurement.

GROUNDWATER

Water contained within pores, cracks and fissures in rocks.

HABITAT

The natural home of plants and animals. Different plants and animals have different needs, and so live in different habitats.

HEAD

A measure of the height between upstream water level and power generating equipment.

HEADRACE

A channel that carries water to a water wheel or turbine.

INDICATIVE FORESTRY STRATEGY

These are produced by some local authorities and show the areas of land that are suitable or unsuitable for afforestation. They are divided into 'preferred areas', 'potential areas' and 'sensitive areas'.

LEACHATE

This is the product of the removal of soluble substances by action of water percolating through soil, waste or rock. Often used in association with dumped waste materials.

LEAT

A channel which conveys water to a mill wheel.

LIST I AND LIST II SUBSTANCES

European Community Directive 76/464/EEC aims to reduce pollution in controlled waters by certain dangerous substances. These consist of chemicals selected mainly on the basis of their toxicity, persistence and bioaccumulation. These substances are divided into 2 categories:

- List I substances are considered to be the most harmful. Pollution caused by these must be eliminated.
- List II substances are less harmful and pollution caused by these must be reduced.

m³/d

Short for cubic metres per day. There are 1000 litres in a cubic metre, and 1000 cubic metres in a megalitre (Ml). In Imperial Units, there are 220 gallons in a cubic metre. This unit is often used to measure abstraction of water.

m³/s

Short for cubic metres per second (cumecs). There are 86,400 seconds in a day. This is used to measure river flows.

MACROINVERTEBRATE FAUNA

Small aquatic animals, such as insects, snails and worms which live in the river bed.

Ml/a and Ml/d

Short for megalitres per annum or per day, both standard international units of measurement. There are a thousand cubic metres in a megalitre and one million litres in a megalitre. In Imperial Units, one megalitre is about 220,000 gallons. These units are often used to measure abstraction of water.

mm

Short for millimetres. There are 1000mm in a metre. This unit is used to measure rainfall.

NITRATE SENSITIVE AREAS (NSA) AND NITRATE VULNERABLE ZONES (NVZ)

Land in areas where water sources exceed or will exceed 50mg/l of nitrate by 2010 are designated as NVZs. Farmers are required to follow regulations designed to reduce nitrate loss from their land in both NVZs and NSAs although they only receive compensation for doing so in NSAs.

PARAMETER

A general name for a characteristic or aspect of water quality. It is often a feature which can be described numerically.

PARCOM

A monitoring programme for pollutants selected by the **Paris Commission**, carried out by the NRA in England and Wales.

PARR

Salmon which are 1 or more year old which have not yet gone to sea.

PERMEABILITY

The ease with which liquids (or gases) pass through materials, (often rocks or soils).

PERMISSIVE POWER

The NRA is given various powers to do things by a number of Acts of Parliament. Some of these powers are 'permissive', which means the NRA can do these things, but is not under a duty to do them. For example, NRA has permissive powers to construct flood defences, but does not have a duty to do this. In contrast, the NRA has certain statutory duties, i.e. things it must do, e.g. it must authorise abstractions, discharges and works to the bed or banks or main rivers.

POOL

A distinct, deeper area of slow flowing water, often with an eddying flow and often found between fast flowing stretches which are known as 'riffles'.

POROSITY

The volume of water that can be held within rock or soil. This is determined by the total volume of the rock or soil divided by the spaces (voids) within it.

POTABLE

Water suitable for drinking.

REACH

A length of a river.

RED LIST SUBSTANCE

A substance that has been selected for monitoring due to its toxicity, persistence and bioaccumulation.

REDD

Salmon excavate a depression in river gravels into which they lay their eggs. The eggs are then covered with gravel. This 'nest' is known as a 'redd'.

RIFFLE

Fast flowing shallow water with a distinctly broken or disturbed surface. Riffles are often found between pools.

RIPARIAN

Associated with the river bank. A Riparian owner is the owner of the banks and land adjacent to the river and usually owns the river bed to the mid - point of the wetted channel.

RIVER CORRIDOR

A term which describes a stretch of river, its banks, and a varying amount of adjacent land that is affected by the presence of the river.

RIVERINE

Something that is associated with the river environment.

RIVER QUALITY OBJECTIVE (RQO)

The quality of water that the river should attain in order to support its agreed uses. An RQO may be bound to a certain date for achievement or to a future, indefinite, time. The latter is described as a Long Term RQO (LTRQO).

SALMONID FISH

Game fish, e.g. trout and salmon.

SETASIDE

The Common Agricultural Policy reform provides for land to be removed (set aside) from food production to reduce surpluses. The land can be set aside temporarily or permanently and can be a valuable opportunity for wildlife habitat improvement or the provision of riparian buffer zones.

SMOLT

At a particular stage of their development, young salmon and sea trout migrate to the sea, and at this stage are known as smolts.

SPATE (flash flood)

A sudden increase in river flows that may cause flooding or other damage. Typically the flows will fall as quickly as they rose once rainfall ceases. A spate, or flashy river is one that is characterised by such sudden and wide variations in flow as a result of rainfall.

SPRING RUN

Salmon return from the sea to freshwater rivers when adults. They migrate up the rivers to spawn, and this upstream migration is known as the 'run'. There are two main periods of the year when the runs occur; spring and autumn. The spring run fish are often larger than later-run fish, and are often more prized by anglers.

SSSI

Abbreviation for 'Site of Special Scientific Interest'.

STATUTORY MAIN RIVER

A legal definition which defines particular rivers and streams on special maps. On the 'Main River', the NRA has permissive powers to construct and maintain defences and to control the actions of others through Byelaws and the issue of Consents. Any proposal that could interfere with the bed or banks or affect the flow of the river requires formal consent from the NRA.

SURFACE WATERS

This is a general term used to describe all the water features such as rivers, streams, springs, ponds and lakes.

TELEMETRY

Telemetry is a means of collecting information that has been collected by unmanned monitoring stations (often for river flows or rainfall) using a computer that is connected via the public telephone system.

TIME LIMITED LICENCE

Every licence states whether it is to remain in force until revoked or is to expire on a specified date.

UNCLASSIFIED REACHES

Stretches of river (usually smaller streams) that do not fall under the General Quality Assessment classification scheme and therefore do not have their water quality monitored routinely.

WASHLANDS

Extensive areas of semi-natural flood plain next to a river, where water is stored during floods. The amount of water stored may be altered by man made devices such as weirs and sluices. Washland storage has the effect of reducing the flood peak downstream and may help to protect developed areas from flooding and also provide valuable wildlife habitats.

WEIR

A low dam built across a river to raise the water level, divert the water or control its flow.

WETLAND

Wet areas where the animals and plants that live there are dependent on that 'wetness' for their survival. They include bogs, reed-swamps and mires but not the river corridor.

95-PERCENTILE FLOW (Q95)

The flow which one would expect to be exceeded 95% of the time on average. This is an estimate of the dry weather flow which the river would be at, or below, for 18 days per year on average.

