

# CLEDDAU CATCHMENT MANAGEMENT PLAN CONSULTATION REPORT



**NRA**

*National Rivers Authority  
Welsh Region*

**CLEDDAU CATCHMENT MANAGEMENT PLAN  
CONSULTATION REPORT.**

**February 1994**

**National Rivers Authority  
Welsh Region**

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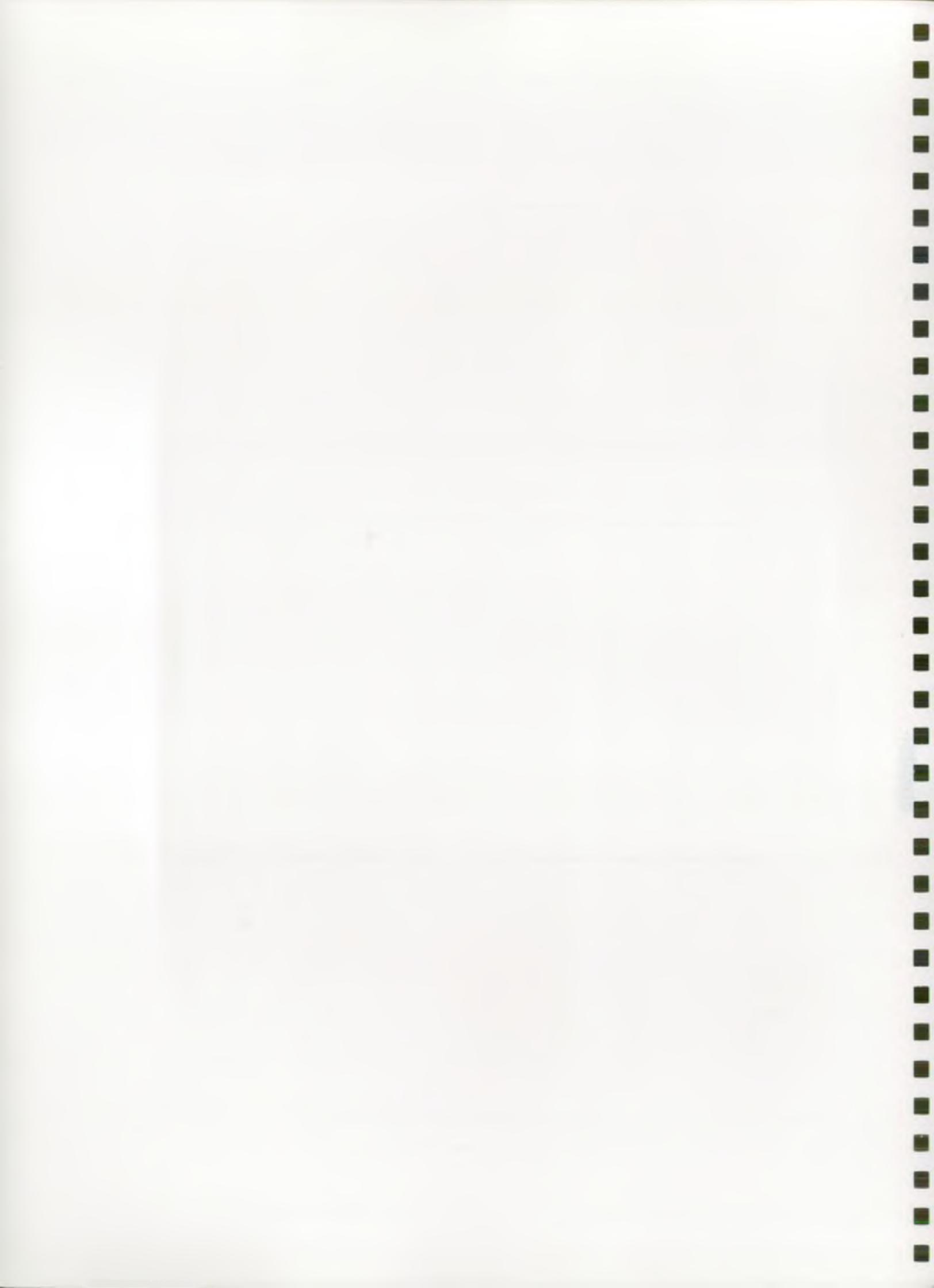
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1.0 THE PURPOSE OF CATCHMENT  
MANAGEMENT PLANS

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### 1.1 THE PURPOSE OF CATCHMENT MANAGEMENT PLANS (CMPS)

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Never before have the rivers, lakes, estuaries and coastal waters of Wales been subject to such large and rapidly increasing demands from the users of water. Many different uses interact, or compete for water or water space, and will inevitably come into conflict with one another.

The National Rivers Authority (NRA) is the major manager of the water environment in England and Wales and has the responsibility to reconcile conflicts between water users as well as its general duties that include:-

- Maintenance and improvement of water quality by control of pollution in surface water and groundwater.
- Flood defence for people and property.
- Flood warning.
- Management of water resources.
- Maintenance and improvement of fisheries.
- Conservation of the natural water environment.
- Promotion of water based recreation.
- Navigation (in some rivers).

The NRA also plays 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 and have consequently chosen to promote our vision and management proposals via published Catchment Management Plans (CMPs). These have the following common objectives:

- We want the Plans to provide a focus for the formation of agreements between water users about the future development of the catchment.
- We will use the Plans to provide a consistent and appropriate response to external pressures, including development proposals and to aid forward planning of development in the catchment and strengthen links with the Planning Authorities.

## THE PURPOSE OF CMPs

- The Plans will enable us to be more effective and will help in the allocation of our resources and those of others.
- The Plans will provide a targeted Action Plan that will detail the measures required of the NRA, and others, to solve problems identified in the catchment.
- We may use the Plans to provide a framework to implement a new system of Water Quality Objectives (WQOs) under development at the Department of the Environment (DoE). These objectives will be use-related and may be given a statutory status following public consultation and agreement by the Secretaries of State.

We have adopted a multidisciplinary approach that requires the involvement of all our Departments and a large degree of co-operation with other organisations and the public to resolve problems and conflicts.

As users of the catchment, we want you to have an opportunity to contribute to our CMPs and so the production of each Plan has two separate phases, spread over two years.

**Phase 1** In the Consultation Report we identify the legitimate and realistic "Uses" of the catchment and promote protective targets. We also assess the current ability of the catchment to support the Uses and include a draft outline of the work required to remedy any identified problems. We distribute this document to the public as part of a wide ranging consultation procedure.

**Phase 2** The Final Plan is produced after we have considered the comments received on the Consultation Plan and presents our Action Plan for the future management of the catchment. The Action Plan details the nature of the work required, cost, timescale and responsible organisations.

The following system is used to produce each Catchment Management Plan:

### **1. Uses of the Catchment:**

We identify existing and future Uses and describe their key locations and details.

### **2. Catchment targets:**

After reviewing the Uses and their requirements we set overall targets for water quality, water quantity and physical features that are designed to protect the interests of identified water users.

**3. Catchment status:**

Areas where the catchment is unable to support identified Uses are detected by analysis of existing information.

**4. Issues and Options:**

The preceding process enables us to identify the key problems (issues) and examine the remedial options available to us. We identify people who are responsible for carrying out the remedial measures and then consult the public and other interested parties about our proposals.

**5. Revision:**

To produce a Final Plan we move forward from the Consultation Plan and take your comments into consideration. We also introduce an Action Plan that represents our vision for the catchment over the next 5-10 years. The contents of this Plan will, where this is possible, have been agreed between ourselves and any others who are implicated. There will also be information on the projected costs and timescales for the work that needs to be done.

**1.2 THE NRA'S VISION FOR THE CLEDDAU CATCHMENT**

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*The Cleddau catchment is central to the popular holiday area of Pembrokeshire and is rich in wildlife, scenic attractions and opportunities for leisure activities. Some 75,000 people live within an area whose economy relies heavily on tourism and agriculture. The remote geographical location has largely deterred industrial development, apart from the oil industry centred around the deep natural harbour of Milford Haven. One might therefore expect the water environment to be largely undamaged by human activity but this is not the case.*

*The challenge of managing the catchment will be addressed by implementing solutions to the existing problems and encouraging imaginative proposals to allow sustainable economic and community development to proceed whilst ensuring protection and improvement of the water environment. The interests of existing water users must also be safeguarded.*

*The NRA's vision for the Cleddau during the lifetime of this Plan is to achieve improvements in water quality through reductions in the impact of sewage discharges and agriculture. In particular, the NRA is keen to see the proposed sewage disposal schemes from Pembroke/Pembroke Dock and Milford Haven become operational within the period of this Plan. The NRA would also wish to have a clear programme agreed with Dŵr Cymru to address inadequate Sewage Treatment Works and sewerage systems that contribute to other problems within the catchment. The impact of agriculture on water quality, and therefore on fisheries, is another major cause for concern within the catchment, particularly in the smaller streams which are so important as nursery areas for migratory fish. Pollution prevention work must realise some real improvements by ensuring that farmers construct appropriate waste disposal systems and implement effective waste management regimes in order that the full potential of the catchment can be realised.*

*The NRA recognises the high profile now being given to the competing uses of the Haven and Daugleddau, and welcomes initiatives by the Milford Haven Port Authority and the Pembrokeshire Coast National Park to manage the recreational activities in this area. The NRA will continue to play a constructive role with other agencies where integrated management solutions are required in this, and other parts of the catchment. In particular, the NRA anticipates that this Plan will significantly influence the planning processes of local authorities.*

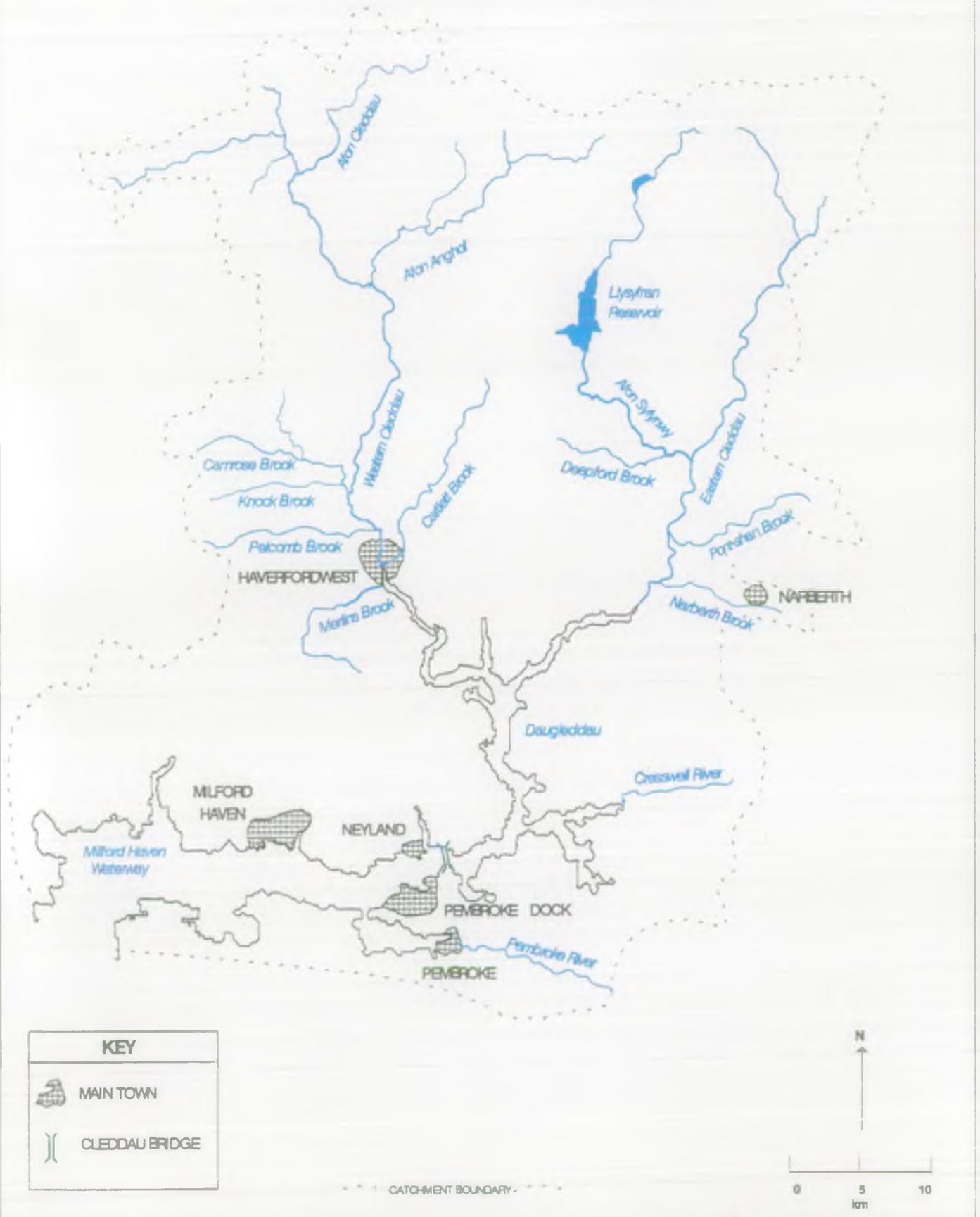
*The realisation of the NRA's vision will be achieved through a balanced management approach to all activities so that the optimal potential of the catchment can be obtained and sustained in active collaboration with all users of the catchment.*

## 2.0 DESCRIPTION OF THE CLEDDAU CATCHMENT



MAP 1

MAIN TOWNS AND RIVERS





### 2.0 DESCRIPTION OF THE CLEDDAU CATCHMENT

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#### 2.1 Introduction

The rivers Eastern & Western Cleddau are branches of the Daugleddau, a tidal reach entering the Bristol Channel through Milford Haven. The catchment is characterised by intensive dairy farming although other forms of agriculture, including upland sheep farming and early potato growing, are favoured in localised areas.

The catchment is largely of lowland nature, although both rivers drain at least partially from the Preseli Mountains (536m). The land is sparsely populated in farms and villages, with centres of population in Pembrokeshire's former market town, Haverfordwest (population 13,000) and in communities around the Haven - Milford Haven (14,200), Pembroke Dock (10,200) and Pembroke (5,500). Pembrokeshire is also renowned as a holiday area and the population increases two-fold during the peak season.

Industry is confined mainly to developments associated with the oil industry which constructed 4 oil refineries around Milford Haven in the 1960s. Although one refinery was demolished in the 1980s, the complex still has the largest refining capacity in Europe.

#### 2.2 Hydrology & Hydrogeology

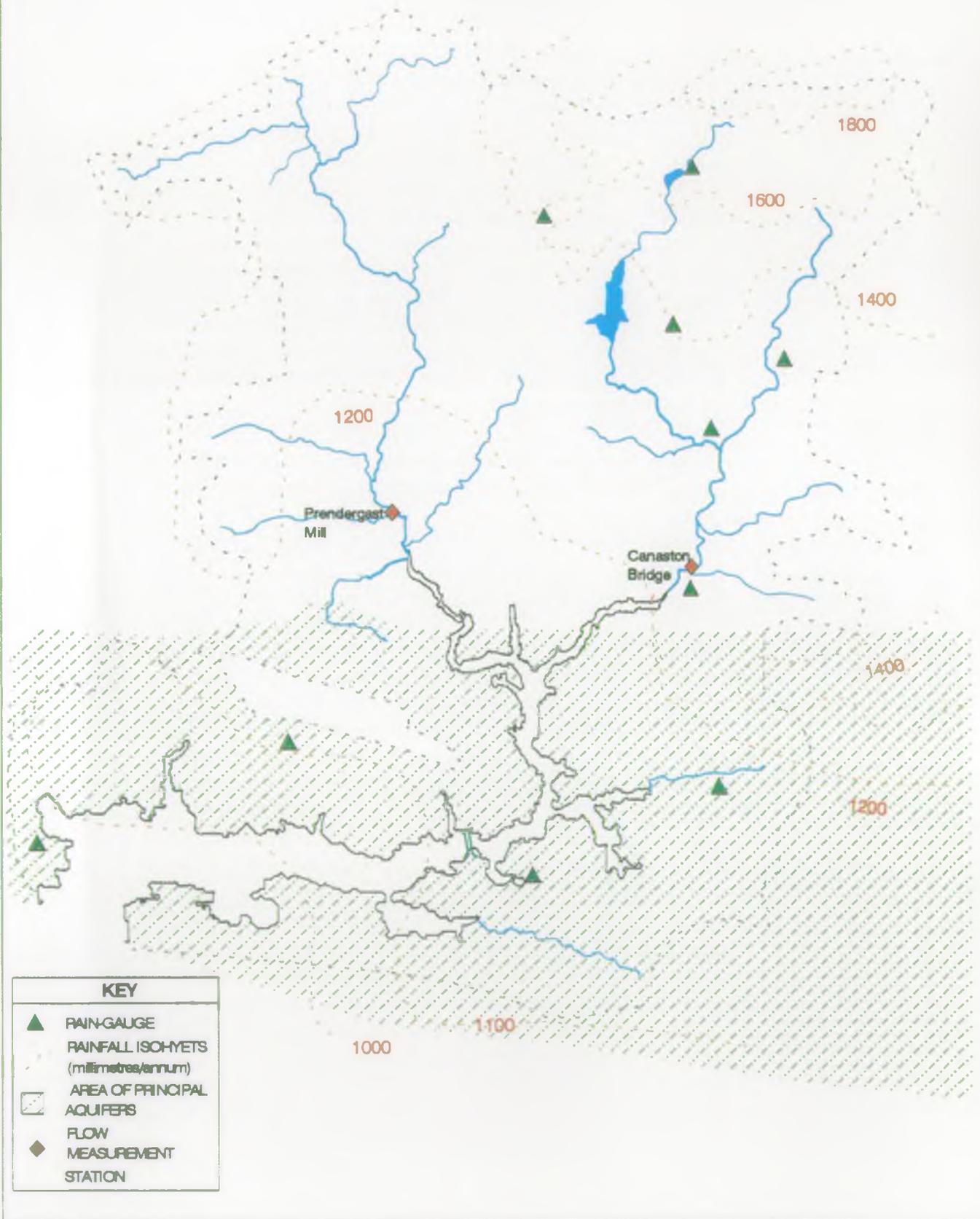
There are two main watercourses in the catchment, the Eastern and Western Cleddau, which flow in a predominantly southerly direction to join in their tidal reaches and form Milford Haven which has an east-west alignment.

Groundwater occurs in the more permeable, highly weathered and fractured rocks. The aquifers are confined to the southern part of the catchment and comprise Millstone Grit, Coal Measures, Carboniferous Limestone and Devonian Sandstone. Rainfall in this part of the catchment is less than 1200 mm per year. Groundwater is exempted from licensing control and little information is available on its potential as a resource.

The Eastern Cleddau is the steeper of the two rivers, with the highest level on the Preseli Mountain being 536 metres AOD, and experiences average annual rainfall in the range 1200 to 1800 mm. The Western Cleddau catchment, which reaches a height of 346 m AOD has a similar area but receives lower rainfall; as a result the average daily flow at the tidal limit is less than that of the Eastern Cleddau. For comparison, the average annual rainfall for Wales is about 1385 mm and for England and Wales together about 912 mm. The Western Cleddau is unusual in rising within 2km of the sea, at 118m AOD.

MAP 2

HYDROLOGY



## THE CLEDDAU CATCHMENT

Flows in the lower reaches of the Eastern Cleddau, and its tributary the Syfynwy, have been regulated since the completion of Llysyfran dam in 1971. The major water intake for potable supply is situated at Canaston just above the tidal limit on the Eastern Cleddau although other abstraction points from both rivers are also used. There is demand for water for potable, industrial and agricultural use within the catchment.

**2.3 Flood Defence** The lowland nature of the catchment produces a less flashy river than many catchments in Wales and the predominantly rural landscape ensures that few properties are threatened. The exception, however, is in the lower reaches of the Western Cleddau where it flows through the town of Haverfordwest. Development has, over the years, encroached onto the flood plain and the main river channel is now inadequate on occasions to accommodate peak river flows and/or tidal surges. Any proposed development which affects the flood plain or the main river channel will ensure that channel inadequacy remains an issue for the catchment.

In the period from the early 1960s to early 1980s, when Government Policy encouraged increased farm production, major land drainage schemes were undertaken in the upper Western Cleddau. These schemes require regular maintenance in order to preserve their effectiveness and careful consideration is given to these activities in view of the significant wildlife and fisheries interests in this area.

**2.4 Fisheries, Conservation & Recreation** Both the Eastern and Western Cleddau support substantial salmon and sea trout rod fisheries, which are exploited by local people and the many visitors that are attracted to Pembrokeshire. In the tidal Daugleddau, migratory salmonids are also captured by licensed Compass nets.

Towards the top of the catchment is Llysyfran Reservoir (76Ha.), one of the most popular put-and-take trout fisheries in Wales and the centrepiece of the Llysyfran Country Park.

The rural nature of the catchment is reflected in its conservation value. There are 25 SSSIs in a catchment considered to be one of the important strongholds for the otter in Britain.

The catchment is almost surrounded by the Pembrokeshire Coast National Park, which also includes the Daugleddau. It is this coastline that attracts over 1 million holiday makers to Pembrokeshire each year, taking advantage of improved road links from the east and placing an enormous strain on inadequate sewage disposal facilities. In addition, the Haven is developing as a water sports centre; marinas have already been constructed at Neyland and Milford Haven, whilst small-boat

## THE CLEDDAU CATCHMENT

activities and wind-surfing thrive at Dale.

The importance of the Haven for wildlife is also now being recognised and bird counts confirm its internationally important status for wintering wildfowl. These competing uses are sometimes at odds with one another: typically between 20 and 30 oil spillages are recorded each year by the Milford Haven Port Authority, some of which threaten wildlife and fish farms, fouling shoreline and craft alike.

**2.5 Water Quality** Water quality in the main watercourses is generally high, 97% of classified reaches categorised as Very Good or Good in the 1990 River Quality Survey.

The sewage effluents from the major towns discharge to tidal waters which also receive trade effluent from 3 oil refineries. 48% by volume of all sewage discharged to the Haven is currently partially or untreated. Current schemes and planned investments will substantially change this situation. No areas in the catchment have been identified by Welsh Office as falling within the scope of the EC Bathing Waters Directive, although limited numbers of bathers frequent small bays, and water sports are very popular.

The rapid expansion of dairy farms in the 1970s and the creation of fish farms, both on-river and in floating cages, have caused ecological impact within the catchment. In particular, releases of slurry and silage liquors from dairy farms into watercourses have caused some acute problems and chronic long term effects on river life. This issue has been the subject of intense regulatory activity in order to achieve an improvement in construction standards and site management.

**2.6 Land Use** The catchment is predominantly rural, with the population centred in a number of towns (6 of population 2,000 - 14,500) and villages. Small industrial estates are located on the edge of the towns, but the only significant industrial development is around the Haven, associated with the oil industry (3 refineries and a power station).

Agriculture is the predominant land use with intensive dairy farming activity present in about two thirds of the catchment. A small area in the upper Eastern Cleddau catchment, near the Preseli Hills, is used for sheep rearing, whilst on either side of the mouth of the Haven, crops -mostly potatoes- are grown. Other small areas are covered by coniferous forests.

**2.7 Infrastructure** A network of trunk and main A roads serve the main population centres, with B roads linking smaller settlements. Major trunk routes are the A40 London to Fishguard road, which serves the car ferry terminal for the Irish Republic, and the A477 which crosses the

MAP 3

INFRASTRUCTURE



## THE CLEDDAU CATCHMENT

Cleddau Toll Bridge and provides links with Pembroke Dock.

The main railway link is that from London to Fishguard (for the crossing to the Irish Republic), and some branch lines exist.

An airfield is located at Withybush, near Haverfordwest, providing significant opportunities for commercial and leisure activities.

### **2.8 Monitoring**

There are two principal river flow monitoring stations and a number of raingauges, read mainly on a daily basis. Some of the instrumentation is supported by telemetry to assist in provision of flood warnings for the Western Cleddau.

There is an extensive range of environmental monitoring undertaken within the catchment to fulfil statutory requirements and enable the NRA to ensure that local environmental quality and use-related standards are achieved.

The NRA has a leading role in the Milford Haven Waterway Environmental Monitoring Steering Group (MHWEMSG). This group consists of industry, local authorities and other statutory bodies, and was formed in 1991. It is currently carrying out monitoring of water quality and sediment chemistry/biology to fill gaps in existing knowledge of background quality within the Haven.

# THE CLEDDAU CATCHMENT

## KEY DETAILS

### Catchment Details

Area	810 km <sup>2</sup>
Existing (1991 Census) Population	73,450 (provisional)
Population Density	91/km <sup>2</sup>

### Topography

Ground Levels	Max.level 536m AOD
Sea Levels (Milford Haven)	Mean High Water Springs 3.29m AOD
	Mean Low Water Springs 3.01m BOD

**Geology** The solid geology is primarily sedimentary in origin, comprising from source to sea:

- (i) Ordovician and Cambrian shales and sandstones
- (ii) Precambrian and Cambrian lavas and tuffs
- (iii) Silurian sandstones, shales and mudstones
- (iv) Carboniferous Millstone Grit, Coal Series and Limestone
- (v) Devonian Old Red Sandstone

The whole structure forms part of a major syncline with considerable faulting.

### Administrative Details

County Council	Dyfed
District Councils	Preseli Pembrokeshire 80% of Catchment Area
	South Pembrokeshire 19%
	Carmarthen 1%
National Parks	Pembrokeshire Coast National Park
Local Flood Defence Committee (LFDC)	West Wales
NRA	Welsh Region - South West Area, West Wales District
Water Company	Dŵr Cymru cyf
Sewage Treatment Works	45 Dŵr Cymru, 7 Private
Private Industrial Treatment Works	12

## THE CLEDDAU CATCHMENT

Domestic Waste        1  
Disposal Sites

### Main Towns                      Approx. Populations (1981 Census)

Milford Haven	14,200
Haverfordwest	13,000
Pembroke Dock	10,200
Pembroke	5,500
Neyland	3,200
Narberth	2,000

### Water Quality

Length of River in National Water Council Class 1992 Survey

Class 1A	(Very good)	24.1 km
Class 1B	(Good)	34.5 km
Class 2	(Fair)	2.1 km
Class 3	(Poor)	0.0 km
Class 4	(Bad)	0.0 km

Cleddau Estuary Class A    34.7 km

Note: Minor tributaries not included in the above.

### Water Resources

Average Annual Rainfall    1250mm

#### PRIMARY GAUGING STATIONS:

Catchment	Area (km <sup>2</sup> )	Runoff (mm)	Rainfall (mm)	Losses (mm)
<b>W.Cleddau at Prendergast Mill</b>	197.6	829	1293	464
<b>E.Cleddau at Canaston Bridge</b>	183.1	1014	1426	412

Principal Reservoirs (volumes)	Llysyfran	10350Ml
	Rosebush	640Ml

## Flood Protection

Length of Designated Main River: 181km  
Length of River on which Flood  
Alleviation Schemes implemented: 30km  
(Hard Defences: 30km)  
(Soft Defences: None)  
Length of River covered by  
a Flood Warning Scheme: 20km  
Length of Sea Defences  
(maintained by NRA): None

Note: The above statistics are estimates which will be refined during compilation of a flood information database which has been approved by the SWWLFDC.

## Fisheries

	Rods (10 Year Average 1982-91)		Nets (average of 1983-1992)
	Eastern Cleddau	Western Cleddau	
Salmon	52	27	30
Sea Trout	629	332	10

### **3.0 STATEMENT OF USES.**

The following sections catalogue the legitimate uses of the catchment which fall under the control of the NRA in one way or another. A general description of the nature of the NRAs responsibility towards each use is given, complete with management Objectives and Environmental Requirements that are designed to protect both the environment and the requirements of other Uses. The Environmental Requirements set for Water Quality are specific to CMPs and embrace a range of formally and informally applied standards. This is explained more fully in Section 4.1 where Catchment Water Quality Targets are set to reflect the NRAs view of the balance of interests between the various uses of water.

MAP 4

ADMINISTRATIVE BOUNDARIES



KEY	
	DISTRICT COUNCIL BOUNDARY
	PEMBROKESHIRE COAST NATIONAL PARK
	TOWN

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3.1 URBAN DEVELOPMENT (including road, rail and airport)

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**General**

Development must be considered when planning the management of a river catchment because it can directly and indirectly affect other Uses. This Use is related to existing and predicted future, residential, commercial and industrial development that is identified in the county structure and district local plans. These plans identify policies against which planning authorities consider development proposals.

The NRA is a statutory consultee under planning legislation and advises local authorities on development proposals that can have an impact on matters relevant to the NRA. Consequently, a major objective of this Catchment Management Plan is to provide the planning authorities with a clear picture of the NRA's responsibilities and policies towards development of this catchment. The Plan identifies all legitimate uses of the catchment so that their interests can be taken fully into account during the planning process. This approach is consistent with the Government's declared objective of "plan led" development.

The NRA seeks to pursue its aims and policies in relation to development through the planning consultation process, and although the final decision on planning matters rests with the planning authority, government guidelines advise on the need to consider the NRA's concerns in determining proposals.

Where necessary, the NRA will use its statutory powers to control the impact of permitted developments. The NRA has produced Guidance Notes for Local Planning Authorities on the methods of protecting the water environment through their Development Plans. Where appropriate, the NRA proposes that LPAs should apply these Notes when producing their own Plans.

**Local Perspective**

*The whole catchment lies within the administrative County of Dyfed with Preseli Pembrokeshire (80%), South Pembrokeshire (19%) and Carmarthen District Council (1%) responsible for District matters. Where the catchment falls within the Pembrokeshire Coast National Park, then the Park Committee is responsible for local planning activities.*

*The Dyfed County Structure Plan was adopted in 1983 and, following review, an amended document was approved in 1989. Work is expected to begin in late 1993 on a review of the Structure Plan. Most of the allocation for development is in the existing towns and main villages.*

## STATEMENT OF USES

*Population prediction estimates to the year 2001 are currently (July 1993) not available from the County Council, but past trends would seem to indicate a growth of no greater than 7%. However, future trends in the economy will influence growth to a large extent.*

<i>Main Towns/Villages</i>	<i>Approx. Population (1981 Census)</i>
<i>Milford Haven</i>	<i>14,200</i>
<i>Haverfordwest</i>	<i>13,000</i>
<i>Pembroke Dock</i>	<i>10,200</i>
<i>Pembroke</i>	<i>5,500</i>
<i>Neyland</i>	<i>3,200</i>
<i>Narberth</i>	<i>2,000</i>

*Preseli Pembrokeshire and South Pembrokeshire District Councils are currently formulating Local Plans. Similarly, the National Park is currently preparing a Local Plan for its area, and this is expected to be circulated for consultation in early 1994.*

*Like much of rural Wales, a key goal for the Cleddau catchment is to achieve sustainable economic and community development. It is therefore important that the policies of all statutory bodies can be brought together in integrated actions to this end.*

*The Welsh Office has designated Preseli and South Pembrokeshire District Council areas as a Strategic Development Zone. The Welsh Development Agency (WDA) acts to stimulate investment and create employment in rural businesses.*

*The proposed oil exploration off the Pembrokeshire coast is not currently anticipated to have any significant impact on the Cleddau catchment area in the life of this Plan (5 years). Land-based disposal of cuttings may be required and this would require a Waste Disposal Licence with NRA consultation. The possible impact of the exploration on the coast will be considered as part of future Plans covering coastal areas. Should the exploration lead to exploitation of the resource, any proposals affecting the Haven will be considered at that time, and taken into account when this Plan is reviewed.*

*The A40 London to Fishguard road, which serves the car ferry terminal for the Irish Republic, is a major road artery which crosses the catchment. Its strategic significance has led to its designation as a "Euroroute", and it will therefore be the subject of improvement works in coming years.*

### **Objectives**

- To support sustainable economic and community development within the catchment, in partnership with other regulatory bodies, whilst ensuring the NRA's statutory interests are suitably safeguarded.

## STATEMENT OF USES

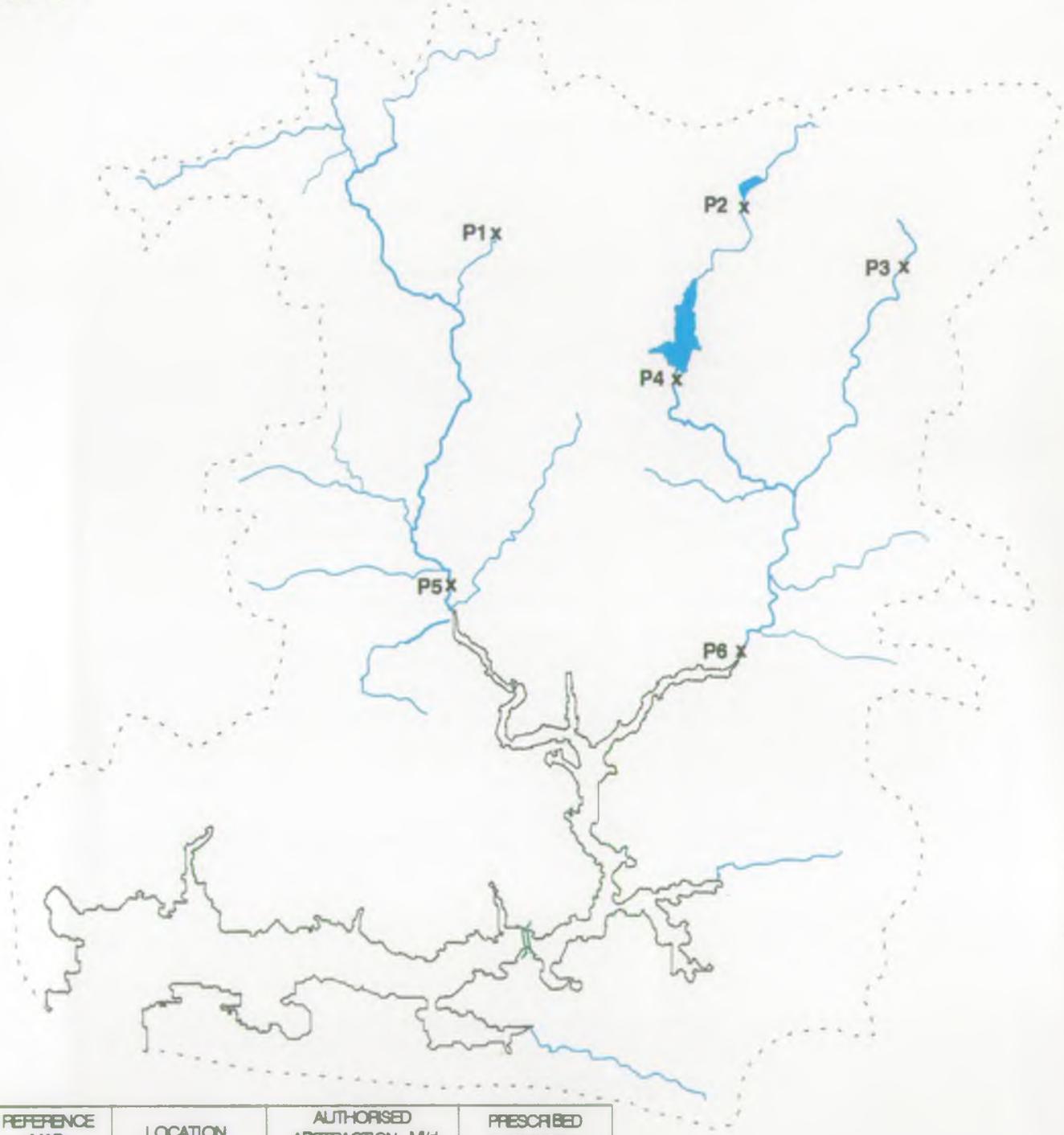
- To ensure that development does not adversely impact and, wherever possible, to ensure that it proceeds in a way that benefits the water environment and its users.
- To ensure that development does not impact on the water environment to a degree that threatens life and property.

### Environmental Requirements

- Water Quality*
- The water environment should not suffer any detriment due to development.
  - Adequate pollution prevention methods that are consistent with the Groundwater Protection Policy, should be incorporated into developments.
- Water Quantity*
- Surface water and groundwaters should be protected from the adverse effects of development, including mineral extraction, landfill, afforestation, road construction and other changes in land use.
- Physical Features*
- Development should not be at risk from flooding and should not put other areas at risk of flooding which could endanger life and damage property.
  - Any work that is needed to reduce the risk of flooding created by a development should be paid for by the developer and not from public funds.
  - Any river works necessary in order to allow a development to proceed should be maintained in perpetuity at the expense of the developer.
  - Existing flood defence assets should be safeguarded.
  - The NRA's ability to maintain both its flood defence assets and the main river system should be safeguarded; adequate access along the river channel must also be available in order that new works can be provided if required.
  - Wildlife associated with the water environment should not suffer any detriment due to development, and wherever possible development should enhance wildlife.

MAP 5

ABSTRACTION FOR POTABLE SUPPLY



REFERENCE MAP	LOCATION	AUTHORISED ABSTRACTION M/d	PRESCRIBED FLOW M/d
P1	HOTWELLS	1.73	
P2	PRESCELLY	18.23	1.82
P3	PONT HYWEL	18.18	4.55
P4	LLYSYFRAN		13.64
P5	CROWHILL	27.28	22.73
P6	CANASTON	85.00	68.19

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3.2 ABSTRACTION FOR DRINKING WATER (POTABLE) SUPPLY

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**General**

Almost all abstractions for public water supply, or for private supplies to more than one dwelling, are authorised by licences granted under the Water Resources Act 1991. Exemptions from the requirement for a licence include most types of supplies to a single household, and all abstractions, regardless of use, from groundwater.

Public water supplies are mainly taken from surface waters - rivers, streams and reservoirs - but groundwater sources can be important on a local scale. Private supplies are generally derived from springs and boreholes.

The NRA is not responsible for the quality of the raw water, nor of the delivered, treated water. However, it does have a duty to protect water 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 the NRA's activities in this area.

All abstraction licences specify volumes that the licence holder may take, but not exceed, and many contain conditions that restrict the impact of the abstraction on 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 the NRA and its predecessors to restrict pre-existing abstractions.

In considering applications for new licences, the NRA must ensure that no derogation of existing abstractors occurs, and that the aquatic environment is properly safeguarded.

The NRA does not guarantee that the authorised volume will be available at all times, nor that the water will be fit for the purpose for which it will be used.

**Local Perspective**

***Surface Water***

*Most of the water abstracted from surface water sources in the catchment is for potable supply purposes. All such abstractions, for public supply, receive A2 treatment (normal physical treatment, chemical treatment and disinfection).*

## STATEMENT OF USES

*The major abstraction is Dŵr Cymru's Canaston river intake. This provides the water supply for much of the catchment, and supplies most of South Pembrokeshire. During times of low river flow additional releases of water are made from Llysyfran Reservoir to ensure that abstraction can be maintained. Works to raise the capacity of the dam to 10350 Ml were completed in early 1993. This has provided more water with which to regulate the river and hence increase the reliability to abstract water from it for industrial and public supply.*

*Rosebush Reservoir supplies northern parts of the catchment and other parts of North Pembrokeshire outside the catchment. Some of this water is therefore lost from the catchment.*

*Demand for potable supply increases during the summer months as a result of the influx of tourists. Operating rules for the supply systems have been developed to optimise the yield of available resources, using a number of different sources. It is particularly important for the reservoirs to be kept as full as possible in the spring and early summer. The authorised abstraction from the Western Cleddau is used in conjunction with the Canaston abstraction from the Eastern Cleddau to facilitate this. Similarly, Pont Hywel is used to support Rosebush Reservoir.*

*A large proportion of the water abstracted by Dŵr Cymru is not returned to rivers above the tidal limit and is thereby effectively lost as a resource.*

### **Groundwater**

*Groundwater is exempt from licensing control in the Cleddau catchment. Aquifers are not regarded as a major source of supply. However, numerous properties do rely on small groundwater sources for private domestic supplies.*

### **Objectives**

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

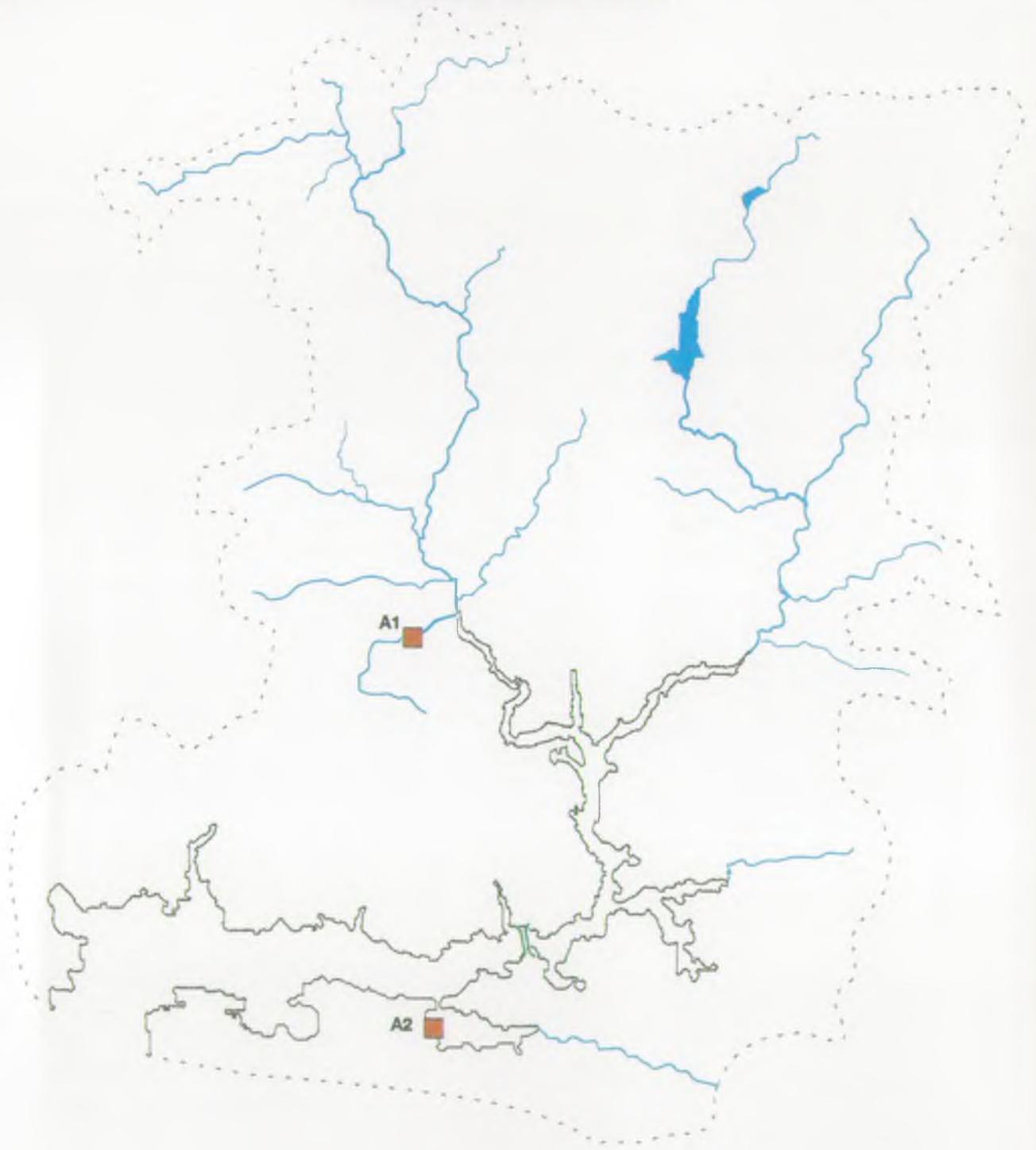
## STATEMENT OF USES

### Environmental Requirements

- Water Quality* - The quality of water at licensed surface waters and groundwater abstractions should meet the standards set out in EC Surface Waters Directive (75/440/EEC) and the informal standards for Aesthetic Criteria for CMPs.
- Water Quantity* - To develop and implement a Regional licensing policy that will, at a catchment level, enable the NRA to manage water resources to achieve the right balance between the needs of the environment and those of abstractors, including protection from derogation.
- Physical Features* - Abstraction and associated activities must not lead to an unacceptable reduction in or, alteration to, the physical habitats required by other uses.

MAP 6

INDUSTRIAL ABSTRACTION



MAP REFERENCE	PRINCIPAL AUTHORISED ABSTRACTIONS	QUANTITY M/d
A1	ST IVEL CREAMERY	0.55
A2	PEMBROKE POWER STATION	5500.66

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### 3.3 ABSTRACTION FOR INDUSTRIAL SUPPLY

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#### General

All abstractions used for industrial or commercial purposes must be authorised by a licence granted under the Water Resources Act 1991. However, the Cleddau catchment is exempted from the licensing requirement for abstraction from groundwater (wells and boreholes), regardless of use. All abstraction licences specify volumes that the licence holder may take, but not exceed, and many contain conditions that restrict the impact of the abstraction on 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 the NRA and its predecessors to restrict pre-existing abstractions.

In considering applications for new licences, the NRA must ensure that no derogation of existing abstractors occurs, and that the aquatic environment is properly safeguarded. The NRA does not guarantee that the authorised volume will be available at all times, nor that the water will be fit for the purpose for which it will be used.

#### Local Perspective

*The area around the Haven creates the major demand for industrial water. This is met by untreated water supplies from Dŵr Cymru taken from the same sources as those used for potable supplies. Dŵr Cymru also has a groundwater source at Milton which is used to supply raw water.*

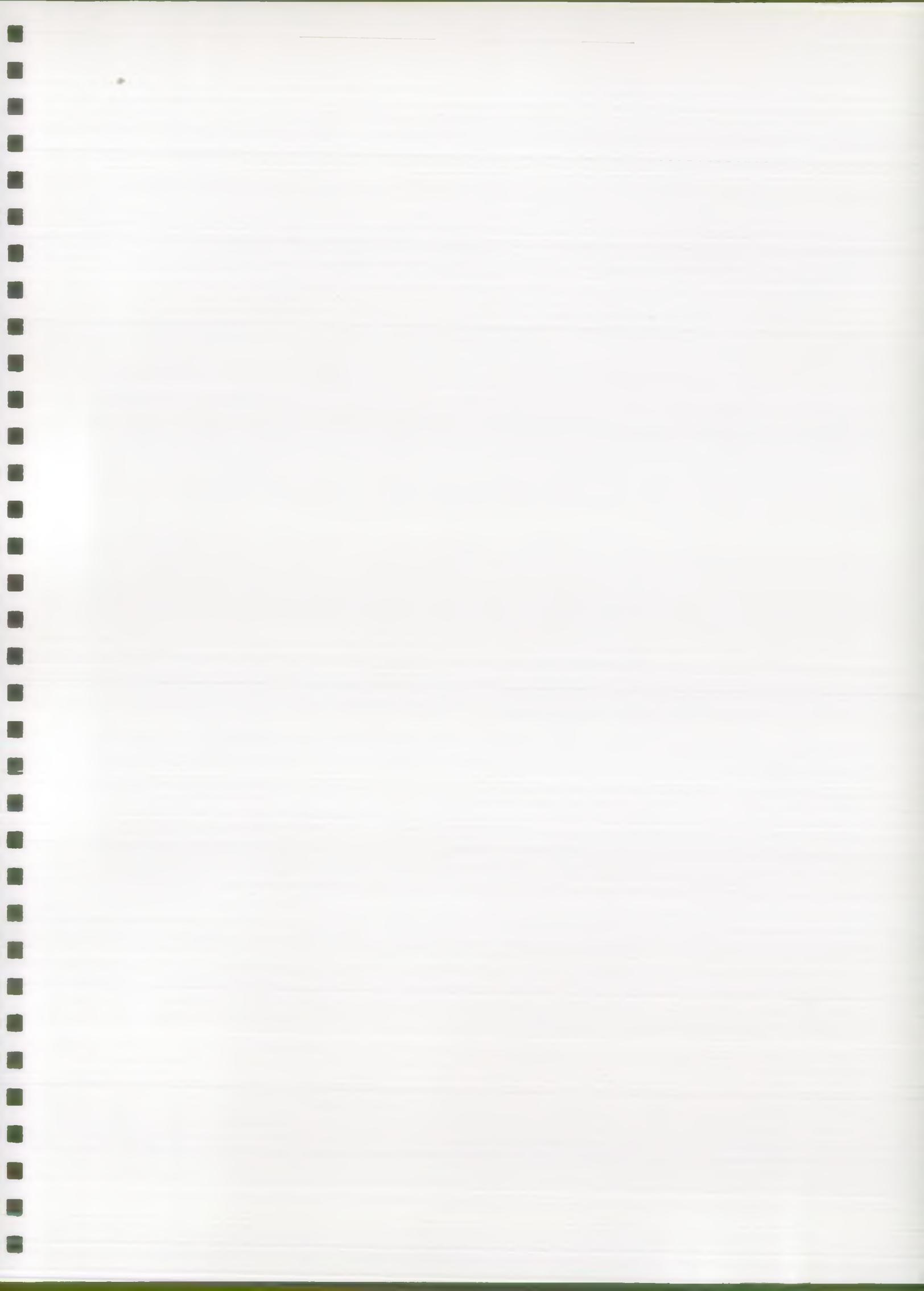
*Quantities abstracted directly from surface freshwater sources by industry are very small. A large volume of water is, however, abstracted from the Haven. This is used for cooling purposes at National Power's Pembroke Power Station before being returned to the Haven.*

#### Objectives

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

**Environmental Requirements**

- Water Quality*** - For industrial abstractions the informal standards for Aesthetic Criteria for CMPs will be met and there should be no deterioration in water quality compared to when the abstraction licence was granted.
- Water Quantity*** - To develop and implement a Regional licensing policy that will, at a catchment level, enable the NRA to manage water resources to achieve the right balance between the needs of the environment and those of abstractors, including protection from derogation.
- Physical Features*** - Abstraction and associated activities must not lead to an unacceptable reduction in, or alteration to, the physical habitats required by other uses.



MAP 7

AGRICULTURAL ABSTRACTION



KEY	
	FISH FARM
	AREA OF PREDOMINANT DEMAND FOR SPRAY IRRIGATION (AUTHORISING 143 LICENCES 991 ML/annum)

3.4 ABSTRACTION FOR AGRICULTURAL SUPPLY

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**General**

This Use deals with abstraction from surface waters for agricultural use. It includes general stock watering, use around the farm and crop spraying, as well as for spray irrigation and fish farming.

In the Cleddau catchment all abstractions for agricultural purposes, apart from some small (less than 20 cubic metres per day) general agricultural uses from surface waters, require an abstraction licence.

The Cleddau catchment is exempted from the licensing requirement for abstractions from groundwater (wells and boreholes) regardless of use.

All abstraction licences specify volumes that the licence holder may take, but not exceed, and many contain conditions that restrict the impact of the abstraction on 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 the NRA and its predecessors to restrict pre-existing abstractions.

In considering applications for new licences, the NRA must ensure that no derogation of existing abstractors occurs, and that the aquatic environment is properly safeguarded. The NRA does not guarantee that the authorised volume will be available at all times, nor that the water will be fit for the purpose for which it will be used.

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 when flows are lowest and no water is returned to the river after use. The NRA encourages winter abstraction into storage and would not usually apply restrictions to winter abstracted water. The winter abstraction charges are only one-tenth of those for summer abstraction.

**Local Perspective**

*The catchment is predominantly rural, and for this reason there are numerous abstractions for general agricultural purposes. These are exempt from licensing, however, either because they are from groundwater, or they involve very small quantities.*

## STATEMENT OF USES

*The majority of abstraction licences in force in the catchment are for the purpose of spray irrigation. A total of 143 licences authorise abstractions amounting to 991Ml/annum. These are mainly concentrated around the Haven where the growing of early potatoes has created a demand for irrigation water. The use of winter storage is encouraged, particularly on minor watercourses.*

*Only two of three licensed fish farms are currently operational. They are located in the Eastern Cleddau catchment. The large quantities of water abstracted are returned to the river after use. A former fish farm at Llawhaden no longer has a licence. Cage units do not require abstraction licences.*

### **Objectives**

- To manage the quality and volume of water resources 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.
- To protect the quality of groundwaters by implementing the NRA's Groundwater Protection Policy.
- To minimise the impact on summer flows of spray irrigation and other forms of net abstraction.

### **Environmental Requirements**

#### ***Water Quality***

- Waters will be required to comply with the informal standards for Aesthetic Criteria and Agricultural Abstraction and the formal standards for Dangerous Substances ( where appropriate) set for CMPs.

#### ***Water Quantity***

- To develop and implement a Regional licensing policy that will, at a catchment level, enable the NRA to manage water resources to achieve the right balance between the needs of the environment and those of abstractors, including protection from derogation.

#### ***Physical Features***

- Abstraction and associated activities must not lead to an unacceptable reduction or alteration to the physical habitats required by other uses.

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3.5 ABSTRACTION FOR WATER TRANSFER

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**General** Abstractions from reservoirs and boreholes may be used directly, or may be transferred elsewhere, within, or outside the catchment. Transfers clearly represent a net loss to the immediate area and so their impact is generally mitigated by the release of regulation or compensation water during periods of low flow. All transfers are subject to abstraction licences.

**Local Perspective**

*Within the catchment, water is transferred from the Eastern Cleddau at Pont Hywel to Rosebush Reservoir. This facility is only used when the reservoir level drops in spring and early summer. The reservoir is topped up at this time to ensure maximum yield if a drought develops, since licence conditions on the Pont Hywel abstraction would prevent it being used later in the year when both flows and reservoir level might be low. It is not used if the reservoir level drops later in the summer as storage would usually be sufficient to meet demand until winter refill begins. It is a pumped transfer system and therefore operating costs preclude unnecessary use.*

*There are no major water transfers in or out of the catchment. However, water from Rosebush Reservoir is supplied to North Pembrokeshire, and water from Canaston is distributed to South Pembrokeshire.*

**Objectives** - To manage the quality and volume of water resources 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.

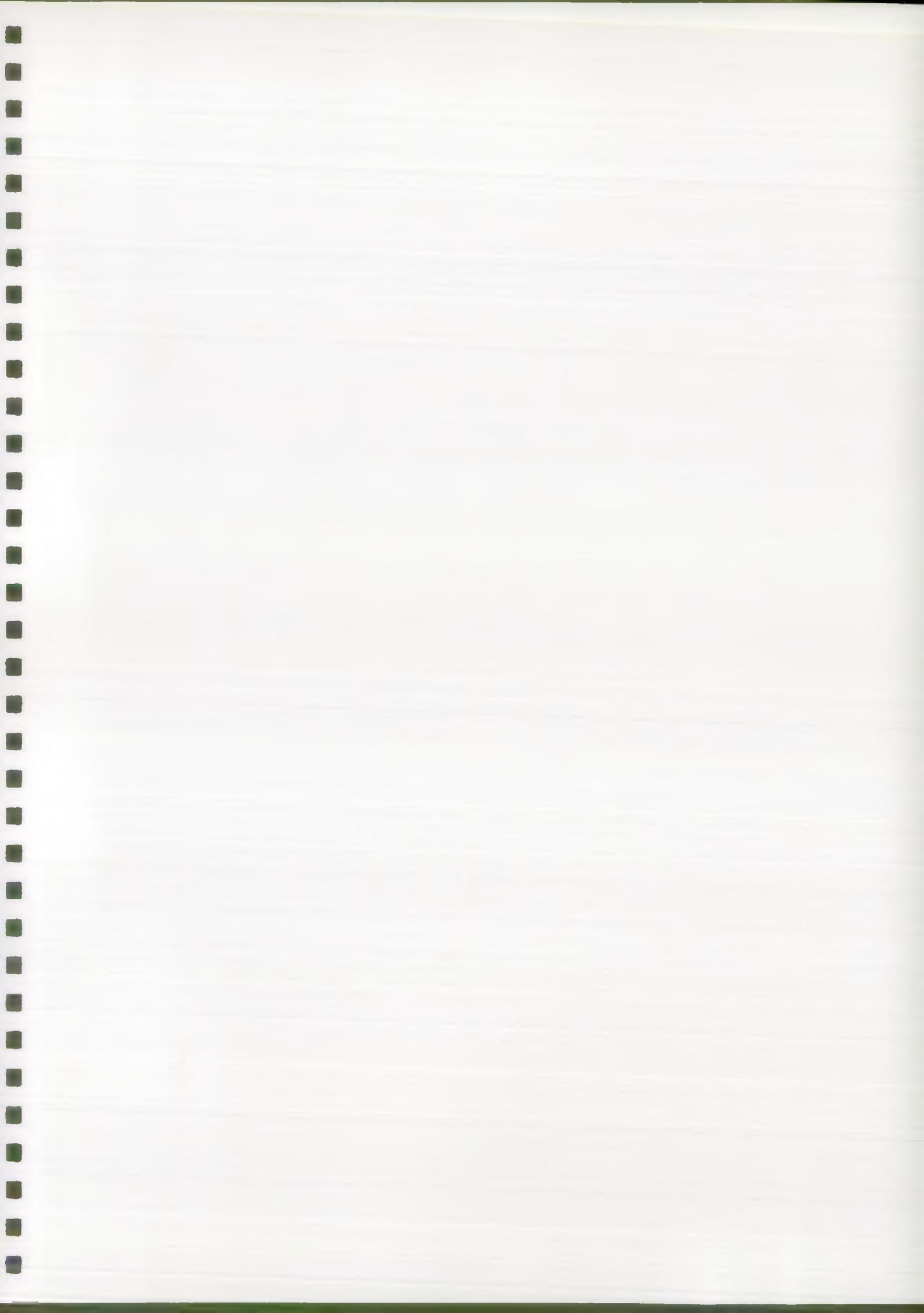
**Environmental Requirements**

**Water Quality** - Water transfer should not adversely affect water quality in either the donor or receiving catchment.

**Water Quantity** - To develop and implement a Regional licensing policy that will, at a catchment level, enable the NRA to manage water resources to achieve the right balance between the needs of the environment and those of abstractors, including protection from derogation.

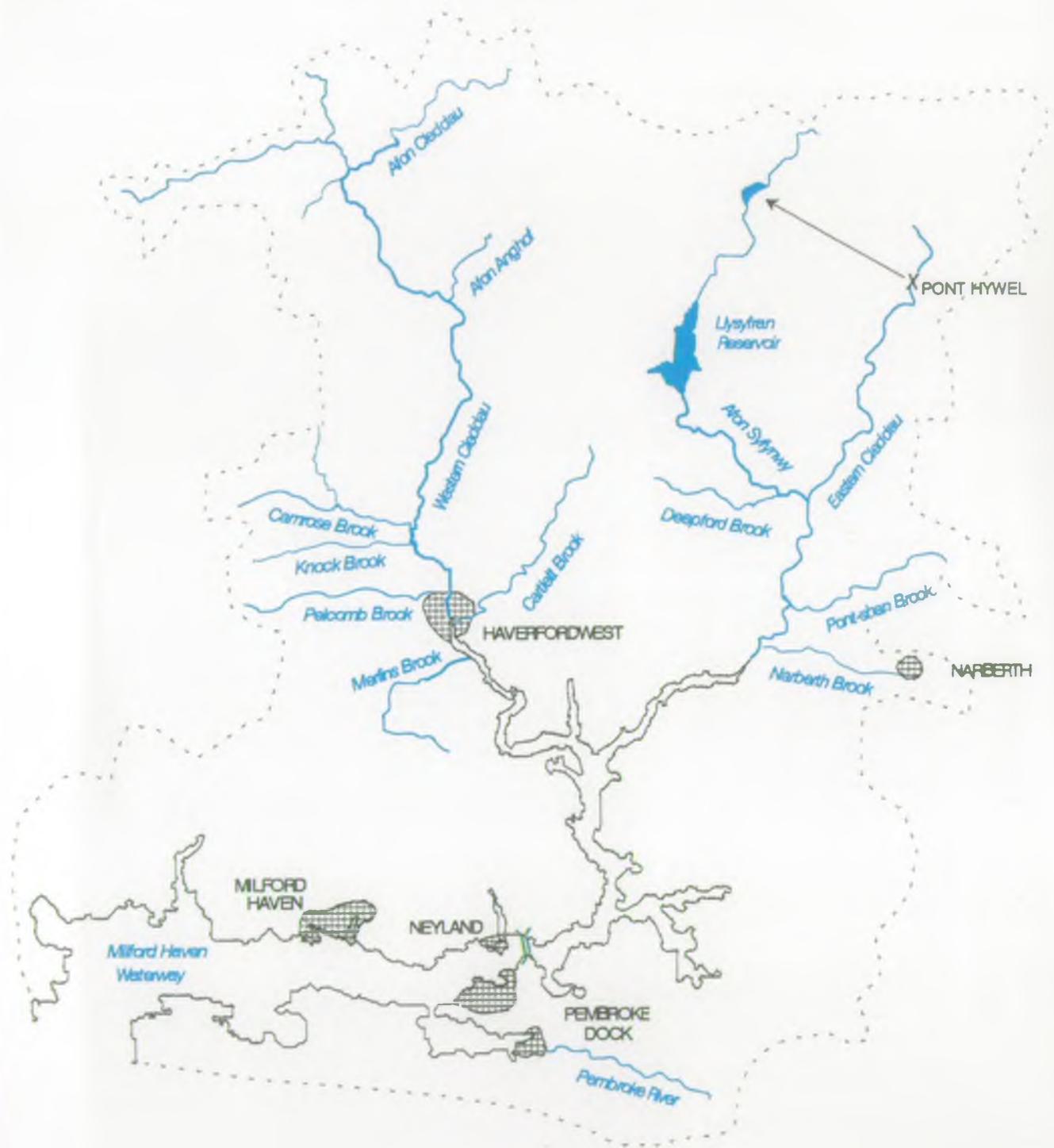
## STATEMENT OF USES

- Physical Features* - Physical features must not be altered in a way that might preclude water transfer at suitable locations.
- Water transfer should not lead to alterations of the habitat to a degree that might affect other uses, in either the donor or receiving catchment.



MAP 8

WATER POWER AND WATER TRANSFER



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3.6 ABSTRACTION FOR WATER POWER

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**General**

The energy of flowing water can be used to generate hydroelectricity, 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.

For this reason, the NRA would usually require a minimum residual flow to be left within the river to protect the legitimate needs that would be affected. New licences would be time limited and be subject to an agreed volume of derogation - otherwise the NRA could not grant any new licences upstream because all the resource was committed to the hydropower user.

All hydropower abstractions require an abstraction licence. Use of water for hydropower can result in appreciable changes in the flow regime, and these can have a large impact on the downstream channel and its flora and fauna.

All abstraction licences specify volumes that the licence holder may take, but not exceed, and many contain conditions that restrict the impact of the abstraction on 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 the NRA and its predecessors to restrict pre-existing abstractions.

**Local Perspective**

*A generating set was installed at Llysyfran Reservoir at the time of construction of the dam and this is able to generate power from the compensation flow released to meet operating requirements for the site.*

*Former mill leats that are still operational within the catchment are now primarily amenity features, although there is an increasing interest in domestic power generation.*

**Objectives**

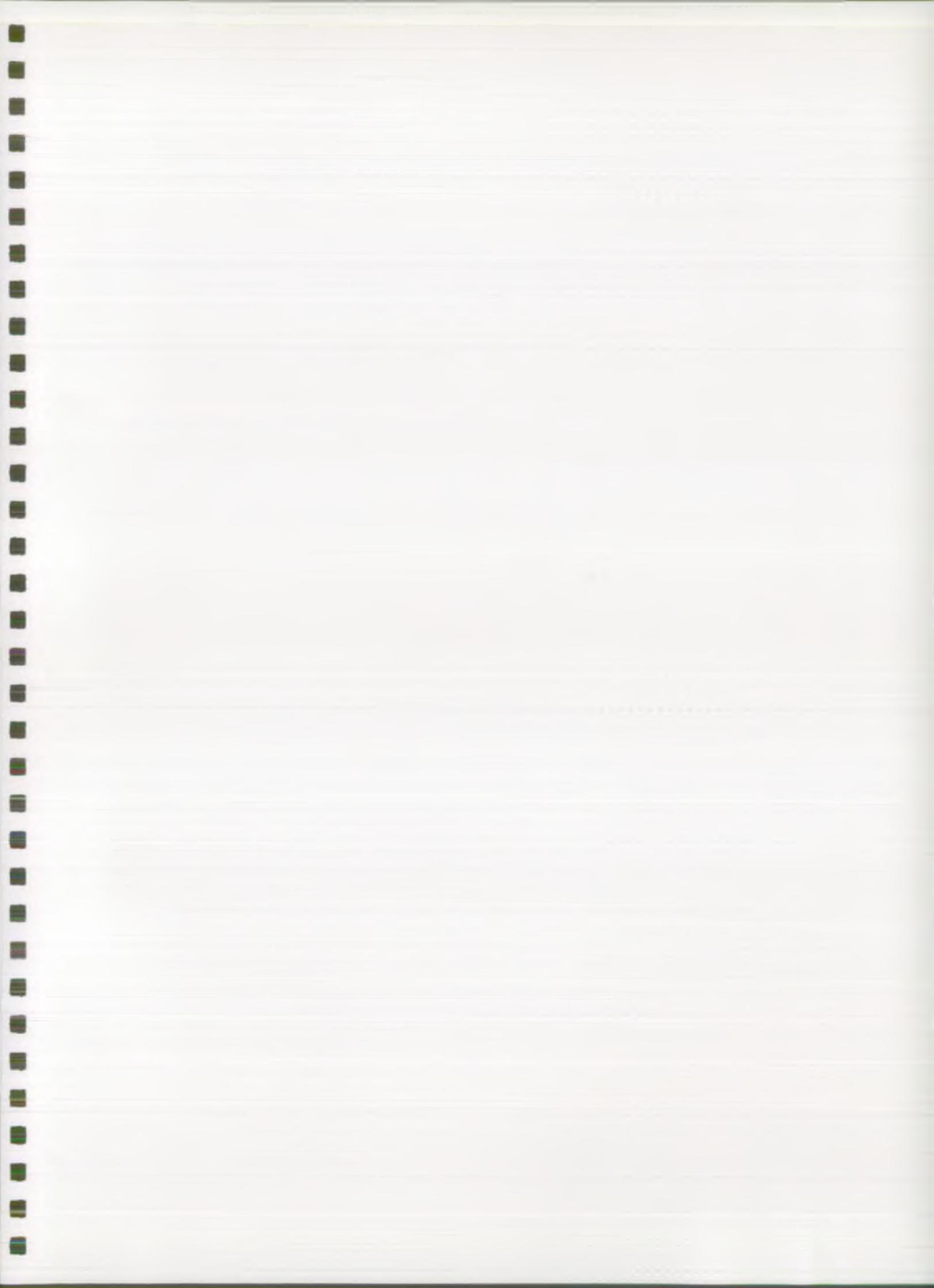
- To manage the quality and volume of water resources so as to safeguard licensed and exempt abstractions, and the environment. This includes the active enforcement of abstractions. The NRA will encourage abstractions to be made as far downstream in a river as possible, and discharges to be made as close to the point of abstraction as is practicable.

## STATEMENT OF USES

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

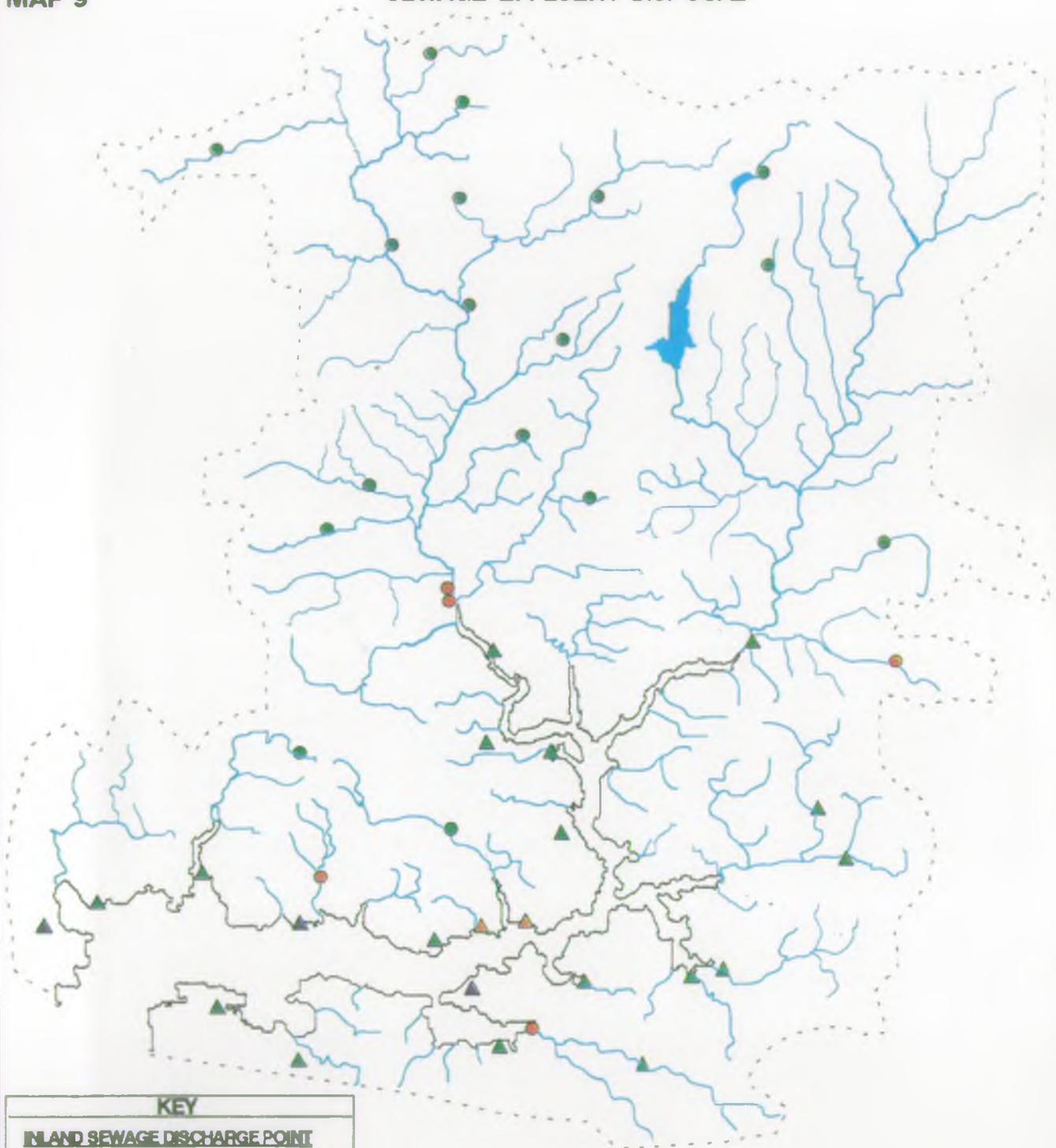
### **Environmental Requirements**

- Water Quality***
- Water quality should not be affected by power generation and associated activities to a degree which compromises other uses.
  - For industrial abstractions the informal standards for Aesthetic Criteria will be met, and there should be no deterioration in water quality compared to when the abstraction licence was granted.
  - Waters will be required to comply with the informal standards set for Aesthetic Criteria and Agricultural Abstraction, plus the formal standards for Dangerous Substances (where appropriate) set for CMPs.
- Water Quantity***
- To develop and implement a Regional licensing policy that will, at a catchment level, enable the NRA to manage water resources to achieve the right balance between the needs of the environment and those of abstractors, including protection from derogation.
- Physical Features***
- The physical characteristics of the river channel should not be altered to a degree that compromises other uses.



MAP 9

SEWAGE EFFLUENT DISPOSAL



KEY

INLAND SEWAGE DISCHARGE POINT

● BIOLOGICALLY TREATED

TIDAL SEWAGE DISCHARGES

▲ BIOLOGICALLY TREATED

▲ PRIMARY TREATMENT

▲ CRUDE-UNTREATED OR  
SCREENED ONLY

OTHER SEWAGE DISCHARGES

●

COMBINED SEWER OVERFLOWS WITH  
AESTHETIC / WATER QUALITY IMPACT

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### 3.7 SEWAGE EFFLUENT DISPOSAL

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#### General

In Wales most sewage effluent discharged into freshwaters has been treated in a Sewage Treatment Works (STW) or smaller facility such as a septic tank. However, some untreated sewage is discharged, from time to time, from overflows on the sewerage system that are designed to operate only under storm conditions when river flows are very high. These overflows act as safety valves to prevent overloading of treatment works and damage to sewerage. All these types of discharge are regulated by the NRA which issues, and monitors compliance with, consents to discharge. 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 handles the bulk of sewage effluent discharged to freshwaters, although the greater number of STWs are privately owned.

Coastal discharges are also generally owned by Dŵr Cymru although few of them receive the level of treatment associated with freshwater discharges.

In Welsh Region, the continuing improvement in sewage effluent treatment and disposal facilities will be the subject of Dŵr Cymru's second Asset Management Plan (AMP2), which is being produced in close liaison with the NRA, having regard to the EC Urban Wastewater Treatment Directive. This Plan covers the period 1995-2015. Consequently, the NRA has, over the past 2 years, assessed the environmental impact of every Dŵr Cymru owned STW discharge and those from Combined Sewer Overflows (CSOs) in order to provide a basis for establishing AMP2 priorities. Consequently, any sewage effluent related issues identified within this CMP will be considered within the agreed AMP2 programme.

#### Local Perspective

*There are major discharges of crude and partially treated sewage from outfalls such as Pembroke/Pembroke Dock, Hakin and Neyland comprising some 48% by consented volume of all sewage discharged to the Haven.*

*The majority of the sewage treatment works in the catchment are minor and/or have adequate available dilution. The fully treated effluent from Merlin's Bridge STW is discharged to the tidal reach of the Western Cleddau and is usually of a high standard, although there are also combined sewer overflow (CSO) outfalls to the Western Cleddau at Haverfordwest which have a history of unsatisfactory operation.*

## STATEMENT OF USES

*Narberth West STW's treated effluent, which used to discharge to a tributary of the Eastern Cleddau with limited dilution some 4km upstream of the Canaston potable intake, was diverted in May 1992 to the main river below the abstraction, affording better protection to the quality of abstracted water.*

- Objectives**
- To control the disposal of treated and untreated sewage effluent and sewage sludge in a way that protects other water uses.

### **Environmental Requirements**

- Water Quality**
- No deterioration in the quality of water above discharges, beyond that assumed when setting the consent for an authorised discharge.

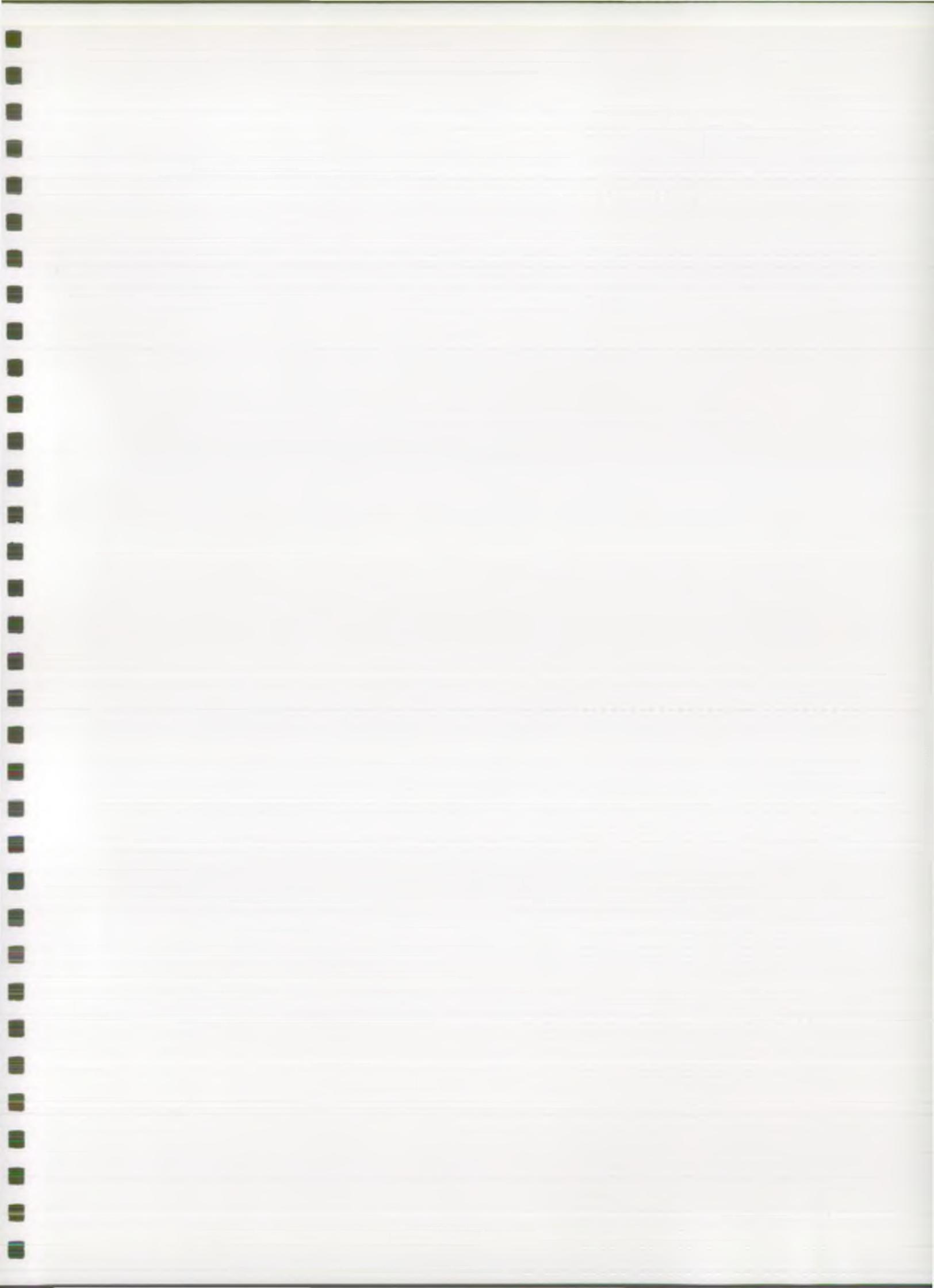
- No deterioration in water quality, below the area of mixing for the discharge, which causes detriment to other uses.

- Water Quantity**
- Discharge consent conditions will be derived taking into account the dilution available under average and dry weather flow conditions.

- To develop and implement a Regional licensing policy that will, at a catchment level, enable the NRA to manage water resources to achieve the right balance between the needs of the environment and those of abstractors, including protection from derogation.

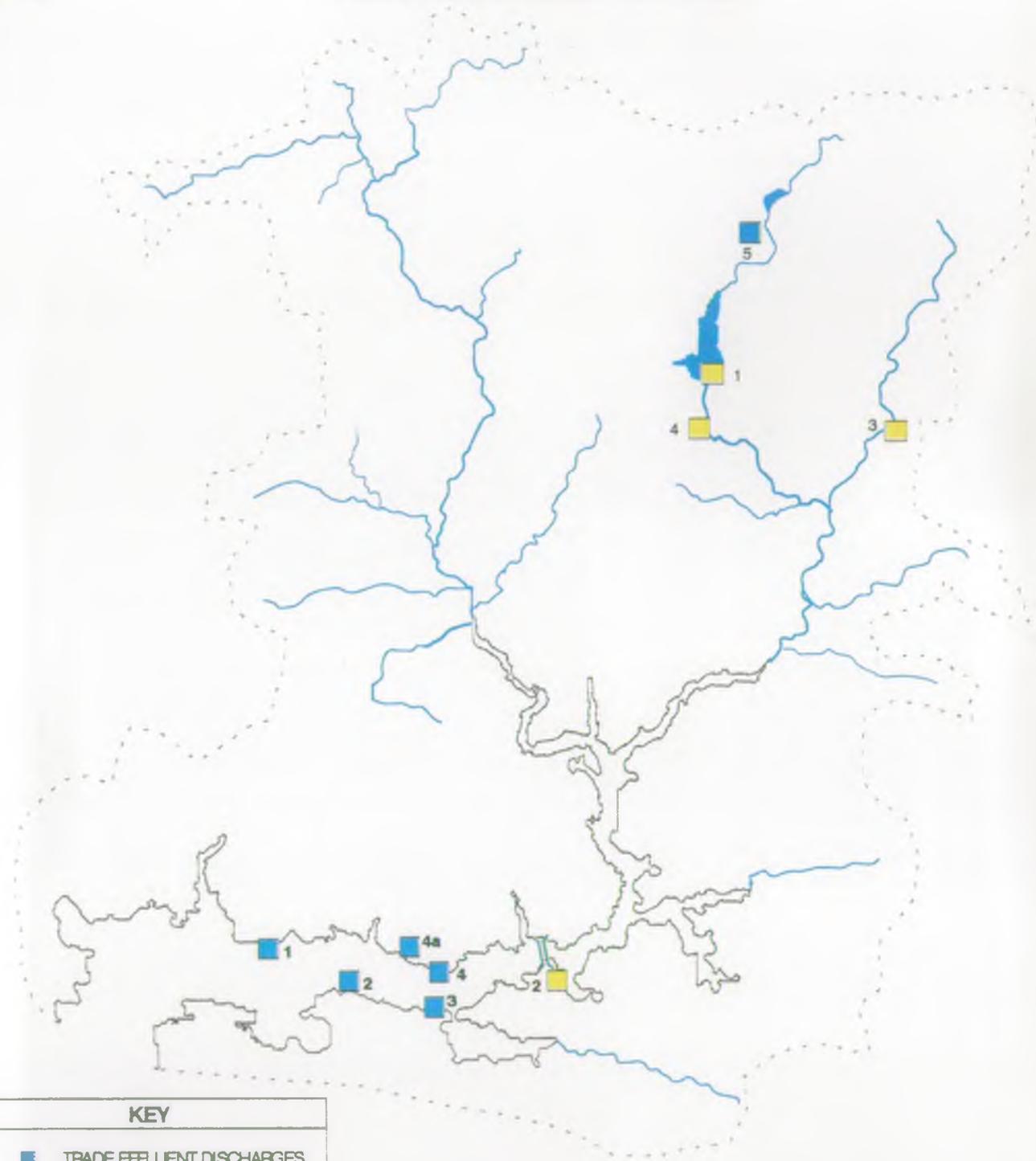
- Physical Features**
- No discharge of sewage from overflows should occur at sewer flows less than those specified in consents.

- 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 10

INDUSTRIAL EFFLUENT DISPOSAL



KEY	
■	TRADE EFFLUENT DISCHARGES
1	ELF OIL
2	PEMBROKE POWER STATION
3	TEXACO (x2)
4/4a	GULF REFINERY
5	ROSEBUSH WTW
■	FISH FARMS/CAGES
1	LLYSFRAN CAGES
2	WARRIOR CAGES
3	VICARS MILL
4	WALTON MILL

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### 3.8 INDUSTRIAL EFFLUENT DISPOSAL

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#### General

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.

At most sites, the NRA controls pollution from industrial effluents by a system of consents to discharge. 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 the NRA will seek to ensure that any consent 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 NRA pollution prevention policy.

Trade effluent is discharged to sewers with the permission of the sewage undertaker (Dŵr Cymru, in Welsh Region) and is then subject to the sewage effluent treatment and disposal controls outlined in Section 3.7.

#### Local Perspective

*There is a discharge of settled filter backwash water from Rosebush WTW to the Afon Syfynwy below Rosebush Reservoir. Other trade discharges in the non-tidal area are restricted to the two fish farms at Walton Mill and Vicar's Mill, and a small cage fish unit at Llysyfran Reservoir. A large, caged, fish rearing unit is sited near the Cleddau bridge.*

*The other major discharges of trade effluent to the Haven are of treated process water from the Elf, Gulf and Texaco oil refineries. Existing discharge consents for these three refineries are in the process of being replaced by authorisations issued by HMIP under IPC in consultation with the NRA.*

*Pembroke power station, operated by National Power, has a large cooling water discharge although this is seldom operated to full capacity. In April 1993 control of this discharge was transferred from the NRA to HMIP. National Power's application to HMIP to burn Orimulsion, a bitumen-based fuel, is temporarily in abeyance while they consider the options for sulphur filter equipment (flue gas desulphurisation) which HMIP has said is essential. The NRA will be fully consulted on any future proposals.*

## STATEMENT OF USES

**Objectives** - To control the discharge of liquid industrial waste to prevent pollution that would affect other uses of the water.

### **Environmental Requirements**

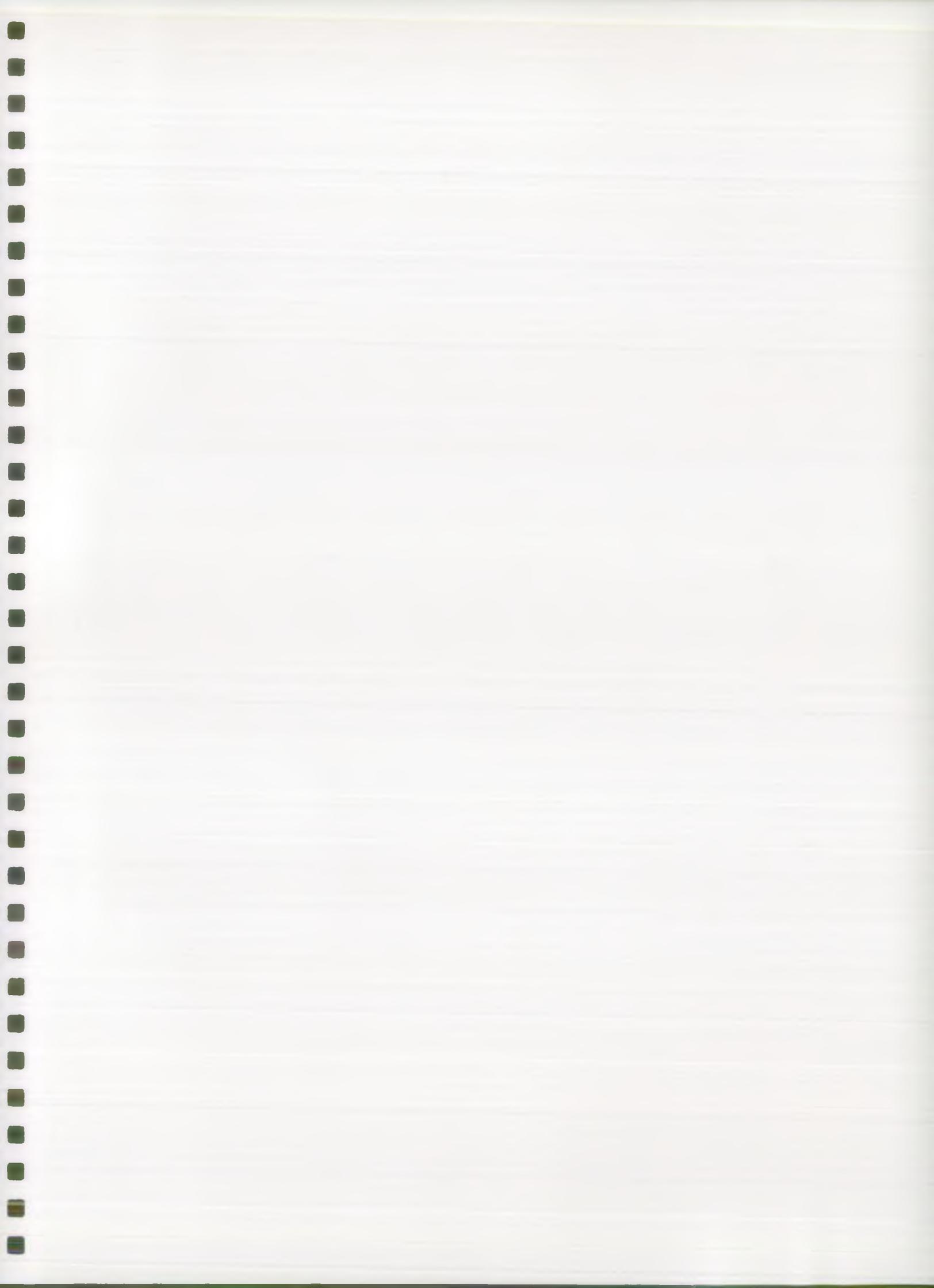
**Water Quality** - Discharges should comply with all conditions stated within discharge consents. This will be enforced by the NRA.

- There should be no deterioration in water quality above the discharge below that assumed when the discharge consent was calculated.

**Water Quantity** - Discharge consent conditions will be derived taking into account the dilution available under average and dry weather flow conditions.

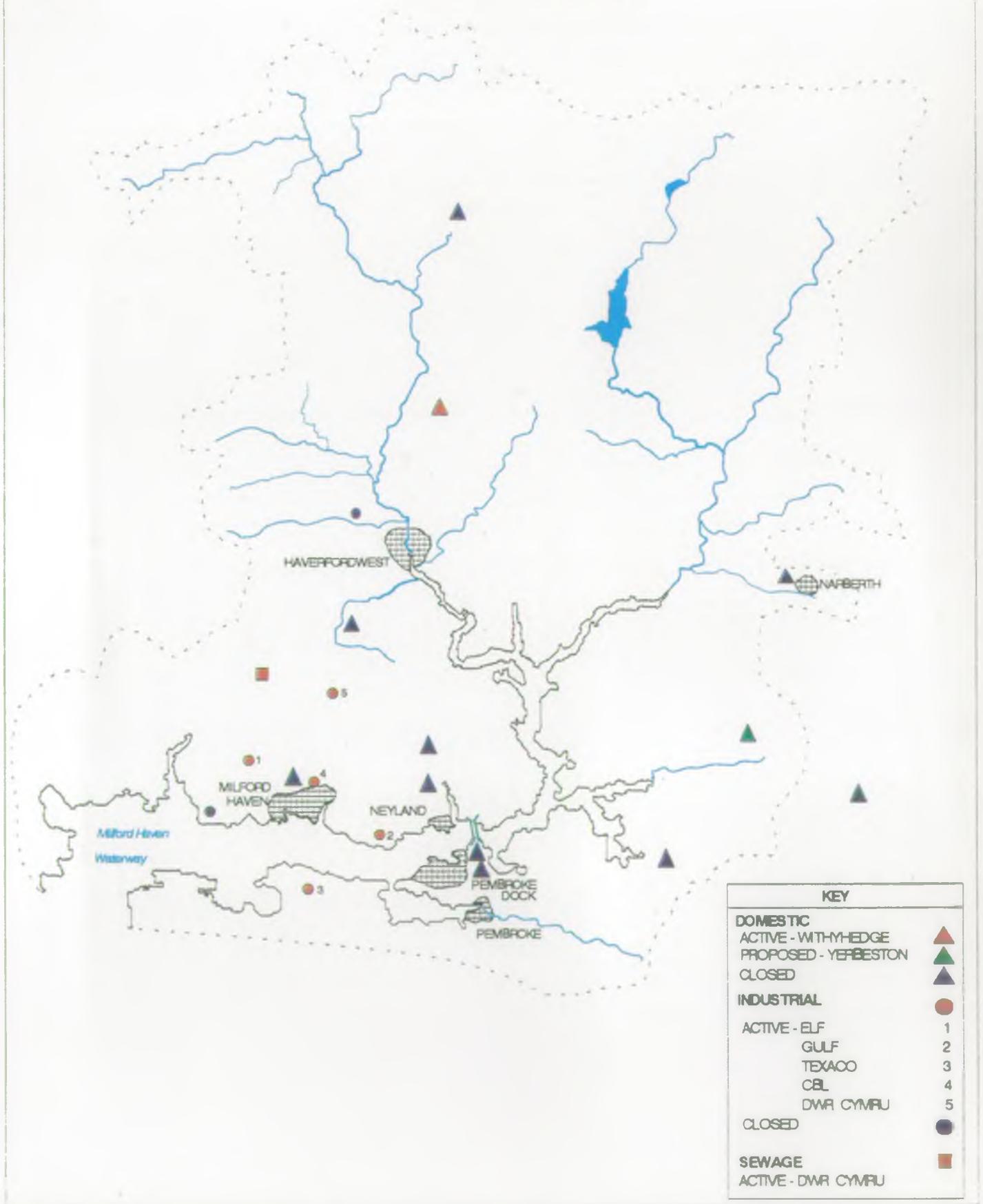
- To develop and implement a Regional licensing policy that will, at a catchment level, enable the NRA to manage water resources to achieve the right balance between the needs of the environment and those of abstractors, including protection from derogation.

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



MAP 11

SOLID WASTE DISPOSAL



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### 3.9 SOLID WASTE DISPOSAL (LANDFILL)

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#### General

The disposal of domestic and industrial refuse into landfill sites is a common form of waste disposal in England and Wales. All sites that receive material that is not inert have the potential to produce a toxic liquid effluent (leachate) which can pollute surface waters and groundwaters. Consequently the NRA's 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 Licences to handle waste or operate a waste disposal site under the Control of Pollution Act 1974 (eventually under the Environmental Protection Act 1990). The NRA is a statutory consultee on all landfill applications.

#### Local Perspective

*An active domestic site at Rudbaxton (Withyhedge) and a closed site at Tiers Cross (Winsel) are currently being monitored by the NRA.*

*The site management at Withyhedge is under discussion with the local Waste Disposal Authority, Preseli Pembrokeshire District Council, in anticipation of the operation being transferred to a local authority waste disposal company (LAWDC) or private company during 1993/4*

*The NRA has given advice on site licence conditions required for a proposed landfill at Yerbeston (Grumbly Bush) to the local Waste Regulation Authority, South Pembrokeshire District Council.*

*The site licence conditions at the three operational oil refineries include the landfarming of oily sludge.*

*There are no licensed hazardous waste sites in the catchment.*

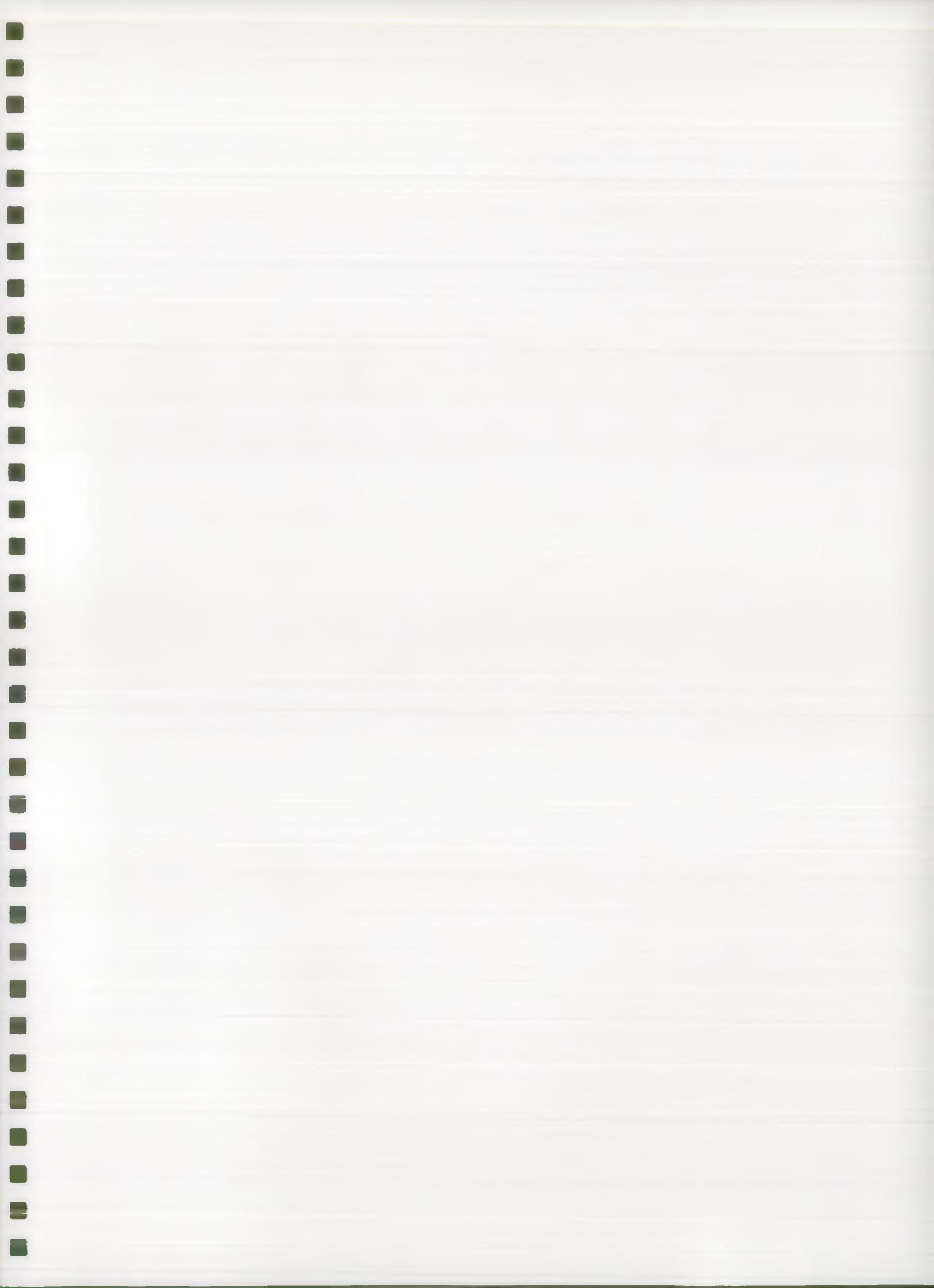
#### Objectives

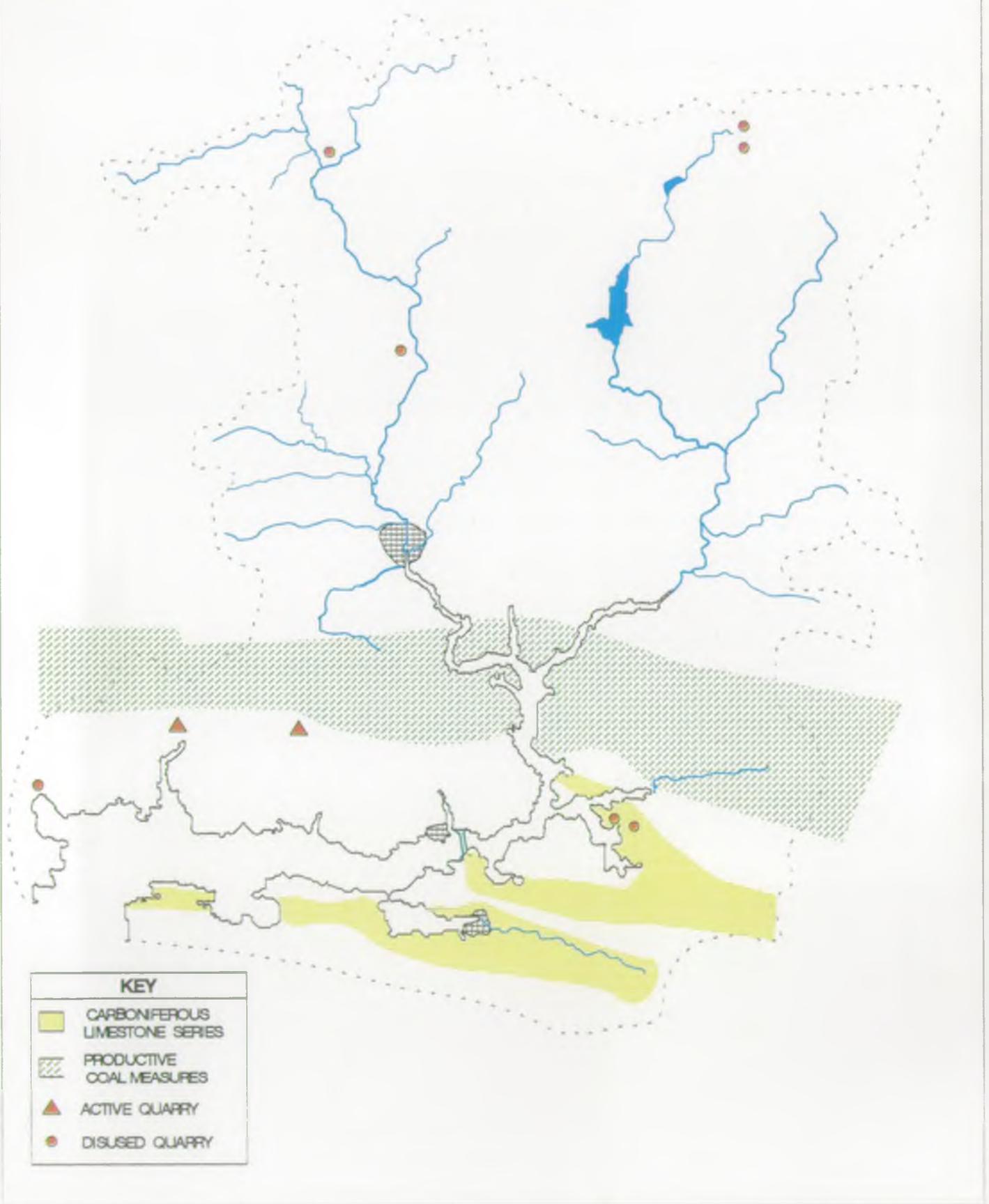
- To ensure that waste disposal sites are designed and operated in a way that does not adversely affect other uses of surface water or groundwater.

## STATEMENT OF USES

### Environmental Requirements

- Water Quality***
- Waste disposal sites must be designed and managed to prevent liquid effluent from adversely affecting the quality of surface waters and groundwaters.
  - Where appropriate waste disposal sites must comply with prohibition notices or discharge consent conditions. This will be enforced by the NRA.
- Water Quantity***
- The quality of groundwaters should be protected by implementing the NRA's Groundwater Protection Policy.
  - Waste disposal activities must not harm groundwater resources or adversely affect the rights of water abstractors.
- Physical Features***
- Windblown litter from waste disposal sites must not be permitted to create an aesthetic problem in adjacent waterbodies.
  - Following the cessation of tipping, all aftercare provisions stated on the planning consent must be carried out by those responsible.





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3.10 MINERAL EXTRACTION

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**General**

Mineral extraction can affect surface waters 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 as groundwater flows can be altered with knock on effects on streamflow. 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 runoff and reduce the recharge of groundwaters by rainfall.

Open cast mining can be of particular concern to the NRA. 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 floodplain and is controlled by planning law and 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 such discharges are consented and monitored by the NRA.

All mineral workings are subject to general planning control and the NRA is a consultee on such applications and considers each application on a case by case basis.

**Local Perspective**

*There are two active quarries in the catchment and the NRA is pursuing the installation of adequate settlement facilities to treat the site drainage.*

*There are many abandoned quarries throughout the area. Most relate to previous small scale operations. The most extensive workings are found at Rosebush on the Preseli Hills, and at West Williamston on the Carboniferous Limestone. These sites do not cause water quality problems.*

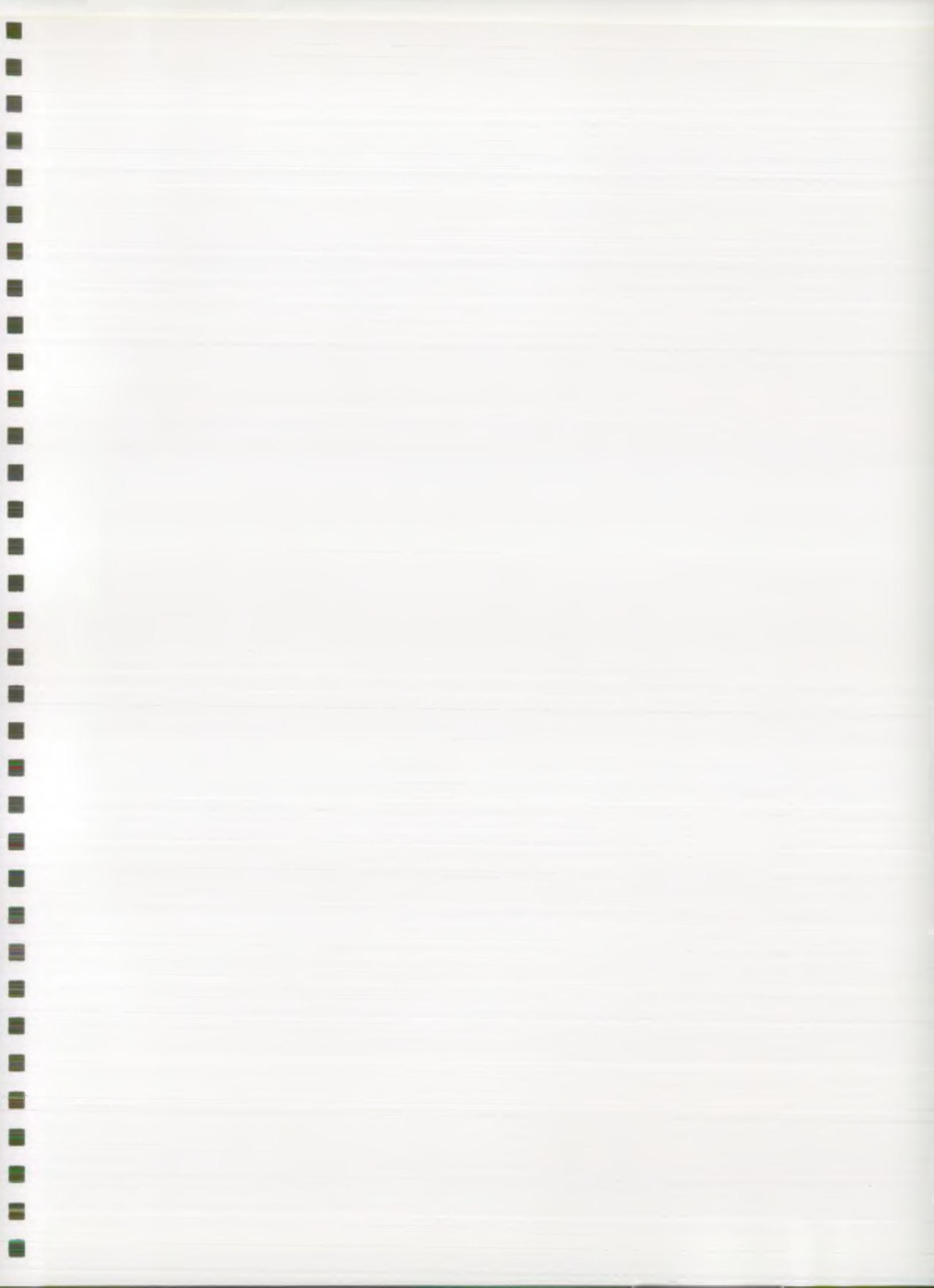
## STATEMENT OF USES

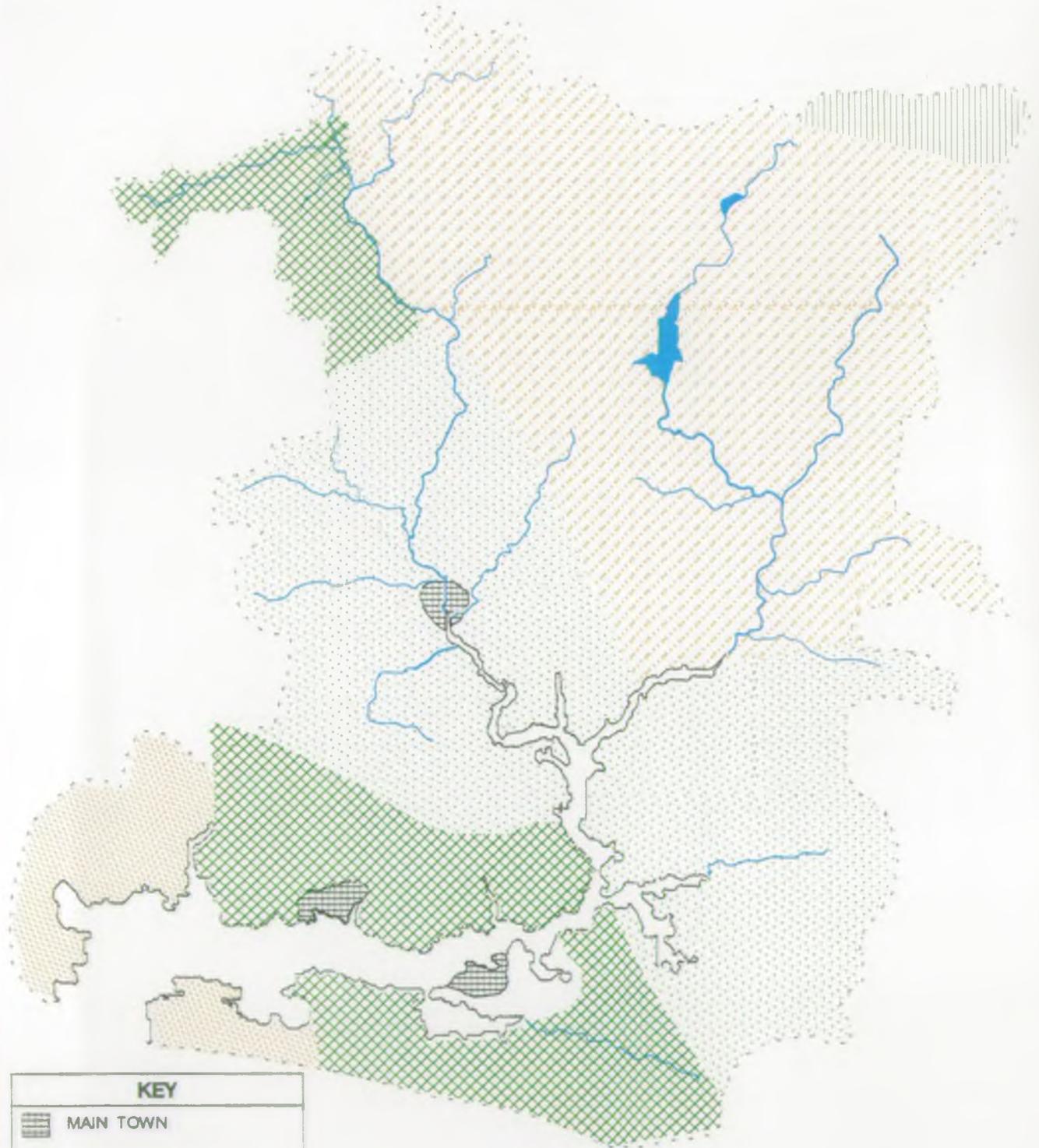
*A band of productive coal measures, which runs either side of the Daugleddau, has attracted scattered small-scale mining operations in the past. There is generally no impact from these sites because of the limited scale of the workings.*

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

### **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 deterioration in water quality above a consented discharge, from that assumed when the discharge consent was calculated.
  - The quality of groundwaters should be protected by the implementation of the NRA's Groundwater Protection Policy.
  - Measures must be taken to prevent diffuse pollution that may arise from rainfall runoff.
- Water Quantity**
- Mineral working and land reclamation should not have an adverse effect on surface and groundwater resources or the rights of 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.





KEY	
	MAIN TOWN
	SHEEP/DAIRY/BEEF
	INTENSIVE DAIRY
	MAINLY DAIRY WITH BEEF
	MIXED LIVESTOCK/CROPS
	CROPS - MAINLY POTATOES

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3.11 AGRICULTURAL ACTIVITY

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**General**

The processes and by-products of agriculture are a major potential threat to the water environment, especially in more intensively cultivated areas. Key areas of concern to the NRA 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 section. However, the highly polluting nature of agricultural waste normally precludes this option and the NRA's approach is aimed at control of source by minimising the volumes of effluent. 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 the NRA. Consequently the NRA has 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 a programme of farm visits by NRA staff helps to alert farmers to potential and existing problems.

The NRA issues 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.

The NRA encourages farmers 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.

**Local Perspective**

*Agriculture is the predominant land use in the catchment with intensive dairy farming activity present in about two thirds of the land. There are small areas of sheep rearing in the upper Eastern Cleddau catchment near Preseli Hills. There is some beef livestock rearing and a small area of crops, mainly potatoes, either side of the mouth of the Haven.*

*Agriculture has intensified over the past 20 years without, in many cases, comparable investment in effluent handling and storage facilities. Given the generally inadequate clean/dirty water separation, and the high rainfall and steep topography in the intensive dairy areas, agricultural premises and activities are the main pollution sources. There is a history of widespread agricultural pollution in both the Eastern Cleddau and the Western Cleddau.*

*The two principal potable water intakes are situated just above the tidal limits on the main Eastern and Western Cleddau rivers, below the intensive dairy areas. This makes them vulnerable to any pollution incident in the catchment. The NRA has undertaken work in the Eastern Cleddau catchment to model pollution dispersal characteristics and the time taken for pollution to reach the intake, under various flow conditions. The results enable the NRA to provide Dŵr Cymru with more accurate information to aid their decision on possible intake closures. Similar studies on the Western Cleddau have yet to be completed and are considered by the NRA and Dŵr Cymru to be of lower priority than outstanding work on some other catchments in the Area (eg Tywi and Teifi) because the Eastern Cleddau intake at Canaston provides an alternative source of supply.*

*The need for increased farm production in the 1970s also led to a demand for improved drainage systems. Major schemes were therefore undertaken on the upper Western Cleddau for this purpose, and their creation and subsequent maintenance has had a significant impact on the general water environment, and salmonid fisheries.*

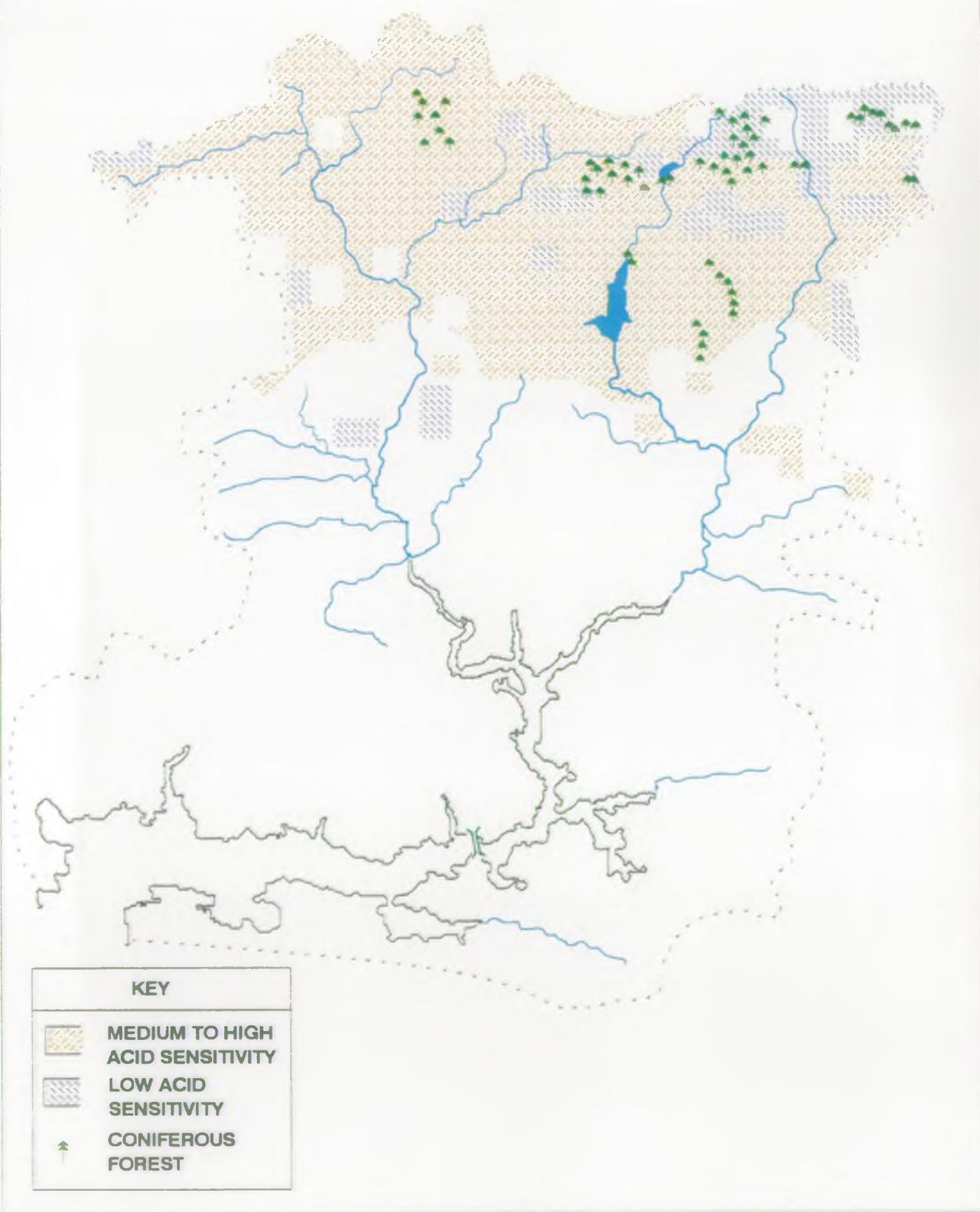
*In June 1992, the Secretary of State announced his intention to designate Preseli as an Environmentally Sensitive Area (ESA); a consultation document followed, in March 1993. The proposal, which relates to the whole of the Preseli Pembrokeshire District, is a voluntary scheme open to those who farm land within the area. It allows farmers to enter into management agreements, in order to retain the wildlife habitats, landscape and historic interest of the area, and recompenses them with annual payments.*

## STATEMENT OF USES

- Objectives** - To protect the water environment from the potential adverse effects of agricultural activity.

### **Environmental Requirements**

- Water Quality**
- All consented discharges should comply with the conditions expressed in the 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.
- Water Quantity**
- To develop and implement a Regional licensing policy that will, at a catchment level, enable the NRA to manage water resources to achieve the right balance between the needs of the environment and those of abstractors, including protection from derogation.
- 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.



3.12 FORESTRY

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**General**

As a result of successive Government policies the use of land for coniferous forestry has increased dramatically over the past 40 years. However, it has become increasingly apparent that in certain circumstances, conversion of land to coniferous forest can have a range of adverse impacts on the water environment. These include:-

- Increased sediment load and runoff rate to rivers that can increase the flood defence maintenance requirement and may also destroy key conservation features.
- In sensitive areas water quality can become too acid for fish and other wildlife to survive, as the dense tree canopy increases the effects of acid deposition- often referred to as "Acid Rain".

Consequently the NRA has worked closely with the Forestry Authority and others in the production of Forests and Water Guidelines that are designed to minimise the impact of forest management on the water environment. While forest development is outside the normal planning process some local authorities have decided to produce Indicative Forestry Strategies that will outline the future of managed forests in England and Wales. The NRA is an informal consultee on these strategies but is pressing for a more formal role in this and other aspects of forest planning.

**Local Perspective**

*There is presently little forestry in the catchment and existing water quality results indicate that acidification is not a problem.*

*A survey of the soil types and geology has been undertaken by the Institute of Terrestrial Ecology. This highlighted areas where afforestation may pose a risk to water quality This information will be used to screen consultations received on future forestry developments. Map 14 indicates, in a general way, the areas potentially sensitive to afforestation in the Cleddau catchment. Forestry proposals which relate to these areas will be considered in detail, on a case by case basis, by the NRA.*

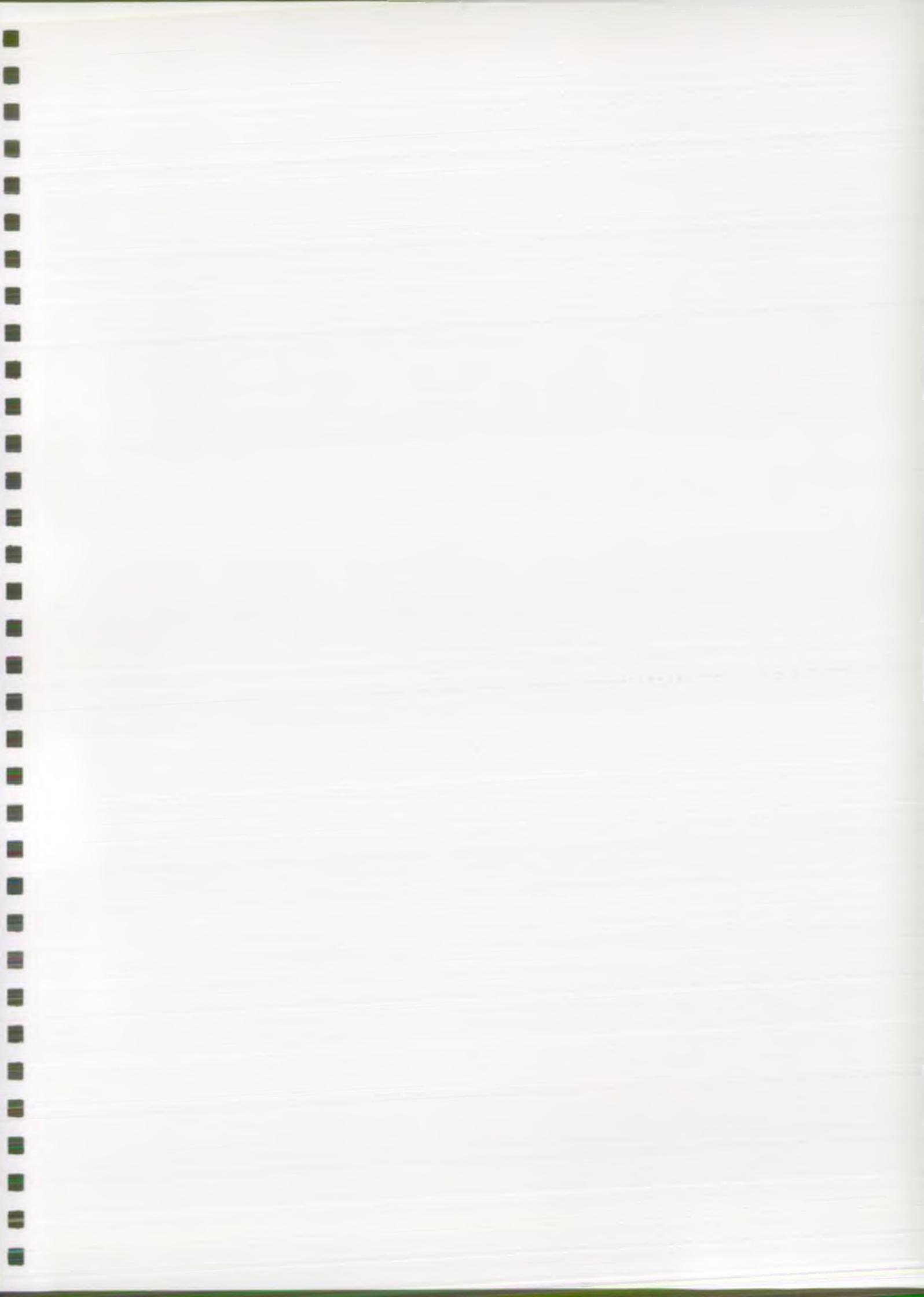
**Objectives**

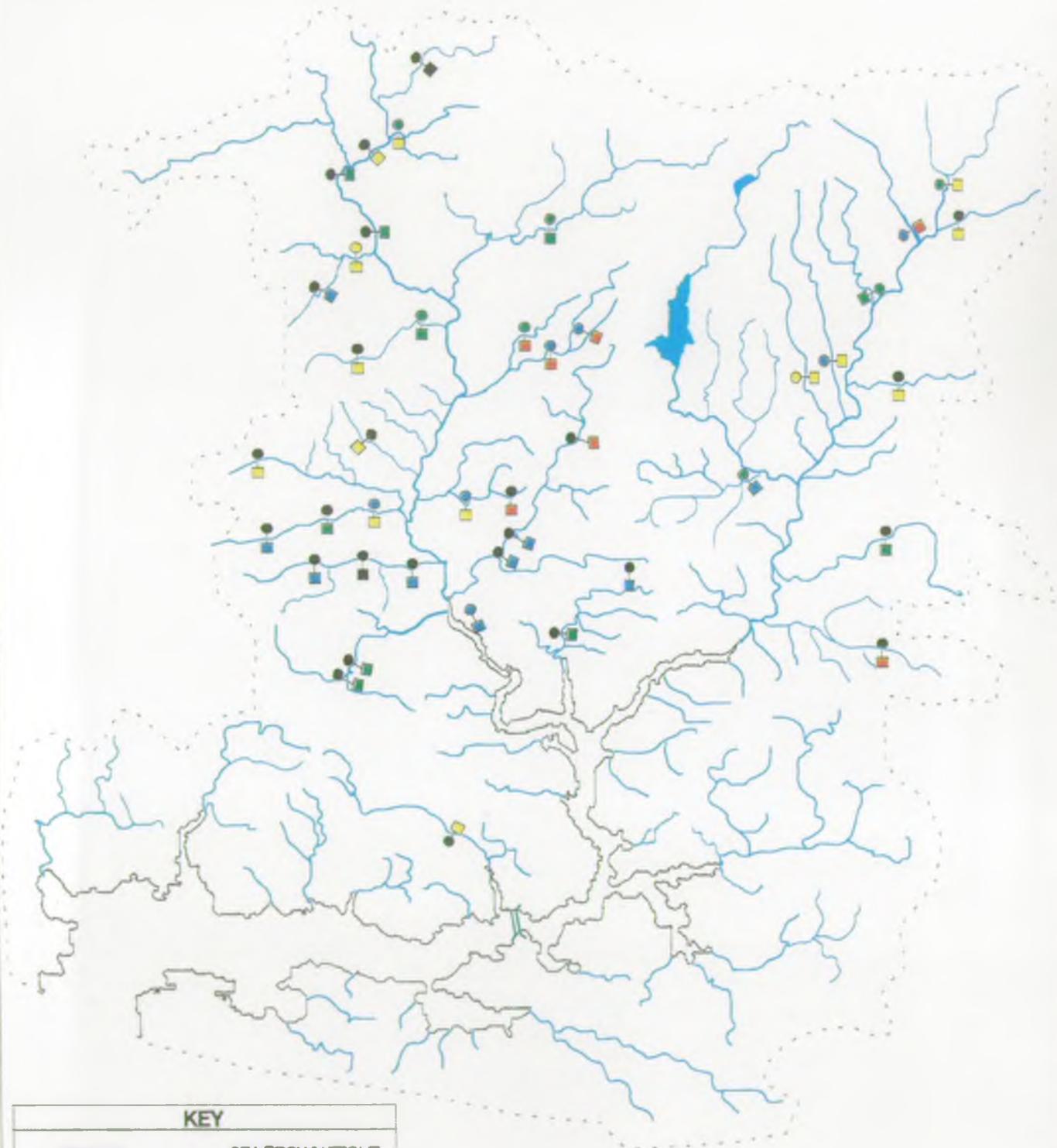
- To protect the water environment from the potentially adverse effects of forestry.

## STATEMENT OF USES

### **Environmental Requirements**

- Water Quality*** - That the provisions of the Forests and Water Guidelines should be complied with in all cases to minimise the impact of forestry on water quality.
- Water Quantity*** - To develop and implement a Regional licensing policy that will, at a catchment level, enable the NRA to manage water resources to achieve the right balance between the needs of the environment and those of abstractors.
- Physical Features*** - That the provisions of the Forests and Water Guidelines should be complied with in all cases to minimise the impact of forestry on the physical environment.





KEY			
SALMON		SEA BROWN TROUT	
●	EXCELLENT	■	EXCELLENT
●	GOOD	■	GOOD
●	MODERATE	■	MODERATE
●	POOR	■	POOR
●	ABSENT	■	ABSENT

(W.CLEDDAU-1990 DATA , E.CLEDDAU-1992)

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3.13 FISHERIES ECOSYSTEM

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**General**

The Fisheries Ecosystem Use addresses the whole water based ecosystem, although fish are used as key indicators of the general wellbeing of the river environment. Consequently, there are 6 water quality classes based upon the requirements of different fish species, Class 1 (high quality salmonid fishery) being the highest.

It is intended that the Fishery Ecosystem Use will be the first to be included within the new Water Quality Objectives (WQO) scheme being developed by the Department of the Environment (DoE). It is proposed that the standards supporting the WQO will be the same as those for the Fisheries Ecosystem targets identified in CMPs. These WQO's would then become statutory following public consultation and agreement by the Secretaries of State.

In setting the first WQOs based on Fisheries Ecosystem Classifications, the DoE will select, a small number of pilot catchments to test the procedures for implementing the scheme. The Cleddau catchment is among those catchments being considered for inclusion in the first batch. Consequently, it is appropriate to consider the proposed water quality standards of the WQO scheme when planning the maintenance and improvements of the fisheries and general ecosystem of the river.

**Local Perspective**

*There is an established migratory salmonid fishery in both the Eastern and Western Cleddau. Some indication of the relative size of the runs can be deduced from declared rod and net catch data. Based on ten years declared rod catch data, Cleddau anglers catch, on average, about 1,000 sea trout and 75 salmon each year; some two-thirds of this number are landed by anglers on the Eastern Cleddau. In contrast, the Compass nets have declared a total of some 30 salmon and 10 sea trout, on average, over a similar period.*

*Brown trout are found throughout the catchment, although few fish attain any great size.*

*The nature of the catchment should enable a high class salmonid fishery to exist. The Fishery Ecosystem Use Class to be applied should, therefore, be Class 1 (FEC1).*

## STATEMENT OF USES

*The length of river accessible to spawning fish is restricted in a small number of tributaries by impassable or low water obstructions. Llysyfran reservoir, on the Syfynwy, is a total obstruction to fish passage and a mitigation scheme provides for the resultant loss of spawning. The Pembrokeshire Water Board (Llysyfran Reservoir) Order 1966, under which the dam was built, enables releases of water to be made, up to a total of 210 million gallons per annum (at a rate not greater than 15mgd), for river management purposes.*

*Available spawning and nursery areas have been significantly affected by extensive agricultural land drainage capital schemes on the Western Cleddau, whilst major farm pollution incidents have also affected fish stocks in many areas of the catchment. Routine and specific electro-fishing surveys have confirmed that fish stocks are generally sub-optimal throughout the catchment.*

*Llysyfran is a "put and take" rainbow trout fishery, receiving some 20,000 fish per annum. Wild brown trout are also present. Rosebush reservoir receives some supplementary stocking with brown trout. The presence of rainbow trout fish farms on the Eastern Cleddau, sea cages in the Haven and the put and take fishery at Llysyfran has resulted in significant numbers of rainbow trout escaping to the river, on occasions.*

*In addition, a number of small private stillwater fisheries have been developed by local landowners, holding small stocks of rainbow trout.*

*The Cleddau fisheries are essentially salmonid and, apart from a population of gudgeon in the upper Syfynwy, there are no known in-river coarse fish populations apart from the ubiquitous minnow.*

*Few natural lakes exist and newly formed pools and reservoirs, if developed, are usually managed as put-and-take trout fisheries. There are a few stillwater populations of coarse fish in the area, including small carp and roach at Treffgarne Quarry; pike, tench and roach at a quarry near Johnston, and various species at a small private fishery in the headwaters of the Carew River.*

*Apart from salmonids and the coarse fish listed, other fish species such as bullhead, stoneloach, lamprey and eel populate the rivers. At the tidal limit different species such as flounder and mullet push up into fresh water when conditions are favourable.*

*The Eastern Cleddau, from its tidal limits to Llangolman (22km) and the Western Cleddau, from its tidal limits to Little Newcastle (20km), are designated under EC Fisheries Directive (78/659/EEC).*

## STATEMENT OF USES

- Objectives**
- To sustain 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.
  - To ensure a rich and varied range of in-river and bankside habitats and species dependant upon them, typical of a catchment of this type.

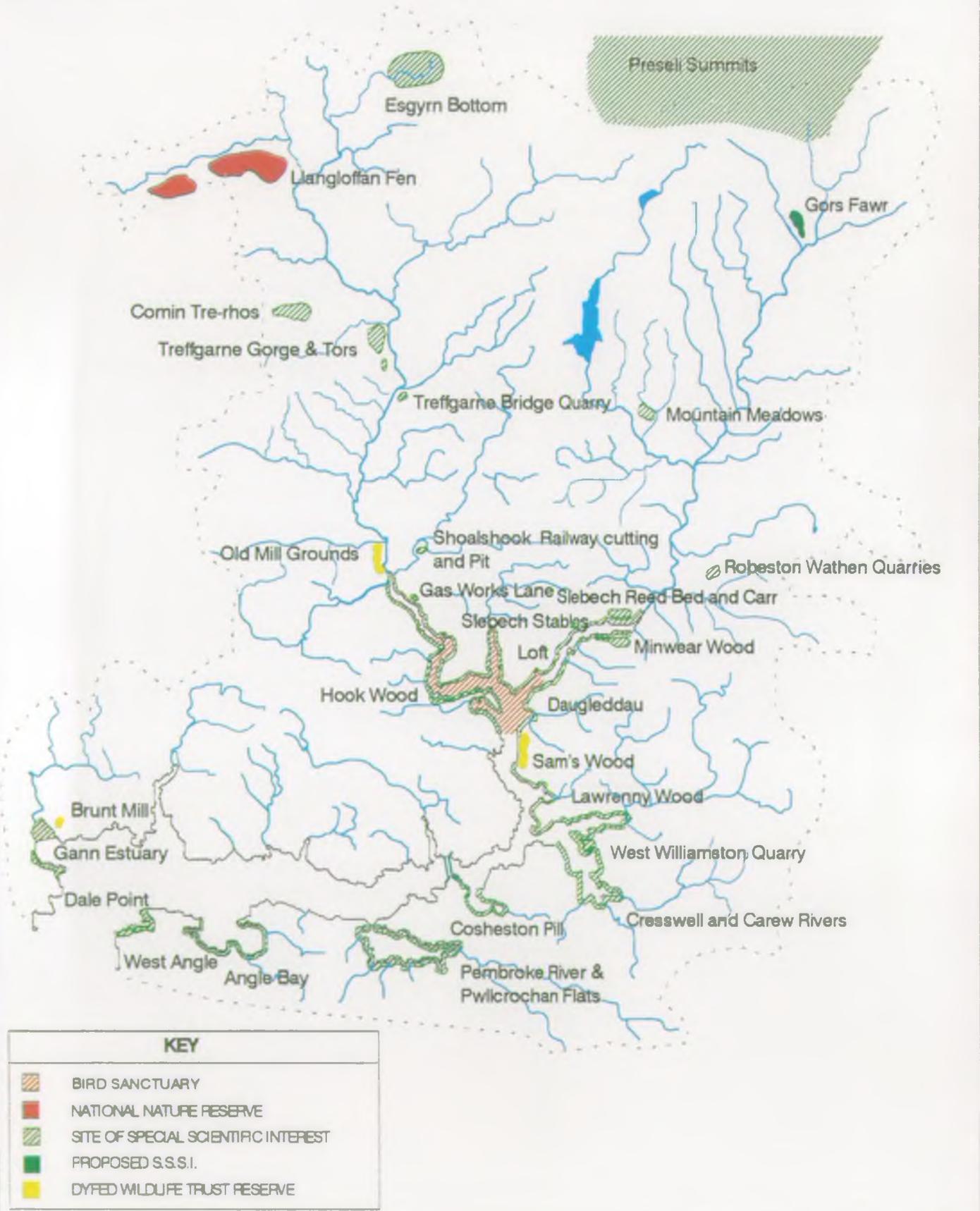
### Environmental Requirements

#### *Water Quality*

- Rivers* - Waters should comply with the formal and informal standards set for the Fishery Ecosystem Use..
- Stillwaters* - Until specific stillwater Water Quality Objectives are set, these waters should conform with the same standards used for the Fisheries Ecosystem Use for rivers.
- Estuaries* - Coastal and Estuarial waters should conform with the informal standards for the protection of aquatic life.

- Water Quantity* - To develop and implement a Regional licensing policy that will, at a catchment level, enable the NRA to manage water resources to achieve the right balance between the needs of the environment and those of abstractors, including protection from derogation.

- Physical Features* - An appropriate diversity of natural instream and bankside habitats should be maintained to support the wildlife (including fish) typical of the river type.
- Appropriate levels of riparian and instream vegetation should be maintained to provide adequate cover for fish and habitats for other wildlife associated with the river and its corridor.
  - 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 or general ecosystem, and where possible should lead to enhanced diversity.



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3.14 SPECIAL ECOSYSTEMS

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**General**

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), and Sites of Special Scientific Interest (SSSIs). This Use is extended to sites that are valuable in conservation terms but are not formally protected, eg. 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 a separate public consultation.

**Local Perspective**

*The Cleddau is a system of exceptional importance to wildlife, providing a range of habitats that support diverse floral and faunal communities. Indeed the former NCC had recommended that the entire Western Cleddau be notified as an SSSI in view of its botanical diversity, being more typical of a lowland river, not usually associated with Wales. This designation is now unlikely under current notification procedures.*

*Twenty five SSSIs have been notified of which twelve are water related, with a further two sites proposed. The SSSIs range in complexity from open moorland, woodland and freshwater marsh communities to the mudflats, saltmarshes and rocky shores of the Haven. Corsydd Llangloffan is a particularly important wetland SSSI in the upper reaches of the Western Cleddau, and has been designated a NNR for its range of fen vegetation and associated animals, many of which are locally scarce. Treffgarne Rocks is another important SSSI in this catchment, recognised at a national level as a Geological Conservation Review site.*

*The Pembrokeshire Coast National Park includes the bays and inlets of the upper Cleddau estuary (Daugleddau), geographically isolated from the coastal strip of the National Park. Part of this area has been designated as a Bird Sanctuary because of its considerable ornithological interest.*

*Five sites in the catchment are managed by the Dyfed Wildlife Trust and there are several otter havens which protect valuable habitats and benefit from agreements between landowners and Otter Project Wales.*

*Nursery areas for bass have been designated by Ministry of Agriculture Fisheries and Food (MAFF) in the tidal waters upstream of the Cleddau Bridge and from the mouth of the Pembroke River (The Bass (Specified Sea Areas) (Prohibition of Fishing) Order 1990).*

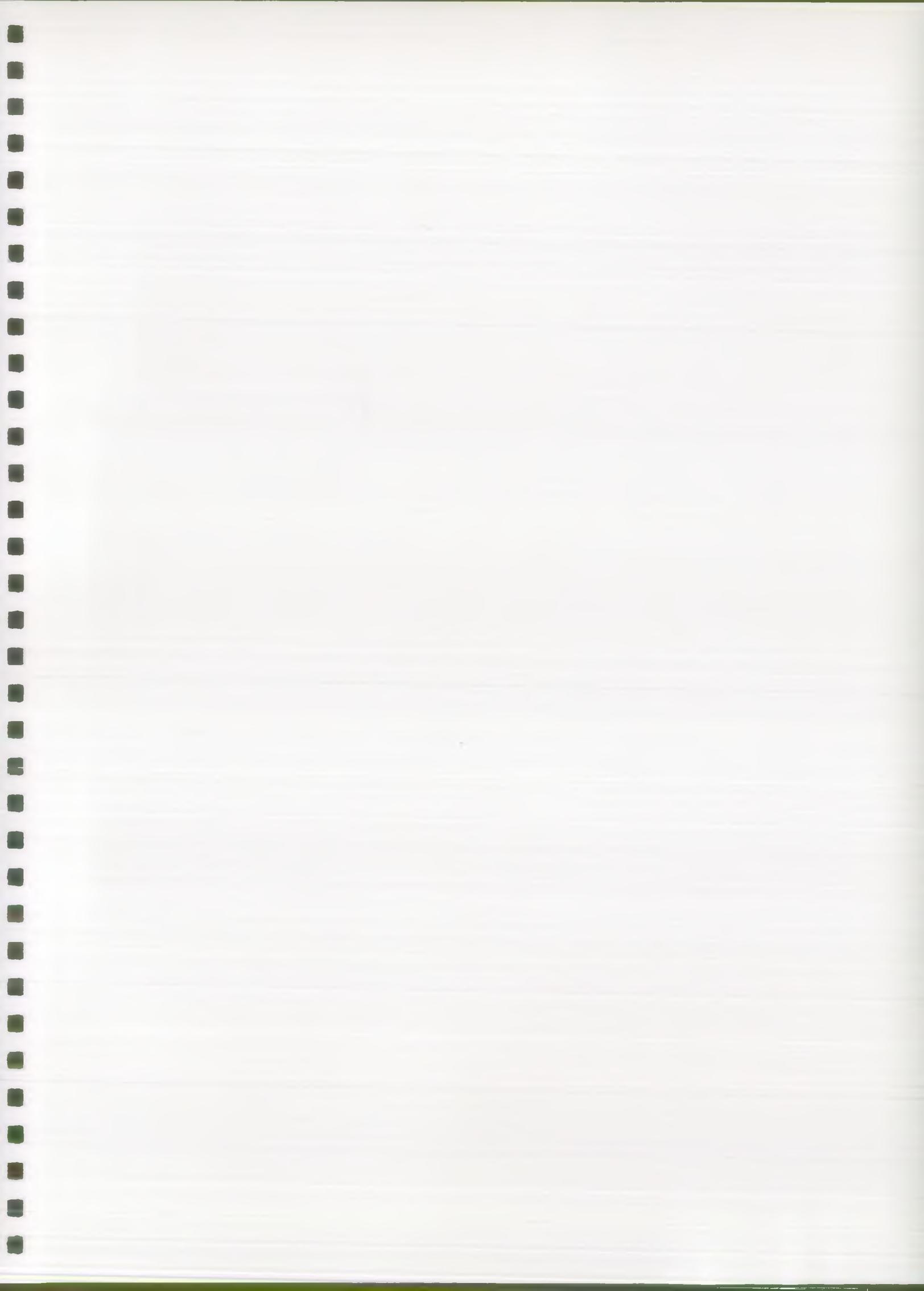
## STATEMENT OF USES

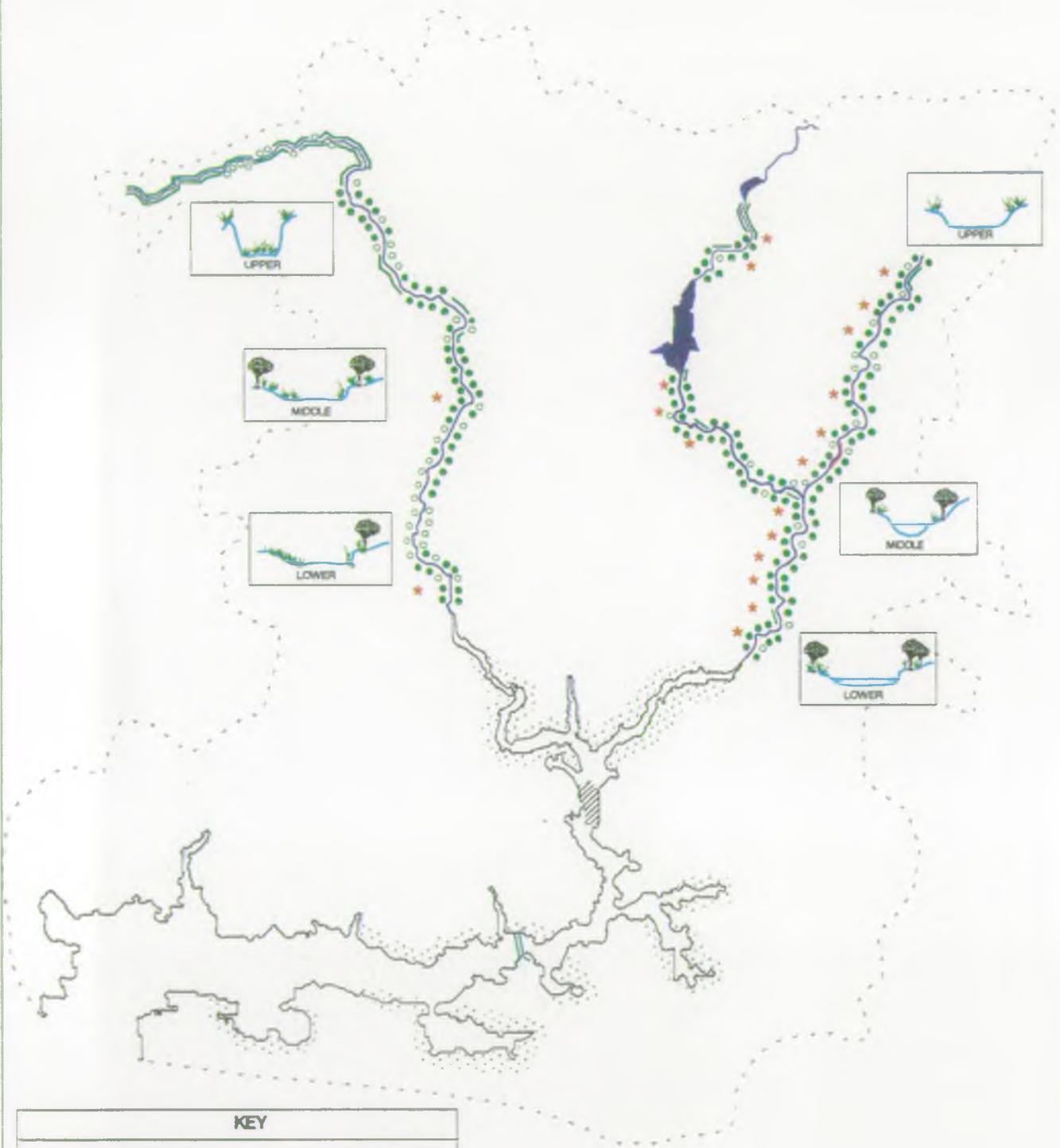
- Objectives** - To protect the special conservation interest for which the water based sites were designated.

### **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.

Meanwhile at sites where water quality is a key factor the most stringent alternative standards for water quality for a "Conservation Use" (ie. Fisheries Ecosystem, Class 1) will be applied. Water quantity and physical features standards will be addressed to the maintenance of existing conditions, unless otherwise specified.





KEY	
<b>DOMINANT BANKSIDE VEGETATION PER 500 METER BANK</b>	
	GRASSES AND HERBS
	SPARSE TREE COVER
	DENSE TREE COVER
	JAPANESE KNOTWEED
	ARTIFICIAL BANK
<b>FAUNA</b>	
	OTTER PRESENCE
<b>INTERTIDAL</b>	
	SALT MARSH
	SUBLITTORAL

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3.15 RIVER CORRIDOR CONSERVATION

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**General**

The protection of the aquatic ecosystem and designated sites for nature conservation are covered in the Fisheries Ecosystem and Special Ecosystems sections respectively. This section deals with the broader aspects of the conservation of wildlife within the river corridor.

The NRA has a duty to promote and further conservation of flora and fauna while it carries out its business. This includes the protection of water based, or associated, plants and animals that are so vital to the water environment. It also has to pay regard to any features of natural beauty or interest and must also consider the desirability of improving access to these features.

**Local Perspective**

*Extensive surveys of major instream and bankside habitats have been carried out on a total of 147km of river corridor along the main rivers and tributaries. The Eastern Cleddau and its tributaries are predominantly natural in character with the watercourses flowing through areas of un-improved or semi-improved land. The variation in morphology provides a range of habitats which should be protected. In contrast, the upper reaches of the Western Cleddau have been modified extensively; river deepening and widening has resulted in habitat degradation. The general instream and bankside features of the rest of the Western Cleddau, however, are diverse.*

*Otters are present throughout, and the catchment has been regarded as one of the most important areas for this species in southern Britain. Protection of bankside vegetation and sensitive river maintenance will help to preserve this stronghold.*

*Kingfishers occur throughout and vertical earth banks, where the birds nest, are frequent throughout the main Western Cleddau. Other birds associated with wetlands which have been recorded include:- dipper, mallard, coot, moorhen, snipe, sedge warbler, grey and pied wagtails and heron. The intertidal mudflats and saltmarsh provide particularly important areas for birds.*

*Japanese Knotweed, although not widely distributed, appears to be increasing along the Eastern Cleddau and lower reaches of the Western Cleddau.*

## STATEMENT OF USES

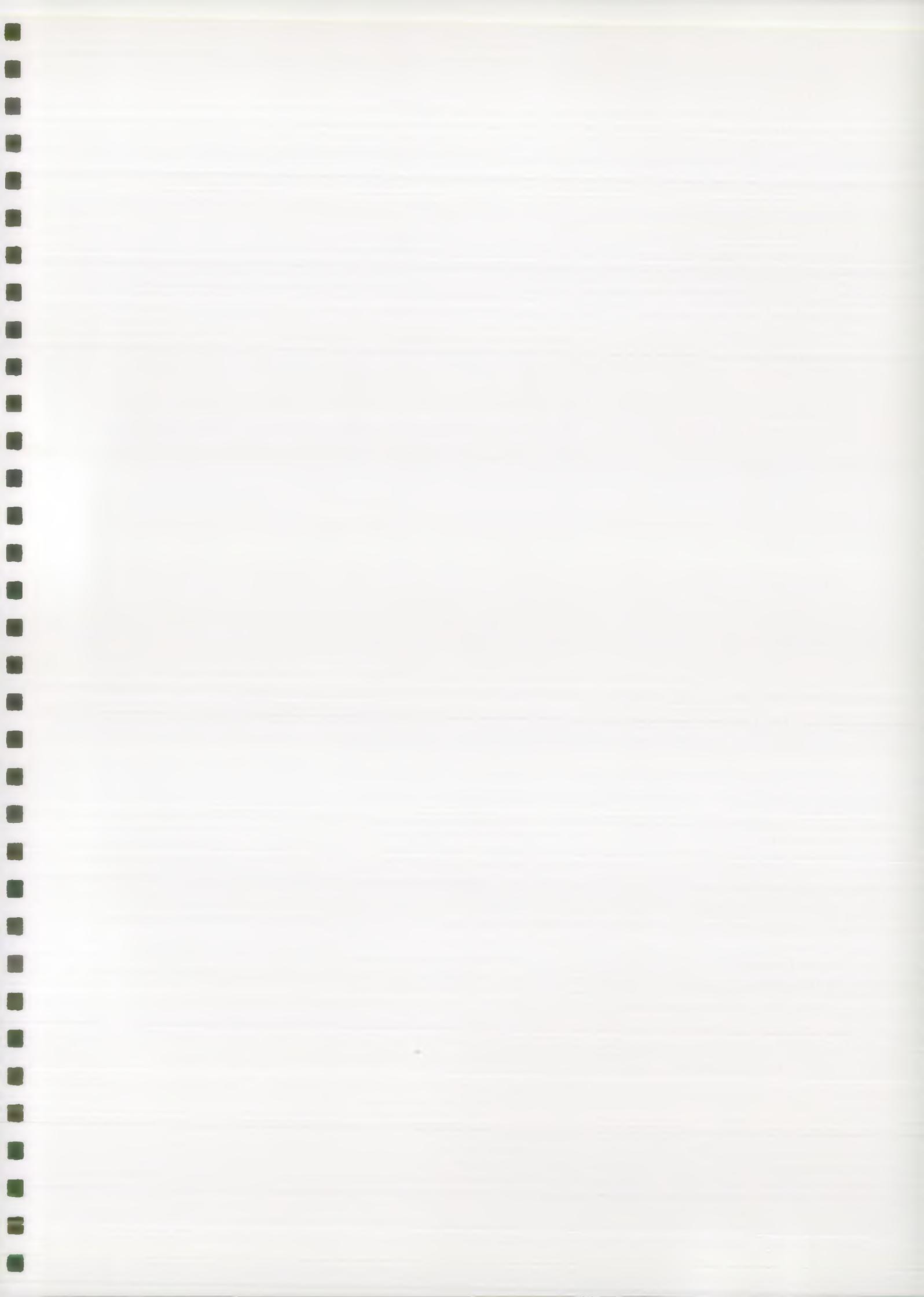
**Objectives** - To ensure that wildlife within the river corridor is protected.

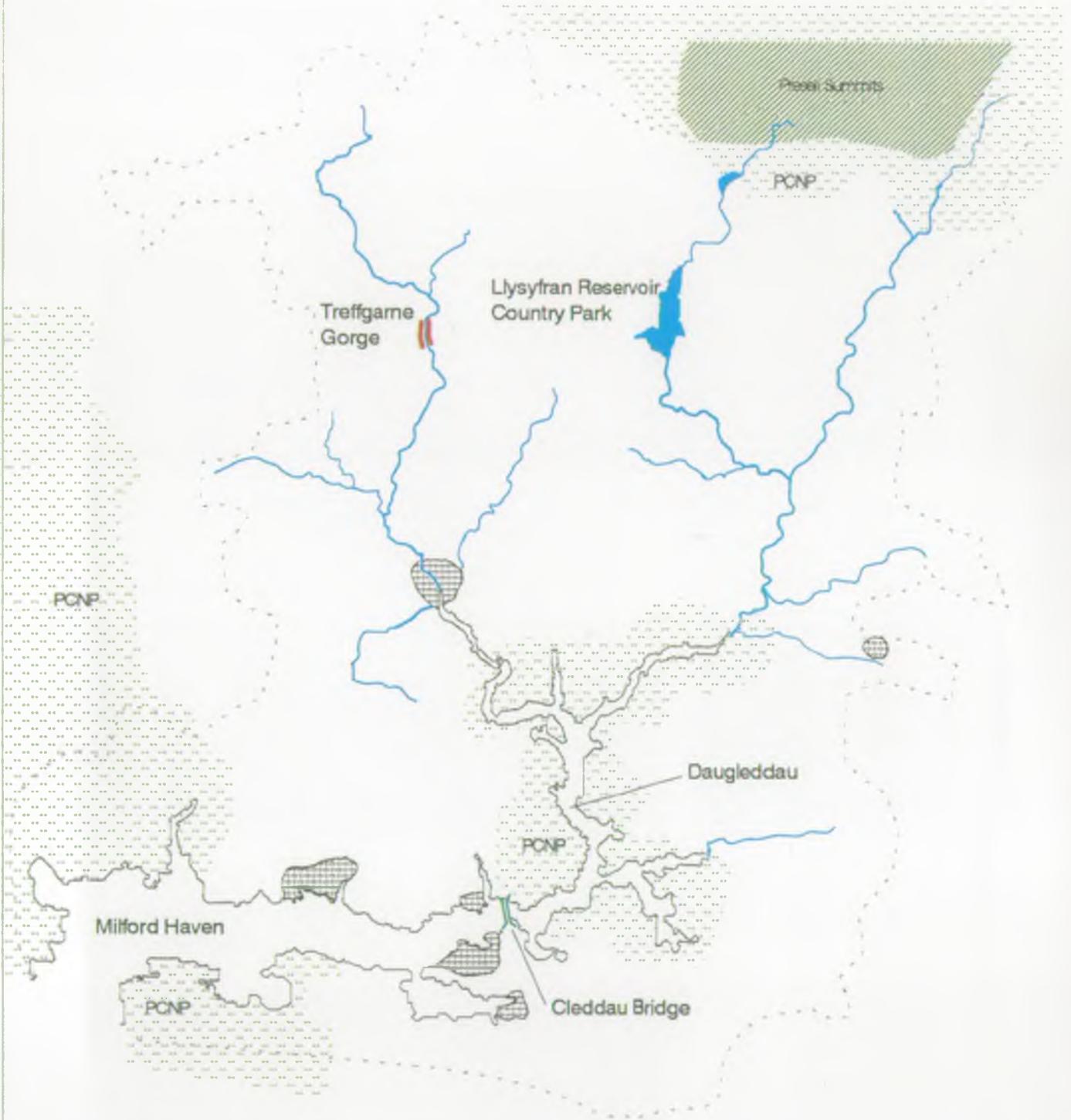
### **Environmental Requirements**

**Water Quality** - Where water quality is a key factor it should comply with the appropriate Fishery Ecosystem standards.

**Water Quantity** - To develop and implement a Regional licensing policy that will, at a catchment level, enable the NRA to manage water resources to achieve the right balance between the needs of the environment and those of abstractors, including protection from derogation.

**Physical Features** - The diversity of natural in stream features and river corridor plants and animals should be maintained and enhanced where desirable.





KEY	
	PRESEILI SUMMITS
	PEMBROKESHIRE COAST NATIONAL PARK
PCNP	

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3.16 LANDSCAPE

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**General** The landscape is of great importance in many catchments and may attract large numbers of visitors. The NRA must pay regard to any features of natural beauty or interest, and must also consider the desirability of improving access to these features. Some individual components of the landscape are considered in other Sections, such as River Corridor Conservation and Archaeology and Heritage.

Exceptionally beautiful landscapes may be protected as Areas of Outstanding Natural Beauty (AONBs) for which the NRA is an informal consultee, or as National Parks.

**Local Perspective**

*The attractiveness of the natural landscape of the catchment is widely recognised and brings many tourists to the area. The Daugleddau, in particular, is an area of great beauty, recognised by its inclusion within the Pembrokeshire Coast National Park. The Haven is one of the largest natural harbours in the world and, in spite of the refinery developments, can present glorious views from a number of vantage points, including the Cleddau Bridge.*

*The river corridors themselves also have a rural charm in the lower and middle reaches, and there is wilder beauty in the headwaters in the Preseli Hills. The Treffgarne Gorge area of the Western Cleddau is particularly attractive, where the river has carved its path through the rock.*

**Objectives** - To ensure the landscape, including designated areas, are protected and, where appropriate, accessible.

**Environmental Requirements**

**Water Quality** - It is unlikely that there could be any specific water quality requirements to protect a landscape feature, although water around such places should at least conform with the informal standards for Aesthetic Standards criteria set for CMPs.

- Where water quality is a key factor it should comply with the appropriate Fishery Ecosystem class standards.

**Water Quantity** - To develop and implement a Regional licensing policy that will, at a catchment level, enable the NRA to manage water resources to achieve the right balance between the needs of the environment and those of abstractors, including protection from derogation.

**Physical Features** - Physical features that give rise to natural beauty should be protected.



KEY	
▲	POST MEDIEVAL
■	MEDIEVAL
●	PREHISTORIC

SOURCE : SITES AND MONUMENTS RECORD . DYFED ARCHAEOLOGICAL TRUST

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3.17 ARCHAEOLOGY & HERITAGE

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**General**

This Use relates to the protection of archaeological sites, historic landscape features and other aspects of local heritage. All known historic sites are registered in the County Sites and Monuments Record, held by the relevant County Council. Only a small proportion of sites are designated as Scheduled Ancient Monuments under the Ancient Monuments and Archaeological Areas Act 1979; their condition is monitored by Cadw's Inspectors of Ancient Monuments and Field Monument Wardens.

The NRA must pay regard to features of archaeological interest, and would seek to safeguard any features or activities which contribute to the local heritage. These often attract visitors and the desirability of improving access must be considered.

**Local Perspective**

*The most important types of prehistoric sites within the catchment area are the small Iron Age hillforts and defended enclosures or raths which are densely clustered on the edge of the steep sides of the many stream and river valleys. Pembrokeshire is of national importance in terms of the numbers, types and condition of these monuments. The medieval fortified sites of earthen and stone castles are often sited closer to the banks of streams and rivers. Most notable examples within the catchment area include the castles of Carew and Pembroke.*

*Medieval economies depended on water power and the sites of water mills are nearly all of medieval origin, even if surviving buildings, weirs, ponds and leats may be of later build. The area contains many little studied and lost mill sites but also splendidly preserved examples of later mills such as Blackpool and Carew Tidal Mills.*

*The catchment area is covered by many ford, ferry and bridging points for a complex communication pattern developed over the last millennium. The lower reaches of the Daugleddau contain early wharves and quays and other sites and features of industrial and maritime archaeological significance.*

**Objectives**

- To ensure that heritage features of interest, including designated sites are protected and, where appropriate accessible.

## STATEMENT OF USES

### **Environmental Requirements**

- Water Quality*** - It is unlikely that there could be any specific water quality requirements to protect a heritage site although water around such places should at least conform with the informal standards for Aesthetic Criteria set for CMPs.
- Where water quality is a key factor it should comply with the appropriate Fishery Ecosystem standards.
- Water Quantity*** - To develop and implement a Regional licensing policy that will, at a catchment level, enable the NRA to manage water resources to achieve the right balance between the needs of the environment and those of abstractors, including protection from derogation.
- Physical Features*** - Sites and buildings of interest should, where cost-effective, be protected from damage by flooding and/or drought.
- The physical structure of sites and their settings should be maintained and, where possible, enhanced, recognising the interdependence of many of the sites and monuments. Where unavoidable change occurs, preservation by record should be implemented.





KEY	
B	Bird Watching
	Extension of Pembrokeshire National Park coastal footpath (part implemented)
	Pembrokeshire National Park
	Daugleddau Trail (length 100m)

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3.18 BASIC AMENITY

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**General** Basic amenity relates to those activities that are principally land based but which could 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**

*The two water related areas within the catchment that attract the most attention are the tidal reaches and Llysyfran Country Park.*

*Access to the Haven foreshore is generally good, but the intricate inlets of the Daugleddau are more inaccessible. The National Park Authority is promoting the development of a new long-distance footpath around the upper Cleddau estuary. In addition, this Authority is currently preparing its Draft National Park Plan, which will set out its proposals for managing the Park, including the conservation of its natural beauty and the promotion of public enjoyment.*

*South Pembrokeshire Action for Rural Communities (SPARC) is endeavouring to extend and link up public rights of way, principally to the south of the Haven.*

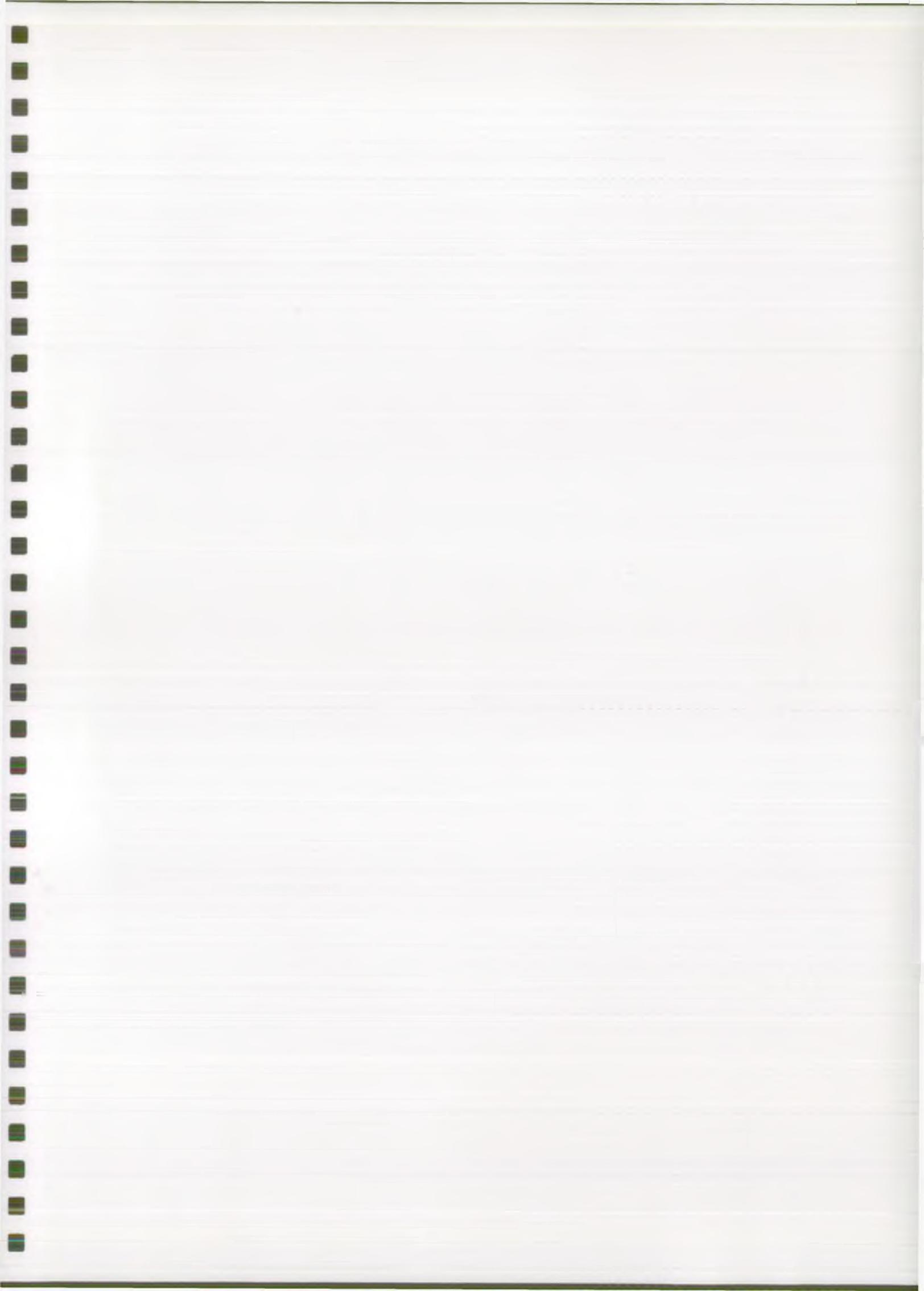
*The rivers Eastern and Western Cleddau flow through farmland and few public rights of way exist along their banks. However, Haverfordwest has recently undergone a major redevelopment and the Western Cleddau now forms the focus of the new town centre.*

*Llysyfran reservoir, situated on a tributary of the Eastern Cleddau, is the largest inland site for water based informal recreation in the catchment. A perimeter footpath of some 11km provides access to an unspoilt shoreline, bounded by deciduous woodland and some farmland. The site, which is rich in wildlife, is equipped with picnic, boating and fishing facilities and developments include an information centre and cafe.*

- Objectives**
- To maintain the water course so that public enjoyment of bankside environment is not impaired.
  - To provide safe and easy access to the waterside without unreasonably constraining other uses.

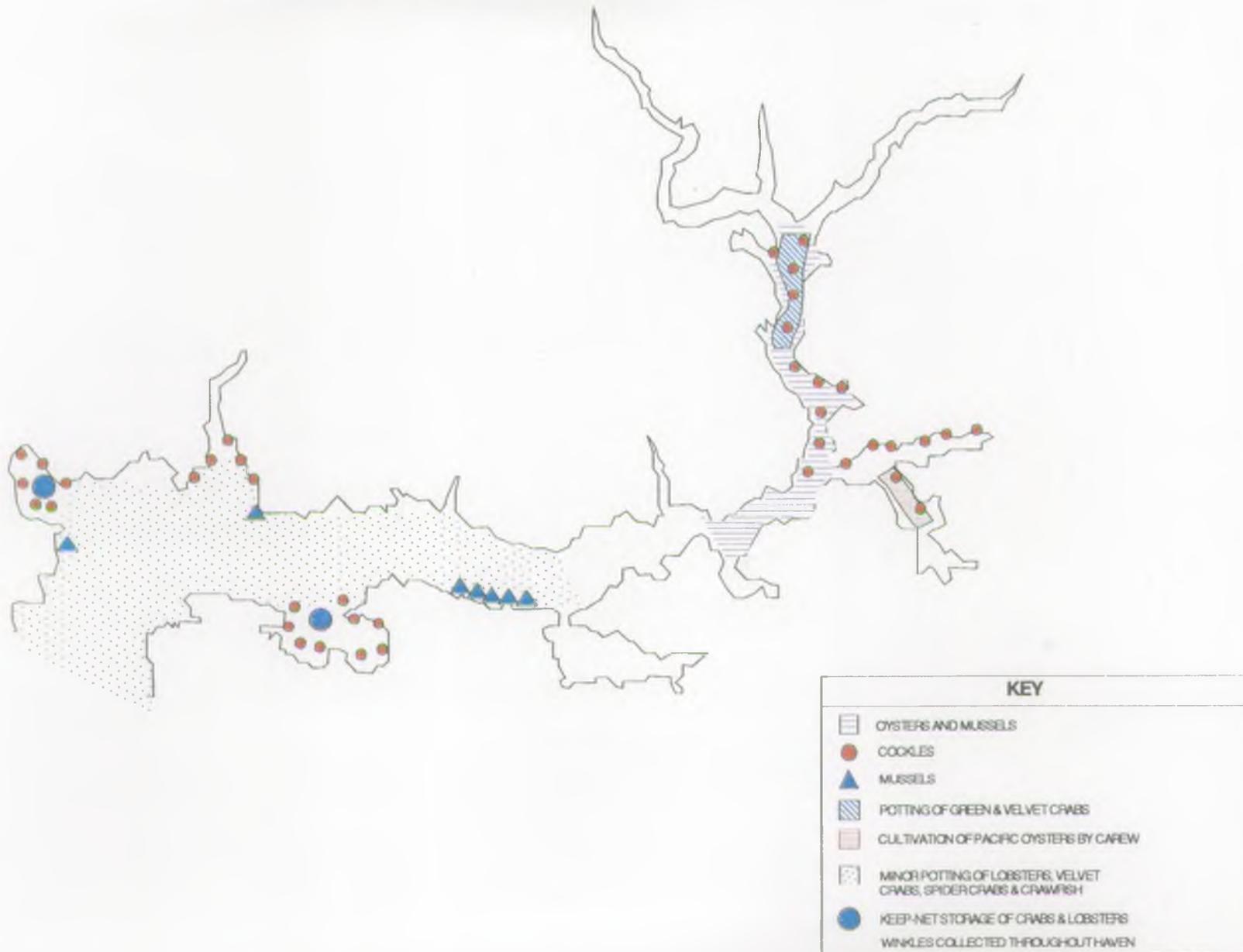
**Environmental Requirements**

- Water Quality* - The Water quality should comply with the informal standards for Aesthetic Criteria set for CMPs. This effectively defines the minimum water quality acceptable for any water body.
- Water Quantity* - To develop and implement a Regional licensing policy that will, at a catchment level, enable the NRA to manage water resources to achieve the right balance between the needs of the environment and those of abstractors, including protection from derogation.
- 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.
  - The design of paths, access points and recreational developments should take into account, wherever possible, the needs of the infirm and disabled.



MAP 21

MILFORD HAVEN SHELLFISH BEDS  
(COMMERCIAL & NON-COMMERCIAL)



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3.19 COMMERCIAL HARVESTING OF FISH AND SHELLFISH

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**General**

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 this is often shared with others, such as Local Authorities, Sea Fishery Committees and the Ministry of Agriculture, Fisheries and Food (Welsh Office, in Wales). Of direct interest to the NRA is the use of nets and other types of gear to catch migrating eels, salmon and trout or other freshwater fish. While fish can be caught commercially in freshwaters with rod and line this is still considered as angling and is covered by the rod licensing system.

**Sea Fisheries**

Sea fisheries are regulated by local Sea Fisheries Committees who control fishing practice using bylaws that are drawn-up, where appropriate (ie in relation to migratory fish) , in consultation with the NRA.

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 the NRA is the Sea Fish Authority in some coastal waters its principal concern is the protection of migrating salmon and sea trout.

**Salmon, trout and eels**

Salmon and trout are only fished for by commercial fisheries in estuaries and coastal areas. The number of these fisheries is closely controlled by Net Limitation Orders that are designed to maintain stocks. The NRA licenses commercial salmonid fisheries within the terms of the Orders and enforces its provisions. In many places the fishing techniques allowed reflect local culture, and consequently in Wales there is a very wide variety of fishing methods employed. These range from coracles and nets, to ranks of fixed traps.

The capture of eels and non-salmonid freshwater fish, other than by rod and line, is also licensed by the NRA. While there is no limit to the number of licences that can be issued, the NRA specifies certain methods that can be employed and may refuse to issue a licence for a location if it feels that fish stocks could not support the fishery, or that the migration of salmon and trout could be impaired.



KEY

-  PERMITTED AREA FOR COMPASS NET FISHERY (SALMON & SEATRUT)
-  PRINCIPAL AREAS FOR SEA NET FISHERY
-  SEASONAL HERRING SET NET FISHERY

## STATEMENT OF USES

**Shellfisheries** Like sea fisheries, shellfisheries (not including crabs, lobsters and other crustacea) are regulated by several different authorities, including the NRA. The shellfish themselves are protected by the provisions of the EC Shellfish Waters Directive that allows the NRA 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 the 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 in Wales). So far about 30 sites in Wales have been designated under this Directive.

### Local Perspective

**Sea Fish** *There is a locally important sea fishery, for herring in particular. These fish are taken at the time of spawning congregation, principally between mid-January to late April in the upper Haven, although populations in the lower Haven are taken in the autumn. Bottom set nets are employed.*

*Historically, floating gill nets have been used throughout the area for the shoals of bass and mullet, and this fishery has accounted for significant numbers of salmonids. Boat fishing for bass in all tidal waters upstream of the Cleddau Bridge, and upstream of the mouth of the Pembroke River, has now been prohibited by MAFF in order to protect these bass nursery areas.*

*Approximately 60 fishermen are known to operate in the Haven and Daugleddau, and their activities below the Cleddau Bridge, with gill and tangle nets, account for the following species: bass, mullet, herring, plaice, sole, turbot, brill, ray, mackerel, pollack, scad, cod, whiting, hake, coalfish and flounder.*

### **Salmon, trout and eels**

*The compass net fishery is the only licensed salmonid fishery in the Daugleddau and Milford Haven area. Provision is made annually for 8 licences under the Net Limitation Order. Compass nets are a rare form of stop net fishing which is believed to have been introduced to Pembrokeshire in the nineteenth century, from Gloucestershire.*

## STATEMENT OF USES

### **Shellfish**

*The only molluscs farmed in the Haven are Pacific Oysters. Native oyster beds exist from Burton to Llangwm, and these are dredged commercially, the annual harvest being generally not more than about 2 tonnes, except in 1990 (7.8 tonnes) and 1992 (10.2 tonnes). Cockles, winkles and mussels, whilst present within the area, are not exploited commercially. A Closure Order was introduced in the area in 1982 to enable the Port Health Authority to monitor shellfishing activity.*

*TBT (tributyl tin, a residual contaminant from anti-fouling paints used on vessels) and strong currents have been suggested as possible reasons for the reduction in oyster farms from three in the mid-sixties to one today, situated in the mouth of the Carew river. Here, the "spat" or seed is reared in a flooded quarry until large enough to survive on the oyster trestles which cover 5 acres of estuarial mud flats. The Carew estuary is a major settlement area for silt which has to be jettied from the trestles almost daily. The throughput is 1,000,000 Pacific oysters/year, up to 4 years old. This gives a standing stock of around 3,000,000 oysters or 200 tonnes. All oysters are cleansed for a minimum of 48 hours at a Ministry approved plant prior to sale. Organic effluents like sewage and farm waste are considered to be useful as a source of nutrients for plankton, as long as harmful elements are excluded.*

*Shellfish harvesting areas within the Haven have been within the scope of the EC Shellfish Health Directive since January 1993. The Directive classifies areas according to the bacteriological contamination present in the mollusc flesh, and determines the degree of treatment needed prior to marketing the shellfish. The requirements under this directive replace the 1982 Closure Order. A preliminary classification has been produced, based on the results obtained from monitoring undertaken by the Milford Haven Port Health Authority from November 1991 to November 1992. This preliminary classification shows no areas where the shellfish may go direct for human consumption. Shellfish from approved beds require cleansing or heat treatment, depending upon bed classification, prior to marketing.*

*Pot fishing for spider crab, crayfish, lobster and crab takes place at several sites towards the mouth of the estuary. In addition to shellfishing within the Haven, sea-caught crab and lobster are penned at discrete sites around the perimeter, prior to transportation to markets in Britain and elsewhere in Europe.*

### **Objectives**

- To maintain, and where possible enhance, marine fisheries and shellfisheries.
- To protect migrating salmon and sea trout from interference by marine fishing activities.

## STATEMENT OF USES

- To ensure that commercial fishing for salmon, trout and eels takes place in a manner that does not over-exploit fish stocks or interfere with other legitimate uses of the water environment.

### Environmental Requirements

#### *Fisheries:*

- Water Quality* - Discharges to coastal waters should be controlled so that the informal standards for Aesthetic Criteria and the formal standards for Dangerous Substances are complied with.
- Water Quantity* - To develop and implement a Regional licensing policy that will, at a catchment level, enable the NRA to manage water resources to achieve the right balance between the needs of the environment and those of abstractors, including protection from derogation.
- Physical Features* - Marine fishing activities should not interfere with the migration of salmon or sea trout. Bye-laws will be promoted where necessary.
- 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.
  - To enforce the provisions of the Net Limitation Orders to ensure that stocks of salmon and sea trout are not endangered by commercial fishing. Also to license and control commercial fishing for eels and non-salmonid freshwater fish to protect stocks of these fish.
  - To minimise conflict between the requirements of different fisheries.
  - Access points for commercial fisheries should be protected.

#### *Shellfisheries:*

- Water Quality* - 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, the NRA, for the purpose of setting informal targets for Catchment Plans, will be guided by the provisions of that Directive.



KEY	
	FRESH WATER CONVENTIONAL TANK/POND UNIT
	MARINE/ESTUARIAL CAGE UNIT
	FRESH WATER CAGE UNIT

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3.20 FISH FARMING

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**General**

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 Ministry of Agriculture Fisheries and Food (Welsh Office in Wales) and the NRA issues consents for freshwater fish farms to both abstract water and discharge effluent (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 the NRA is particularly concerned 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.

**Local Perspective**

*There are currently three consented sites, under common ownership, operating within the catchment. Inland units at Walton Mill and Vicar's Mill rear rainbow trout, predominantly for the table. The third site, at the Warrior, is a large cage unit in the Milford Haven waterway. This site has two consents which allow for a doubling of the existing number of cages. A small consented fish farm at Llawhaden is not operating at present and there is no indication as to whether the unit will be re-opened. Dŵr Cymru operate a caged unit at Llysyfran reservoir to enable phased stocking with rainbow trout.*

**Objectives**

- To control fish farming activity to protect wild fish stocks and other uses of the water environment.
- To manage the quality and volume of water resources 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**

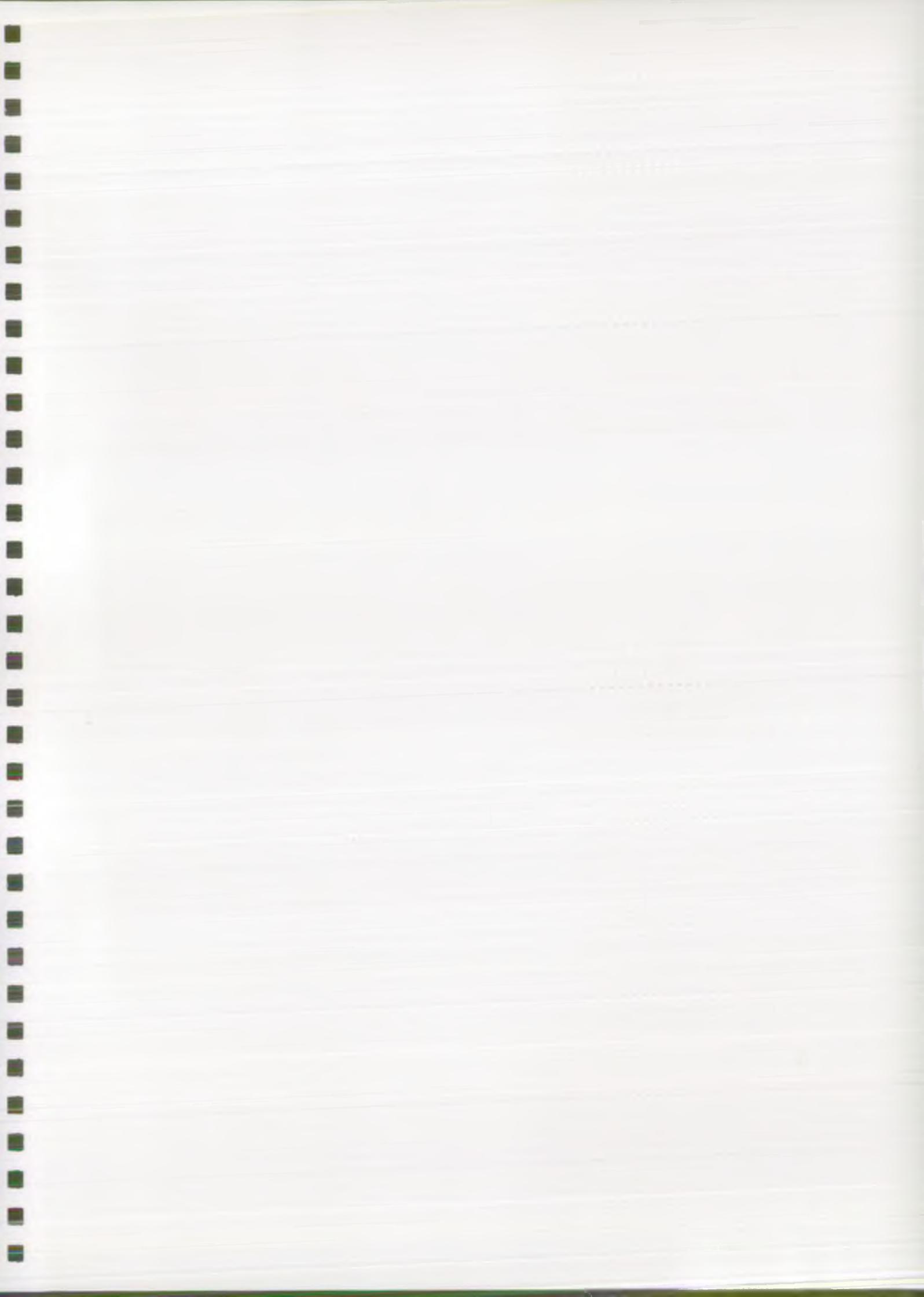
**Water Quality**

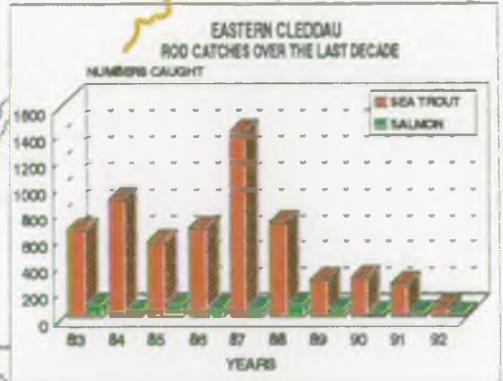
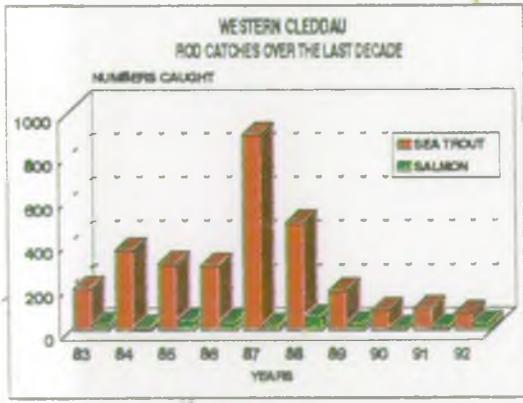
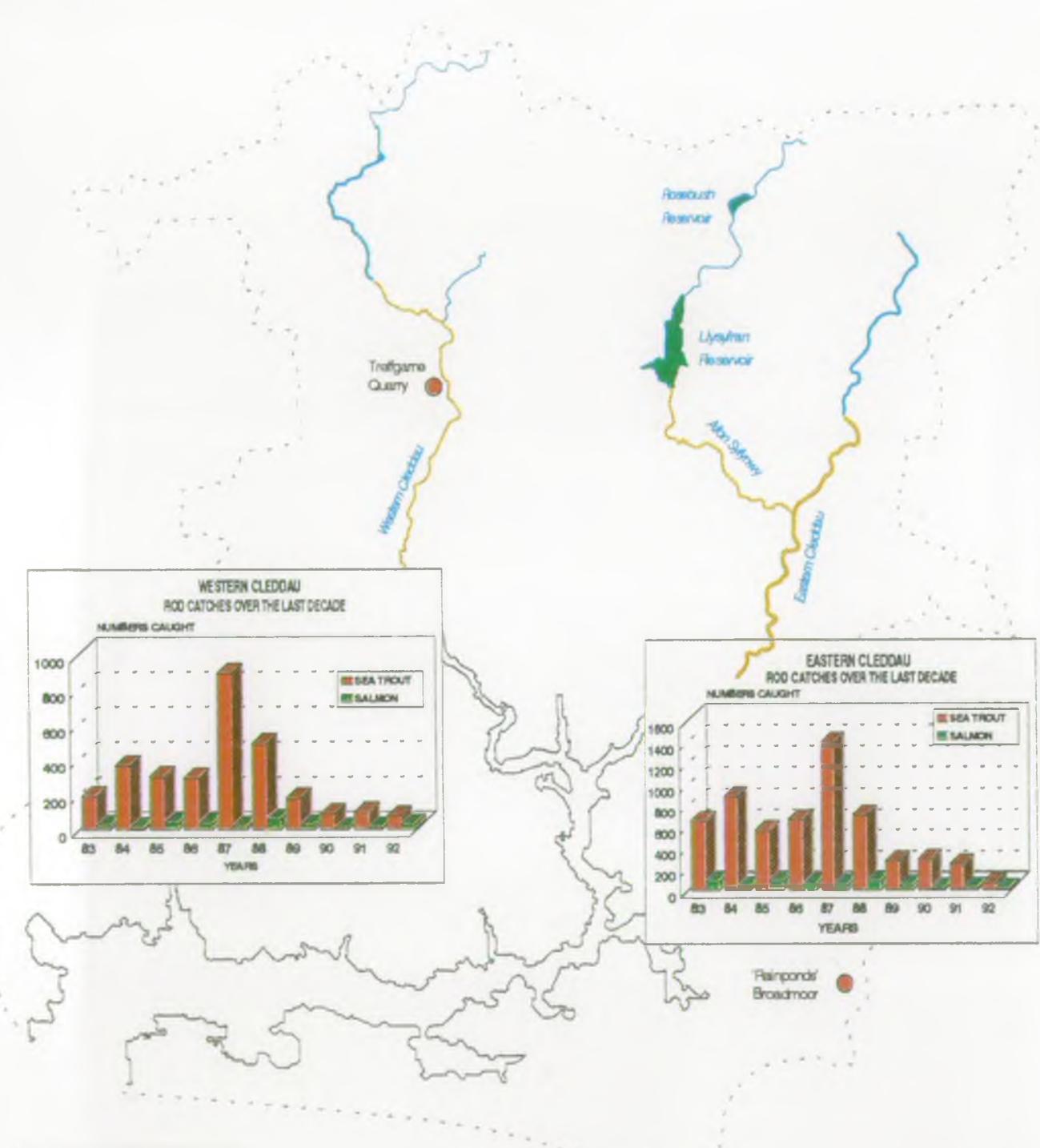
- That the conditions stated in the discharge consent are complied with. This will be enforced by the NRA.

## STATEMENT OF USES

***Water Quantity*** - To develop and implement a Regional licensing policy that will, at a catchment level, enable the NRA to manage water resources to achieve the right balance between the needs of the environment and those of abstractors, including protection from derogation.

***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.





**KEY**

- PRINCIPAL STRETCHES FOR RIVER GAME FISHING
- STILL WATER GAME FISHERIES
- STILL WATER COARSE FISHERIES

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3.21 ANGLING

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**General**

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 Ecosystem section.

In many ways the requirements for angling are very similar to those for the basic amenity use. However the NRA has formal responsibility towards angling, and issues rod licences that are required before fishing for freshwater fish and are used to raise revenue to pay for fishery management.

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. Angling for sea fish takes place at many sites covered by CMPs. However, the NRA has no control or responsibility for sea angling and it will not be covered specifically in the Plans.

**Local Perspective**

*Angling in the catchment is predominantly for sea trout and trout although salmon fishing is also important in some areas.*

*Fishing on the Eastern Cleddau is generally managed by private individuals although two clubs/syndicates exist, albeit with very restricted membership. Llysyfran and Rosebush reservoirs are privately owned waters but both are promoted as trout fisheries. Llysyfran attracts more than 13,000 angler visits per annum and is considered to be one of the foremost stillwater fisheries in the Region. Rosebush is managed as a fly-only, brown trout, day ticket fishery.*

*On the Western Cleddau, some 21km of main river, from Haverfordwest upstream, are accessible to the public through the Pembrokeshire Angling Association. Brown trout fishing is practised throughout the catchment.*

*Coarse fishing in the catchment is almost non-existent, the only significant site being an unofficial coarse fishery at a flooded quarry in Treffgarne.*

*Shore based sea angling is only practised on a casual basis in the Haven and then usually off the rocky shores near the mouth, because many better locations are available on the nearby coastline. However, recreational*

## STATEMENT OF USES

*boat fishing is popular in the Haven and its approaches, with mackerel, bass and pollack being the usual quarry. Bass nursery areas prohibit boat fishing for bass in all tidal waters upstream of the Cleddau Bridge and upstream from the mouth of the Pembroke River.*

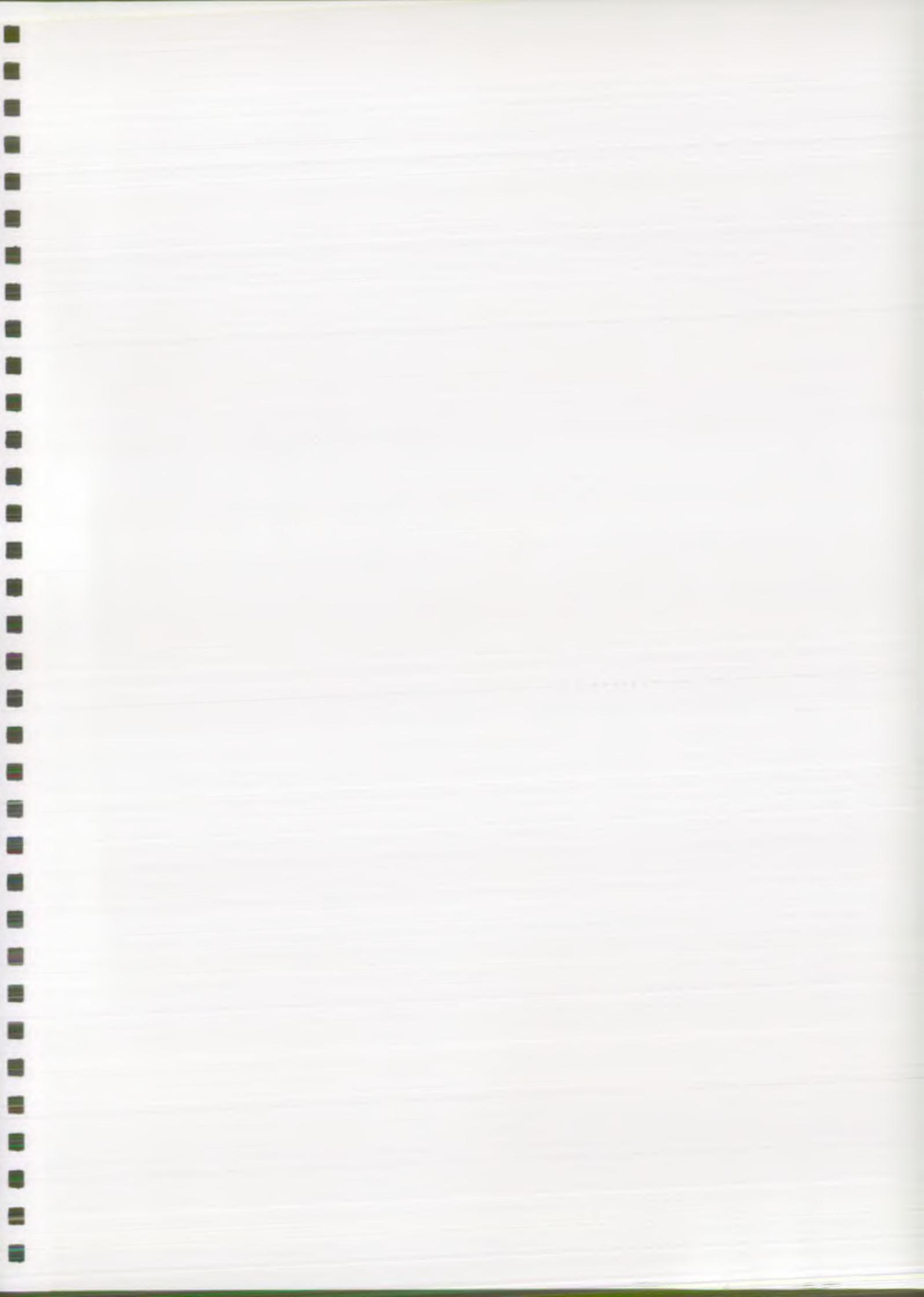
- Objective** - To ensure that the water environment can sustain angling at least at its current distribution and quality.

### **Environmental Objectives**

- Water Quality** - The informal standards relating to Aesthetic Criteria set for CMPs should be maintained so that the enjoyment of the waterside is not diminished. Fish stocks are protected by the provisions in the Fisheries Ecosystem use.

- Water Quantity** - To develop and implement a Regional licensing policy that will, at a catchment level, enable the NRA to manage water resources to achieve the right balance between the needs of the environment and those of abstractors, including protection from derogation.

- Physical Features** - Safe access to and from the waterside should be promoted.
- The waterside features required for angling should be maintained and developed.



MAP 25

WATER SPORT ACTIVITY



- 1. MILLBAY
- 2. WATWICK BAY
- 3. CASTLE BEACH BAY
- 4. DALE
- 5. MONK HAVEN
- 6. LINDGWAY BAY
- 7. SANDY HAVEN
- 8. GELLISWICK BAY
- 9. HAZEL BEACH
- 10. LLANHEATH
- 11. WEST ANGLE BAY

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### 3.22 WATER SPORTS ACTIVITY

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**General** 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 statutory Water Quality Objectives.

***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), waters must have met several criteria that include: high numbers of bathers, first aid facilities, life guards and toilets. Identified waters are required to achieve the mandatory bacteriological standards of 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 Waters***

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

**Local Perspective**

*No areas in the catchment fall within the scope of the EC Bathing Waters Directive. Limited numbers of bathers frequent a few small bays, most of which (excepting Dale and West Angle Bay) have restricted access and limited facilities, for example; no car park, telephone or toilets. In recent years, bacteriological monitoring at Dale has shown compliance with the EC Directive bacterial standards. However, results at other locations, such as Gelliswick and Llanreath, show wide variability and these sites do not usually comply with EC Directive limits.*

*There is considerable activity involving immersion sports throughout the Haven. Scuba-diving is concentrated mainly in the lower reaches of the Haven, especially around areas containing sunken wrecks. Water skiing, whilst involving only about 5% of craft based in the Haven, is frequently practised in the lower Daugleddau and Haven, and jet ski boats are now becoming increasingly popular.*

## STATEMENT OF USES

*During 1992 and 1993 a Milford Haven Waterway Recreation Plan was formulated by the Milford Haven Port Authority, in consultation with various bodies, including local authorities, PCNP, CCW and the NRA. As a result, a system of zoning has been introduced within the bye-laws to avoid conflict between high speed craft and other users. A water warden has been appointed by the National Park Authority to enforce these bye-laws and educate the public, with financial assistance from a number of organisations including the local authorities and the Countryside Council for Wales.*

*Windsurfing tends to be confined to the wider spaces of Dale and Llysyfran reservoir, the latter being a popular training site. Canoeing takes place throughout the tidal waterway and at Llysyfran reservoir. There is no public right of navigation upstream of the tidal limits on the Eastern and Western Cleddau.*

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

### **Environmental Requirements**

#### ***Bathing in Identified Waters:***

- Water Quality***
- At Identified Bathing Waters (EC Directive), water quality should conform with the standards contained within the EC Bathing Waters and Dangerous Substances Directives and should meet the informal standards for Aesthetic Criteria set for CMPs.

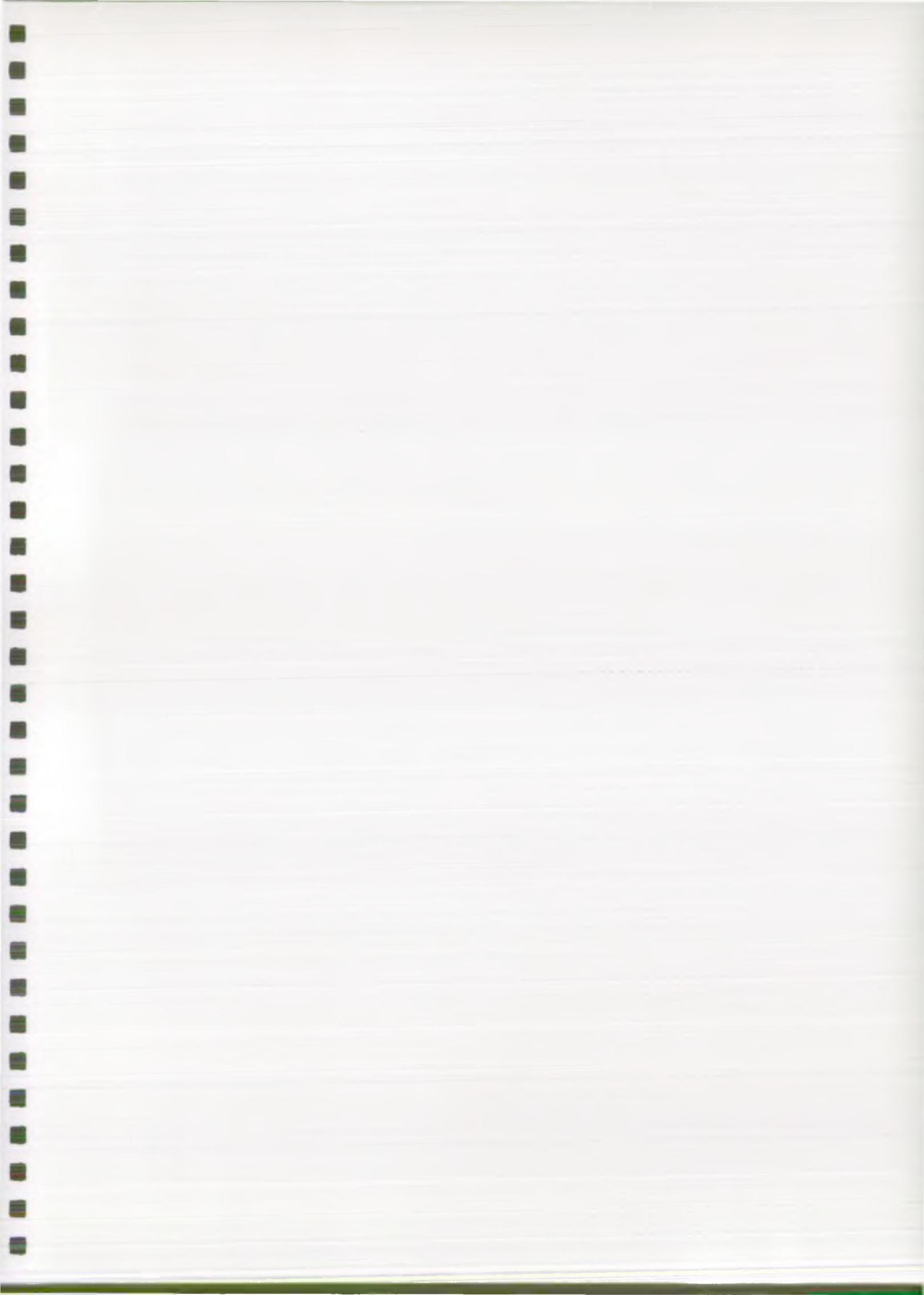
- Physical Features***
- Promotion of safe and easy access to and from Identified Bathing Waters.

#### ***Water Contact/Recreational Use Waters:***

- Water Quality***
- To ensure that water quality in the catchment is compatible with the informal standards for Aesthetic Criteria and the formal standards for Dangerous Substances (where appropriate) and Immersion Sports set for CMPs. Where such waters are used for immersion sports, including bathing, the NRA will be guided by the EC Bathing Waters standards in assessing water quality requirements for CMPs.

- Water Quantity***
- To develop and implement a Regional licensing policy that will, at a catchment level, enable the NRA to manage water resources to achieve the right balance between the needs of the environment and those of abstractors, including protection from derogation.

- Physical Features***
- To protect and, when possible, improve access to these waters.





KEY	
	SAILING
	ROWING

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3.23 BOATING

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**General** 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 the NRA's concern is principally for the participants' enjoyment of the activity.

**Local Perspective**

*There is no public right of navigation upstream of the tidal limits on the Eastern (Blackpool Mill) and Western (Haverfordwest) Cleddau. There are no agreements to use boats in the freshwater river reaches, which are fished for salmon and sea trout.*

*The only freshwater boating venues are Llysyfran and Rosebush Reservoirs, and then usually as an adjunct to angling (generally rowing, although electric motors are available at Llysyfran). Other water based activity on Llysyfran generally involves immersion (windsurfing, canoeing), but dinghy sailing also takes place occasionally.*

*The lower catchment is heavily used by recreational craft, particularly at weekends and over holiday periods. Yacht and dinghy racing in the Haven and its approaches is extremely popular, the number of events per annum equalling the total held elsewhere on the coast from Fishguard to Swansea. Motor boats (private and commercial) and sailing craft utilise over 1100 moorings allocated in the lower catchment, the largest proportion being cruising yachts.*

*The most popular locations for boating activity are in the Llangwm, Lawrenny, Hobbs Point, Pembroke Dock, Neyland and Dale areas.*

*Rowing also takes place in the catchment, mainly in the upper reaches of the Haven, and includes use of the traditional Pembrokeshire longboats which race in coastal waters during the summer season.*

*The Welsh Development Agency and Wales Tourist Board have been promoting the Haven for a number of years, including its development as a new "International Maritime Park". The 1991 Tall Ships Race started at Milford Haven, part of a strategy to heighten awareness of the potential for recreational development. Marinas already exist at Neyland and Milford Haven.*

## STATEMENT OF USES

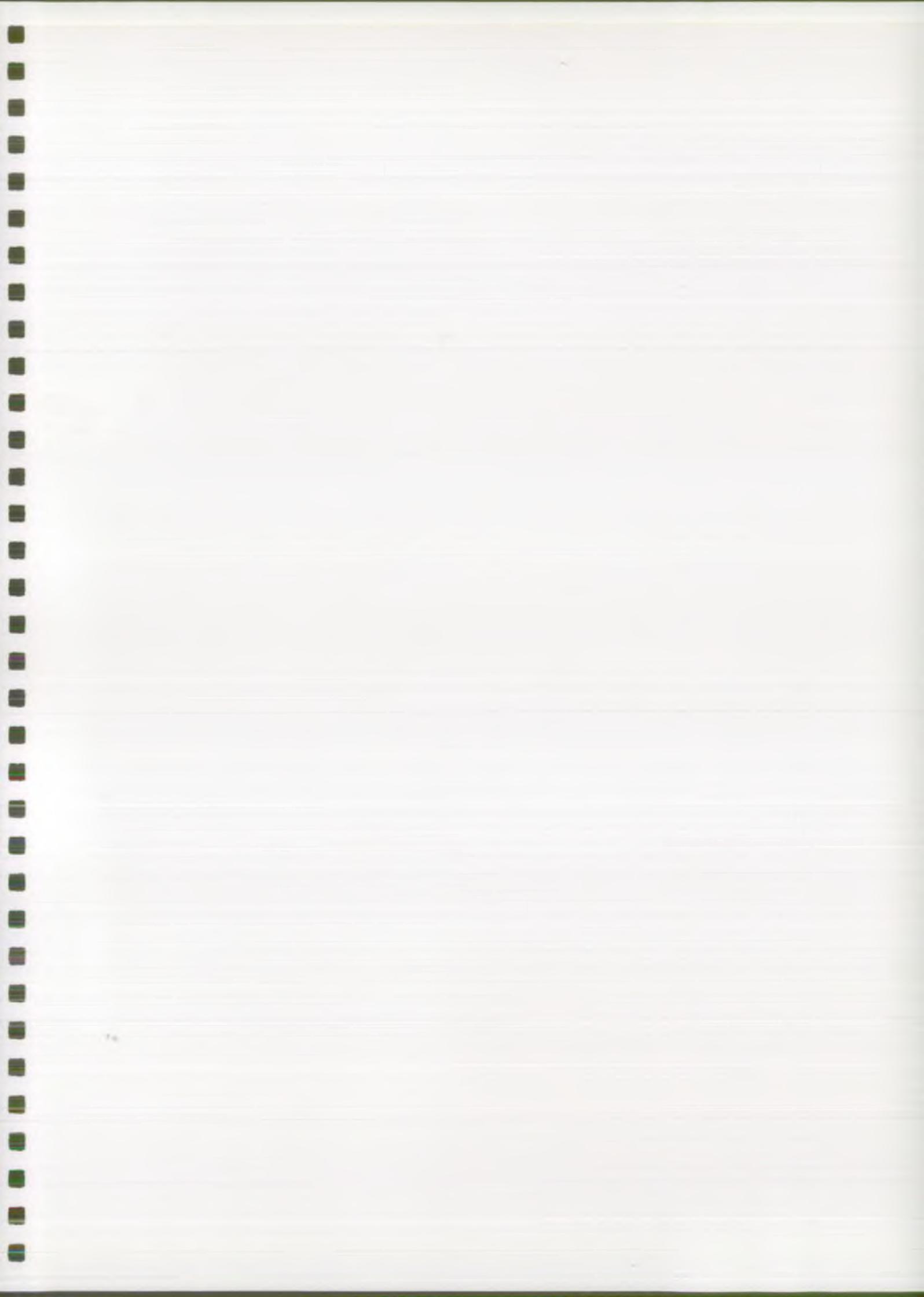
- Objectives**
- To ensure that waters in the catchment can support boating and related activities at least at their current levels and locations, if there is no detriment to other uses.

### **Environmental Requirements**

- Water Quality**
- The informal standards for Aesthetic Criteria set for CMPs should be complied with.

- Water Quantity**
- To develop and implement a Regional licensing policy that will, at a catchment level, enable the NRA to manage water resources to achieve the right balance between the needs of the environment and those of abstractors, including protection from derogation.

- Physical Features**
- 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.



MAP 27

NAVIGATION



### 3.24 NAVIGATION

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#### General

Navigation is considered to be the use of pleasure and commercial craft in waters that fall under the general control of the NRA 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 Harbour Authority who will liaise with the NRA. However, in the Dee estuary the NRA is the navigation authority.

While the NRA is not the navigation authority for either of the two freshwater rights of navigation that exist in Wales, it may, under certain circumstances, introduce bye-laws to control navigational use of a river. The NRA must also pay regard to the needs of those rights of navigation that do exist.

#### Local Perspective

*There is no right of public navigation upstream of the tidal limits: Haverfordwest on the Western Cleddau and Blackpool Mill on the Eastern Cleddau. Downstream of these points, and throughout the Daugleddau and Milford Haven, recreational and commercial boating is carried out extensively, under the control of the Milford Haven Port Authority (MHPA).*

*The Haven is one of the largest natural harbours in the world, and offers deep water access and moorings. Consequently it is used by the oil industry, ferry services, the Royal Navy and the fishing industry, making it the most important port in Wales and one of the largest in the United Kingdom.*

*The MHPA's statistics for 1992 record the arrival of 3,861 dues paying vessels (trawlers are excluded). Commercial shipping movements recorded within the MHPA's area of jurisdiction were 11,786, including 8,569 for tankers, 1,314 for ferries and 907 for trawlers.*

*Dredgers are operated by Govan Davies, Texaco and the Milford Haven Port Authority in the Haven downstream of the Cleddau Bridge. Generally speaking it is not necessary to dredge the deep water channels because*

## STATEMENT OF USES

*there is little siltation in these areas. However dredging at the deep water berths is sometimes necessary, particularly at the new Port of Pembroke facility. Vessels are monitored, by Milford Haven Port Authority radar, as much as possible, to ensure that spoil is dumped in the designated area, located just outside the Haven.*

*Concern has been expressed by the CCW that dredging activity may be decreasing water clarity and increasing siltation down tide from the dumping site, thereby affecting fauna and flora close to the sea-shore.*

**Objectives** - To ensure that NRA activities or authorisations do not interfere with navigation.

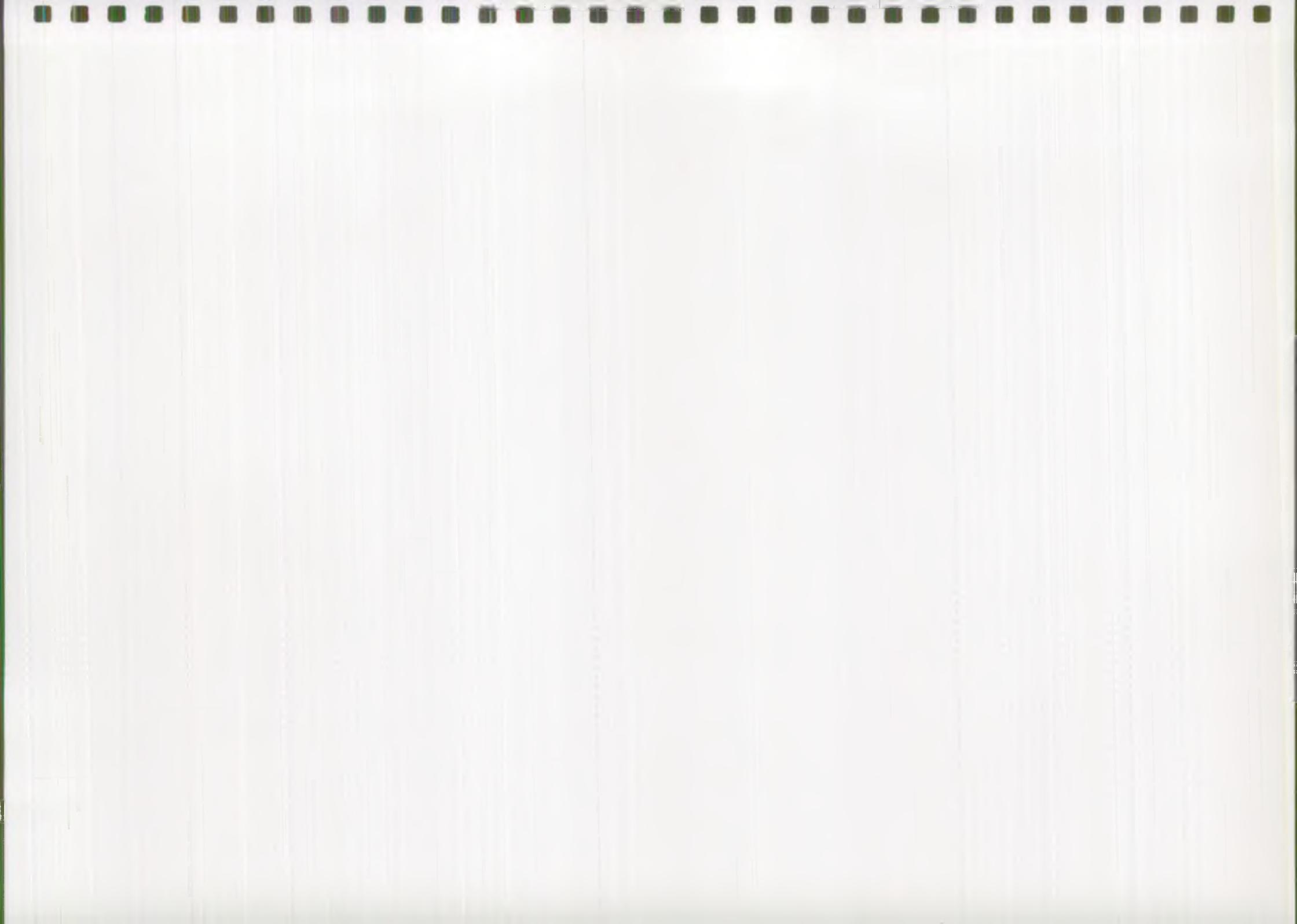
### **Environmental Requirements**

***Water Quality*** - Compliance with the informal standards for Aesthetic Criteria set for CMPs, should be achieved.

***Water Quantity*** - To develop and implement a Regional licensing policy that will, at a catchment level, enable the NRA to manage water resources to achieve the right balance between the needs of the environment and those of abstractors, including protection from derogation.

***Physical Features*** - Where waters under the control of the NRA are used for navigation there should be no obstruction to the passage of vessels.

- Any maintenance of navigation channels or aids to navigation should take into account other uses of the water.





KEY	
	STATUTORY MAIN RIVER
	PAST COMPREHENSIVE CHANNEL IMPROVEMENT SCHEME
	PAST SELECTIVE TREE CLEARANCE SCHEMES
	HARD DEFENCE
	PROPERTY AT RISK FROM FLOODING
1.	Haverfordwest
2.	Llawhaden
3.	Narberth Bridge
4.	Begelly
5.	Commons Rd Pembroke
6.	Dale

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3.25 FLOOD WATER STORAGE AND FLOOD DEFENCES

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**General**

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

Flooding normally follows from extreme climate conditions, such as very heavy rainfall 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 frequency is 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 plain or washlands take the additional flow, or naturally store water, when the channel capacity is exceeded. Development of these areas over time has resulted in the need for protection works.

Protection against flooding is provided, where necessary and cost-effective, by the construction and maintenance of flood defences. The effectiveness of these flood defences is often measured in terms of the most severe flood against which protection is provided. The level of protection required depends on the land use; for example, urban areas are often provided with 1 in 100 year protection, while for agricultural areas, 1 in 5 year protection may be considered sufficient.

Under the Water Resources Act 1991 the NRA has general supervisory duties with respect to all matters relating to flood defence, and, under the Land Drainage Act 1991, powers to consent culverting and the construction of obstructions in "ordinary watercourses" (i.e. not designated as "Main River"). Certain reaches of a river are designated formally as "Statutory Main Rivers" and on such Main Rivers the NRA has special powers to carry out flood defence works and to control the actions of others.

Any proposal that could interfere with the bed or bank or obstruct the flow in the Main River requires the formal consent of the NRA. If such works are not consented then the NRA can serve notice on the person carrying out the works, requiring their removal. Failure to comply with this instruction may result in the NRA removing the works and recharging the cost to that person.

## STATEMENT OF USES

On ordinary watercourses the Local Authority is a designated drainage authority and as such, has powers to carry out flood defence works (LD Act 1991). Works on some ordinary watercourses are administered by Internal Drainage Boards.

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. For this reason consultations are carried out within and outside the NRA so that the requirements of other uses are considered during the formulation and undertaking of schemes. In this way, wherever feasible, and consistent with the original purpose, habitat enhancements form part of the scheme.

The NRA provides and operates a flood warning system on designated main rivers within the catchment. The Police pass the warnings to the general public.

### Local Perspective

*The catchment is predominantly rural, possessing a large lowland flood plain, and areas of upland fen in the upper catchment of the Western Cleddau. These areas are prone to flooding following periods of heavy rainfall and the storage they provide tends to reduce flood peak flows.*

*Many of the capital improvement schemes undertaken in the past were aimed at providing improved drainage of upland fen areas in order to increase agricultural productivity. These improved artificial drainage systems require regular maintenance in order to maintain their effectiveness, and there is an on-going commitment to their maintenance where take up of agricultural benefit has occurred.*

*Flooding of properties has been experienced at Begelly, Llawhaden and Haverfordwest, and formal flood defences exist at Haverfordwest on both the Western Cleddau and the Cartlett Brook. Flood protection standards are recognised as being below standard through Haverfordwest and an investigation into the flooding problem at this site is planned. This could lead to proposals to improve existing standards.*

*In general, tidal defences on the Cleddau do not constitute a significant problem, although tidal surges can cause flooding in Haverfordwest, and recent storms have highlighted deficiencies in the sea wall at Dale. The latter, together with other sea defence structures, are the responsibility of the District Council and other owners.*

*Flood warnings are issued by the NRA for the Cleddau catchment. They are predominantly focused on Haverfordwest and the adjoining flood plain.*

## STATEMENT OF USES

### Objectives

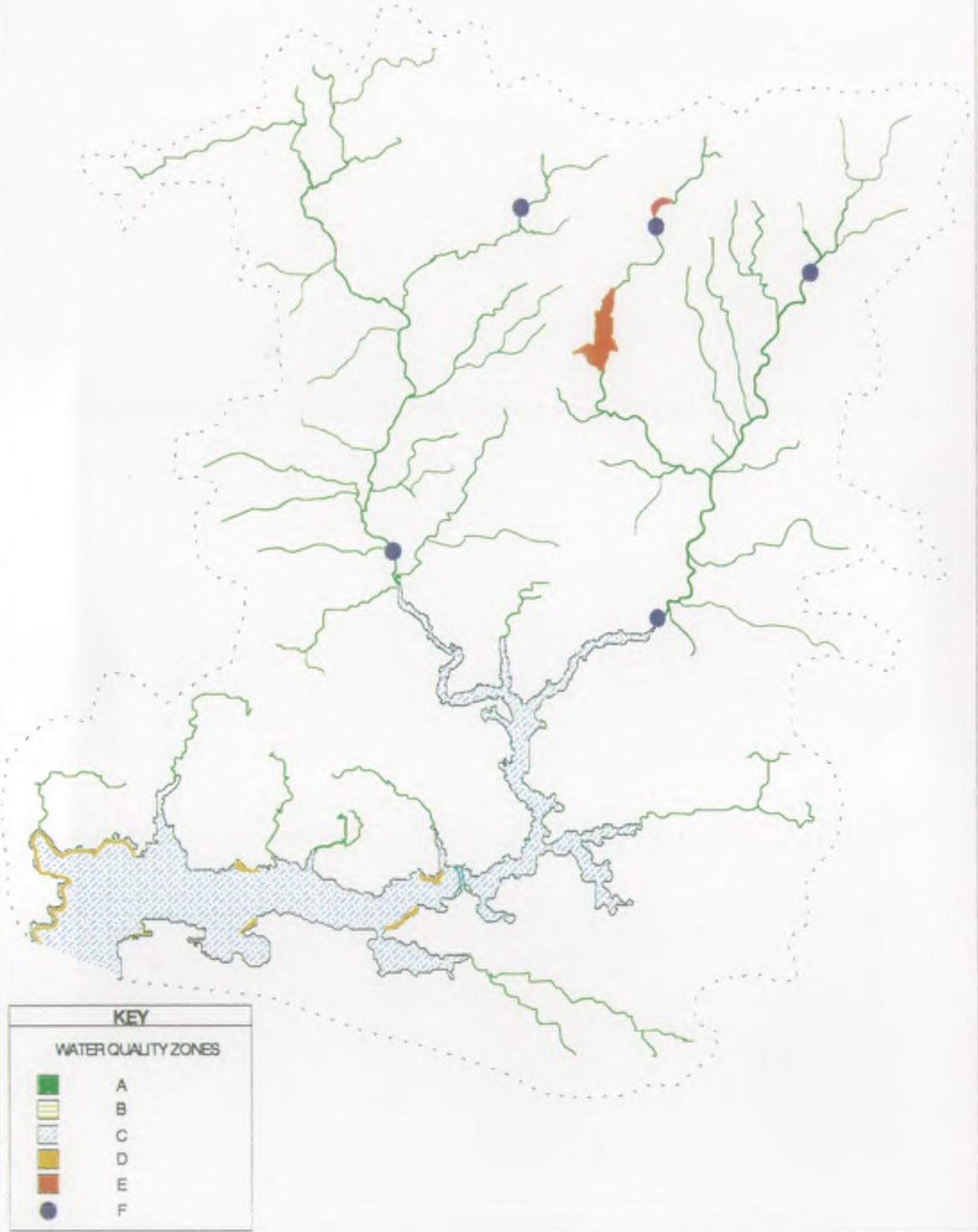
- To maintain existing flood defences for people and property against flooding from rivers and the sea, taking account of environmental requirements.
- To improve the standard of flood defence where appropriate by promoting and constructing new flood defences.
- To maintain effective drainage, taking account of environmental requirements.
- To provide warnings of imminent flooding to the public where appropriate.

### Environmental Requirements

- Physical Features*
- In protected areas, the flood defences/river bank should not be overtopped by a flood flow with a specified return period.
  - In areas where land use is primarily agricultural, the water course should provide effective drainage.
  - The river banks should contain flows up to a defined maximum, expressed as the calculated probability of occurrence.
  - No development should be permitted which would impair the effectiveness of any flood defence scheme or prevent access for maintenance of flood defence.

#### 4.0 CATCHMENT TARGETS

In this Section targets which are designed to protect the most sensitive Use that has been identified for each reach, are set for Water Quality, Water Quantity and Physical Features. In this way any other Uses that are less sensitive should also be protected.



### 4.1 WATER QUALITY TARGETS

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#### **General**

There are two aspects to water quality assessment; the first relates to the classification of waters according to a graded system, the second to the measurement of achievement of specific targets. The first aspect has, for many years, involved using the National Water Council (NWC) system where water quality classes range from excellent to very poor. In future this will be superseded by the General Quality Assessment Scheme, currently under development within the NRA. The new system will also include biological and fisheries elements and will provide an overall snapshot view of river water quality across the country. However, this approach will not be appropriate for water quality assessment for individual catchments, such as is required for CMPs.

For CMPs it is more appropriate to assess the performance of waters against specific water quality targets. In this instance the targets are set to protect specific Uses of the catchment and call on suites of water quality standards that have been determined for each Use. These suites draw heavily on the existing sources of data, especially the EC Directives for; Bathing Waters, Freshwater Fisheries, Shellfish Waters, Shellfish Hygiene and Urban Wastewater Treatment but are constructed to give a more complete coverage of water chemistry than any of the Directives or NWC classes individually. These suites are used as the basis for setting use-related water quality targets for all parts of the catchment. The targets set using these suites represent the most stringent available and reflect the visionary concept of Catchment Plans.

#### **Water Quality Targets for CMPs**

Specifically water quality targets are set for CMPs by firstly identifying the appropriate targets for each Use at each site (or reach). Then the Use(s) with the most stringent water quality requirements is identified and used to set the overall targets for that site. All other Uses with lower water quality requirements will be protected by the chosen targets.

#### **WQOs**

For a number of Uses the Department of the Environment is developing schemes of Water Quality Objectives which can be made statutory following public consultation and agreement with the Secretaries of State. It is intended that the standards supporting these WQOs will, where appropriate, be the same as those used within the Catchment Plan for the relevant Uses. When the scheme has been finalised these WQOs will ultimately be introduced to all catchments via the Catchment Planning process.

## CATCHMENT TARGETS

### Local Perspective

*By considering the water quality requirements of each Use, five water quality zones, plus one point target, have been identified where the following water quality requirements apply:*

	Zone A	Zone B	Zone C	Zone D	Zone E	Zone F
Suite 1: Aesthetic Criteria	*	*	*	*	*	*
Suite 2: List 1 substances	*	*	*	*	*	
Suite 3: Protection of estuarine/coastal aquatic life including salmonid migration		*	*	*	*	
Suite 4: Protection of sensitive aquatic life including inland still-water fisheries.					*	
Suite 5: Freshwater fisheries ecosystem (FEC1)	*					
Suite 6: Potable abstraction						*
Suite 7: Bathing				*		
Suite 8: Immersion sports			*			
Suite 9: Shellfisheries			*			

\* Suite of Environmental Quality Standards applies.

Brief description of water quality zones:

Zone A = High class salmonid (freshwater, rivers - Fisheries Ecosystem Class 1)

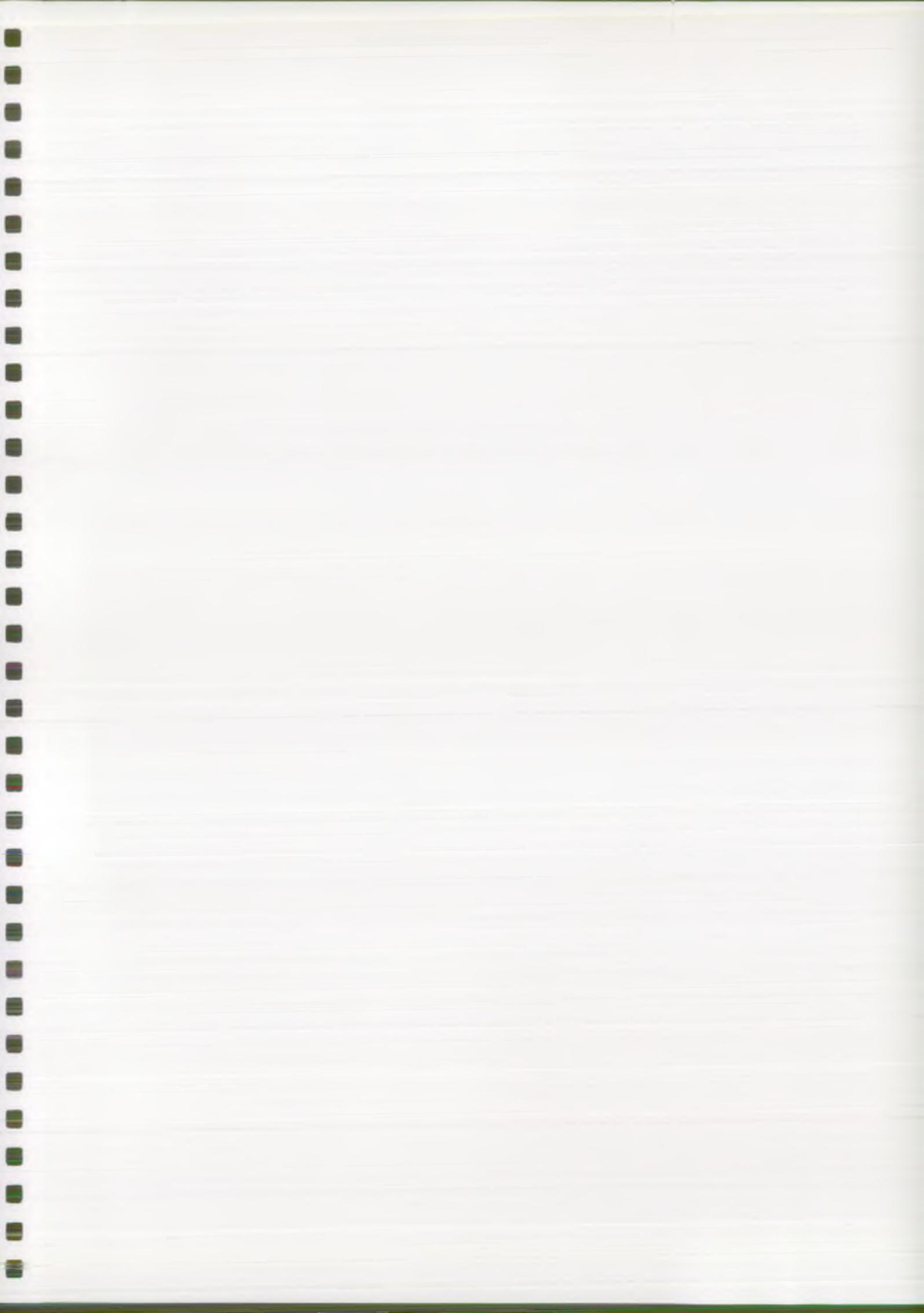
Zone B = Non-freshwater salmonid migration

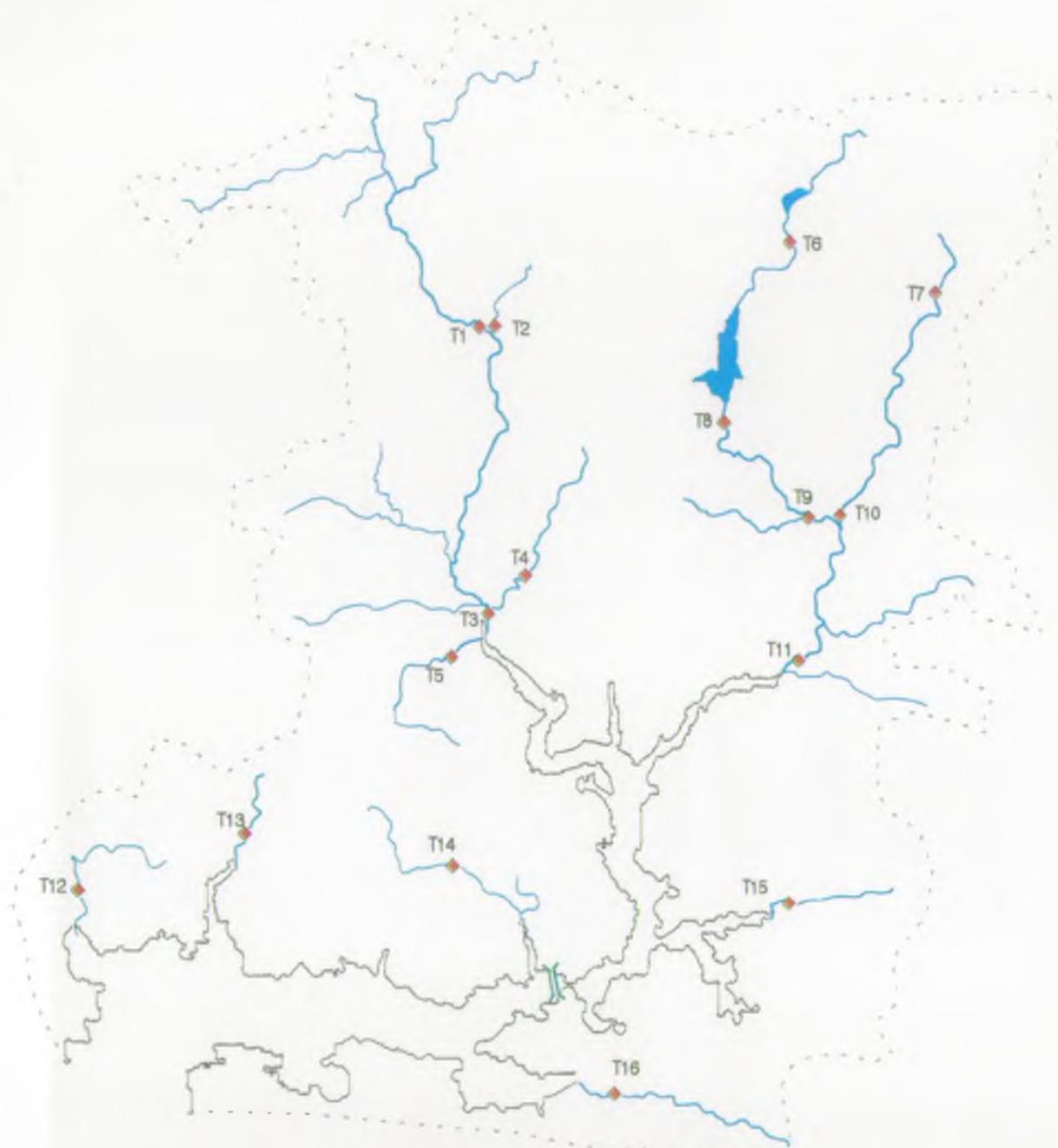
Zone C = Immersion sports, & salmonid migration & shell fisheries

Zone D = Bathing

Zone E = Inland stillwater fisheries

Point F = Potable abstraction





REF. NO.	LOCATION	FLOW M <sup>3</sup> /d
T1	W. CLEDDAU	21.0
T2	ANGHOF	18.0
T3	W. CLEDDAU AT TIDAL LIMIT	62.0
T4	CARTLETT BROOK	5.0
T5	MERLINS BROOK	3.9
T6	SYFYNNWY AT ROSEBUSH RESERVOIR	3.2
T7	E. CLEDDAU AT PONT HYWEL	14.0
T8	SYFYNNWY AT LLYSYFRAN	21.0
T9	SYFYNNWY	9.8
T10	E. CLEDDAU	28.0
T11	E. CLEDDAU AT TIDAL LIMIT	63.0
T12	SLATEMILL STREAM	1.9
T13	SANDYHAVEN PILL	1.7
T14	WESTFIELD PILL	3.1
T15	CRESSWELL RIVER	2.4
T16	PEMBROKE RIVER	1.6

ESTIMATED NATURAL 95 PERCENTILE FLOWS

---

## 4.2 WATER QUANTITY TARGETS

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### 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.

The NRA takes a precautionary approach to the granting of new licences, and will only grant them if it is confident that the available resources are able to sustain the proposed abstraction in the long term without harm to the environment or existing abstractors.

The NRA currently is developing an abstraction licensing policy that will allow it to consider in a structured way the environmental needs of the river system and to balance these with the needs of abstractors.

A methodology for the assessment and prioritisation of rivers that suffer artificially reduced flows is already in use. In Welsh Region the production of CMPs will aid this process.

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

### Catchment Targets

The resource will be managed to ensure the conservation, redistribution or augmentation of water, and to ensure its proper use.

### Local Perspective

*The two main uses of water within the catchment have been identified as water supply (potable and industrial) and spray irrigation. The supply area extends beyond the boundaries of the catchment. The Llysyfran Regulation Scheme is a major water resource management scheme.*

*Groundwater in the catchment is exempt from licensing control and so no targets have been set in respect of groundwater levels. However, groundwater levels should not be reduced to the extent that they impact on the environment or other users of groundwater.*

### Flow Requirements

*In the absence of the policy to assess in-river needs for the watercourses within the catchment the natural 95 percentile flows have been calculated. The 95 percentile flow is that flow which one would expect to be exceeded 95% of the time on average.*

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### 4.3 PHYSICAL FEATURES TARGETS

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#### 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, CMPs will adopt the general theme that the abundance and diversity of physical features typical of the type of river, should be maintained and where possible, improved. This requires subjective assessment by trained staff. The NRA is also 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 be able 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 Cleddau catchment:*

#### **Flood Defence - Operational Activity**

*The NRA will provide a cost-effective flood defence service, as follows:*

- *Protection of people and property from inundation by floodwaters:
  - (a) for domestic, commercial and industrial property against flood events up to 100 year frequency and
  - (b) for land, against flood events up to 5 year frequency, depending upon land use.*
- *Provision of adequate outfalls to existing land drainage systems, to allow them to perform efficiently, where this is still required by the landowner.*

## CATCHMENT TARGETS

- *Provision of suitable access for maintenance of the river/channel and sea/tidal/flood defences and for the construction of new defences as required.*
- *Maintenance of unobstructed river flow by the removal of excessive silt and other major obstructions, especially in urban areas where aesthetic standards must also be maintained.*
- *Continued operation of flood defence structures to ensure adequate flood protection of all identified uses.*

*The NRA will carry out all its flood defence works in an environmentally sensitive manner.*

### **Flood Defence - Regulatory Activity**

- *The NRA, in its role as statutory consultee under the planning legislation, will advise the Local Planning Authorities on all flood defence matters, particularly with a view to encouraging planning authorities to use their planning powers to guide development away from flood risk areas.*
- *For particular developments, the NRA will aim to avoid development taking place:*
  - (a) *on land where flood protection standards are sub-standard or*
  - (b) *when an increase in flood risk would result.*
- *The NRA will exercise control, via its consenting powers, over all proposed developments which impact directly on all main river channels and the adjoining land falling within 7 metres of the top of the bank. For all watercourses it will also control any proposed culvert works or works that will obstruct flow.*

### **Fisheries**

*Through its operational, regulatory and advisory activities the NRA will endeavour to ensure that there is:-*

- *suitable habitat for salmonid breeding with an adequate distribution of potential redd sites and nursery areas.*
- *unimpeded access for migratory fish through the estuary and up river to all potential spawning reaches (where appropriate), with adequate holding pools and cover throughout the catchment.*

## CATCHMENT TARGETS

- *effective fish screening on all abstractions and discharges (where necessary) to protect wild fish stocks and prevent escapement from fish farms.*

### **Conservation**

*NRA operational, regulatory and advisory activities will be undertaken so as to maintain the current diversity of natural features such as bankside features, wetlands,, emergent vegetation, meanders, pools and riffles in order to conserve river corridors and safeguard landscape quality; effecting improvements and reinstating degraded features 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 NRA activities, a "standard of service" that will maintain, and if possible enhance, the conservation value of the site will be agreed with CCW.*
- *Areas of degraded wetland and riverine habitat will be 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 should be maintained and, where possible, enhanced, recognising the interdependence of many of the sites and monuments. Where unavoidable change occurs, preservation by record should be implemented.*
- *Control of the spread of Japanese Knotweed, and other alien weeds should be undertaken, as required under the Wildlife & Countryside Act 1981.*

### **Recreation**

- *An appropriate network of riverside paths and access points should be maintained and, where appropriate, promoted.*
- *Existing recreational sites should be protected and the development of new sites promoted at suitable locations as opportunities arise.*
- *The design of paths, access points and recreational developments should take into account, wherever possible, the needs of the infirm and disabled.*

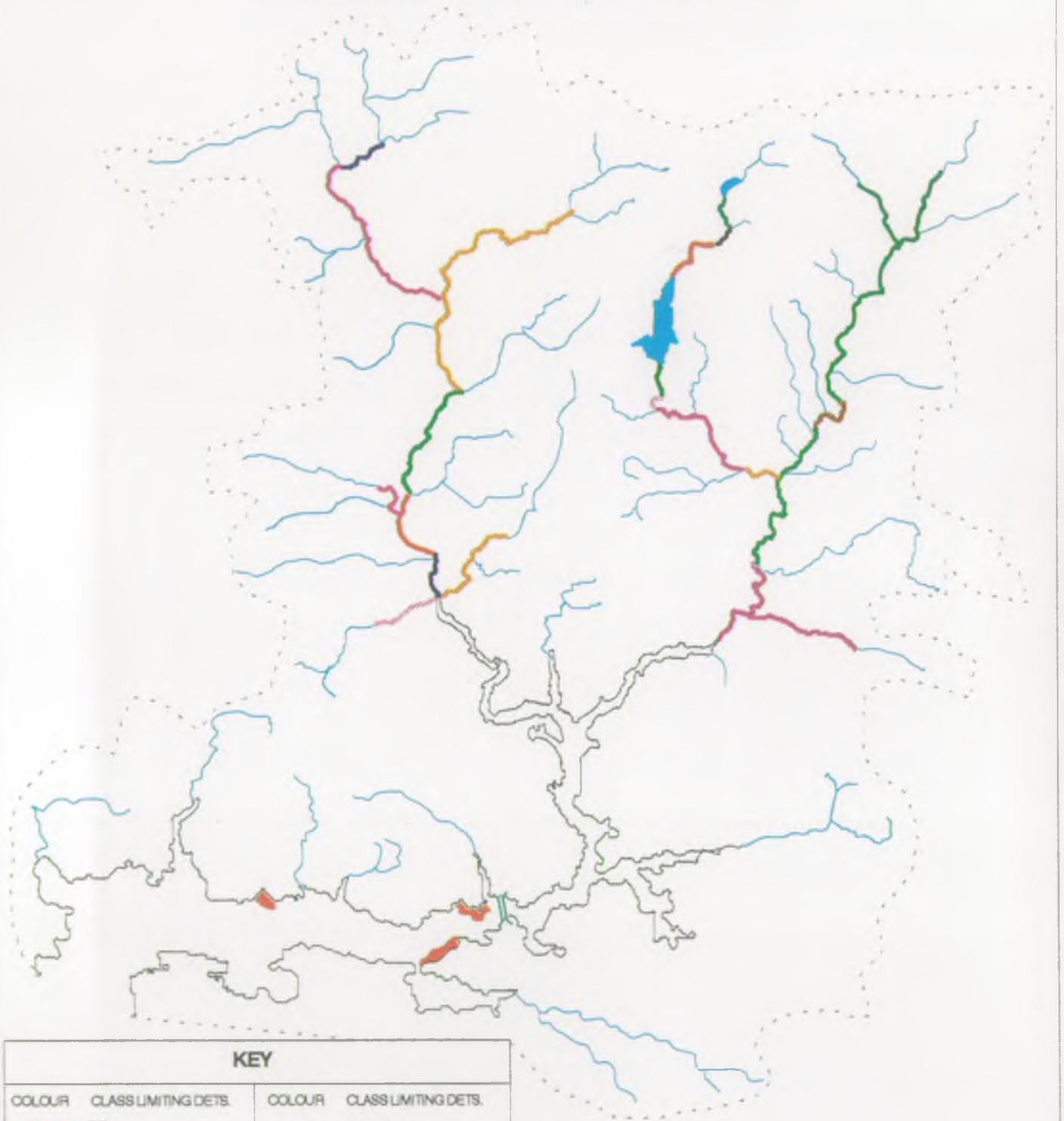
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## 5.0 THE STATE OF THE CATCHMENT

The following Section examines the ability of the Catchment to meet the targets set in Section 4. In this way the key Issues in the catchment can be identified. These are addressed in Sections 6.0 and 7.0.

MAP 31

CLEDDAU WATER QUALITY: CURRENT STATUS  
DETERMINANDS CAUSING USE CLASS FAILURE



KEY

COLOUR	CLASS LIMITING DETS.	COLOUR	CLASS LIMITING DETS.
Orange	DO	Orange	DO, NH3
Red	BOD	Black	DO, BOD, pH
Yellow	BOD, NH3	Red	E.Coli, total coliforme
Pink	BOD, NH3, DO	Green	PASS
Dark Blue	BOD, DO	Light Blue	UNCLASSIFIED

## 5.1 WATER QUALITY

---

### General

The current state of the water quality of the Cleddau catchment has been assessed against the Use-related targets set in Section 4. This has been achieved largely by the use of data collected from routine sampling points for the past 3 years. In many of the smaller and headwater streams there is no requirement for the NRA to collect routine water quality data and in these reaches data from other sources has been used. These sources are often "one-off" special surveys and the data cannot carry the same statistical certainty as those from routine points.

Since aquatic animals and plants have to endure the whole range of water quality at each site, biological data can be very useful in supporting the water chemistry data that only represent a series of "snapshots" of the water quality. This is especially true in the smaller streams that are not routinely sampled. The Welsh Region of the NRA has developed a series of "biological keys" based upon the presence and absence of certain indicator species, which can be used to detect intermittent or background problems such as acidification (acid rain) or farm pollution. The Authority also routinely samples fish stocks at many sites. All these sources of data are used to assess the state of the catchment and identify areas where the targets set in Section 4 are not met.

The following sections and maps illustrate the results of this analysis; unless it is specifically stated otherwise, the catchment passes its identified targets,

### Local Perspective

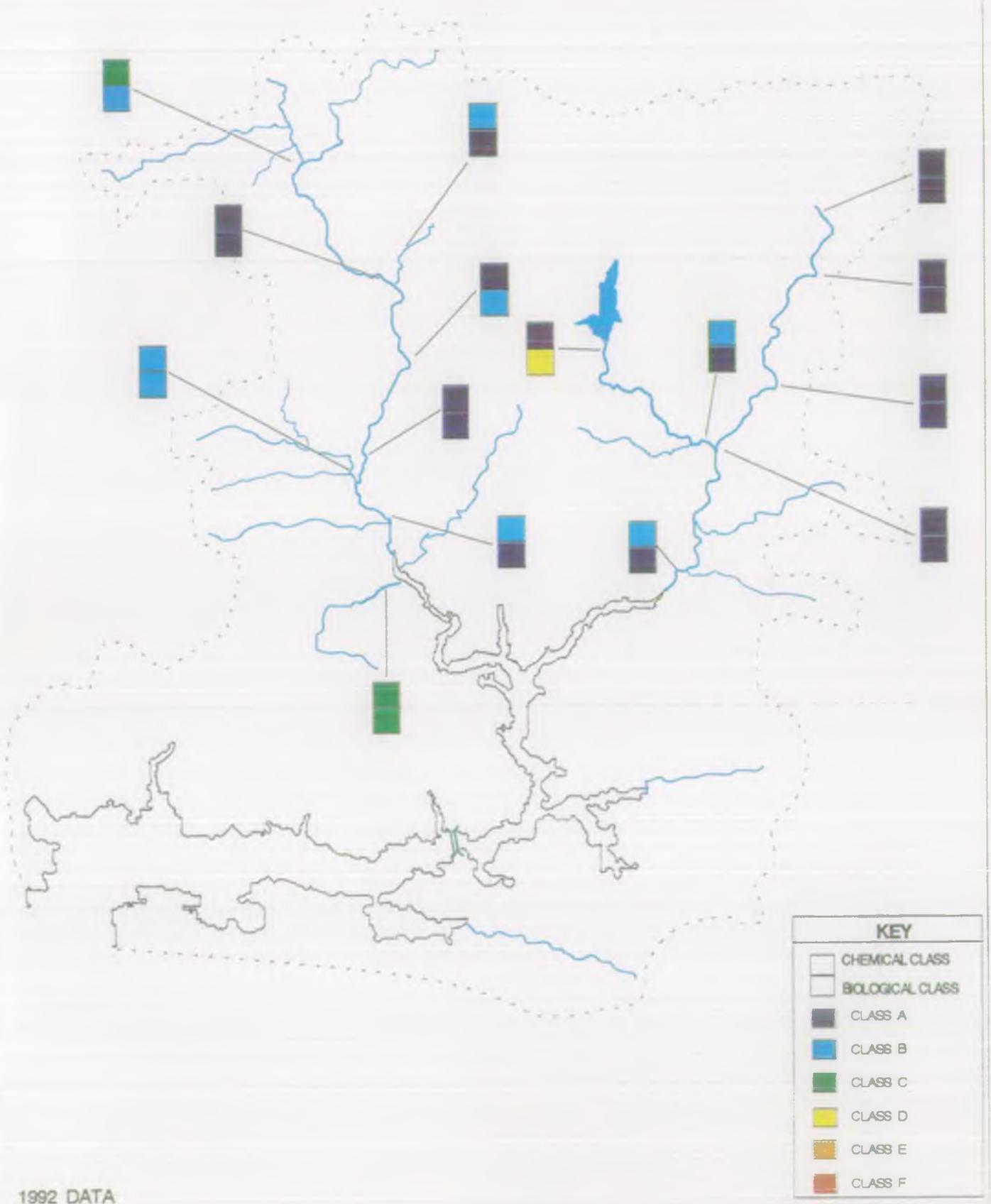
*The maps identify where water quality fails to meet standards required by the uses. Map 31 indicates the determinand(s) causing failure and Map 32 shows the classification of rivers and streams using the hierarchical Fisheries Ecosystem classification.*

*In addition to routine water quality monitoring, the NRA also undertakes a programme of biological monitoring. A national classification system is under development by the NRA (DoE 1992) which will allow rapid comparison between chemical and biological quality for a given river (for further details, please refer to Appendix 2). Map 33 shows the results of this comparison for the catchment, in this case using a prototype biological classification system.*

CLEDDAU WATER QUALITY: CURRENT STATUS  
FISHERIES ECOSYSTEM CLASSIFICATION



KEY	
COLOUR	FE CLASS
— (green)	1
— (black)	2
— (red)	3
— (yellow)	4
— (orange)	5
— (light blue)	UNCLASSIFIED



## STATE OF THE CATCHMENT

### *Issues identified*

There is widespread failure to meet Fisheries Ecosystem Class 1 (FEC1) standards for rivers and streams. Failure is caused by the exceedance or non-achievement of specified limits for dissolved oxygen, BOD, ammonia and pH. However, whilst the water quality is variable throughout the catchment, most stretches of river are either Class 1 or Class 2. The issues identified are:

- Agricultural activities result in poor water quality in some classified stretches of the Eastern and Western Cleddau, Cartlett Brook and probably Narberth Brook (Issues 1-3, Section 7).
- In unclassified stretches with low dilution, excessive growths of sewage fungus, reduced diversity of invertebrate fauna, and poor fishery status may occur in first order streams in the vicinity of farms contravening standards (Issue 4, Section 7 - see also Section 6, Conflicts).
- Inadequate sewerage systems contribute to poor water quality in some stretches, such as Crundale sewage pumping station which impacts on an unclassified tributary and on the Cartlett Brook (Issues 2 & 5, Section 7).
- The previously non-compliant stretch downstream of Narberth STW will need to be re-assessed following the relocation of the treated sewage outfall to the Eastern Cleddau, downstream of Canaston intake (Issue 3, Section 7).
- Chemical and biological quality on several unclassified tributaries is affected by discharges from small STWs such as Spittal, Letterston East, Langdon and Lamphey (Issue 14, Section 7).
- The Syfynwy, downstream of Rosebush WTW, is presently non-compliant as a result of discharges of filter backwash water from the works (Issue 6, Section 7).
- Aesthetic bathing standards are contravened in most parts of Milford Haven by the presence of sewage solids and debris (Issue 7, Section 7 - see also Section 6, Conflicts).
- Occasional development of blue-green algal blooms in Llysyfran reservoir may indicate the possibility of eutrophication of this water body (Issue 8, Section 7 - see also Section 6, Conflicts).
- Surface water quality in the lower reaches of the Eastern and Western Cleddau is at risk from pollution incidents arising from agriculture. This may pose a threat to potable supplies (Issue 9, Section 7).

## STATE OF THE CATCHMENT

- Pesticide monitoring at potable water abstraction points in the Eastern and Western Cleddau catchments has identified occasional slightly elevated levels of some pesticides, although these levels are well below the limits specified in the EC Surface Waters Intended for Abstraction of Drinking Water Directive-(75/440/EEC) (Issue 10, Section 7).
- Road drainage from the A40 at Canaston Bridge presents a serious threat to the potable water intake some 200 metres downstream. Vehicles travel along this stretch of road at high speed, and the gradient of the bridge approaches, plus the staggered road junctions adjacent to it, increase the risk of accidents, and a serious pollution incident. There is a bankside storage facility at the abstraction, but improved protection for the intake is required at the river crossing (Issue 11, Section 7).
- Combined sewage overflows (CSOs) in Haverfordwest operate prematurely because of inadequacies in the sewerage system, thereby causing aesthetic problems (Issue 12, Section 7).
- Whilst generally water quality and biological quality are in good agreement there is poor agreement at one site, below Llysyfran reservoir, where chemical quality is very good (class A) but biological quality is poor (class D). Low populations of salmonids have also been recorded at this site. This probably reflects an impact on the physical aquatic habitat in the upper River Syfynwy as a result of the artificial flow regime imposed by the reservoir, but needs further investigation (Issue 13, Section 7).
- Developments within sewered areas, that would lead to unacceptable environmental impact because of inadequate sewerage or sewage treatment infrastructure, will normally be opposed by the NRA at the planning consultation stage unless Dŵr Cymru confirms that the Company propose to undertake the required improvements within the five year period of any planning permission. The Local Planning Authority would, in these circumstances, be asked to impose a negative condition on any planning permission banning occupation of the development until the required improvements had been completed to the satisfaction of the NRA.

Within the Cleddau Catchment, this policy has been a factor in the early commitment from Dŵr Cymru to install secondary (biological) treatment for the existing crude discharges at Pembroke Dock and Milford Haven and these works are scheduled to be completed by 1995 (Issue 7, Section 7). The NRA position on other discharges or existing sewage treatment works is as follows;

## STATE OF THE CATCHMENT

- **Dale:** The outfall was extended in October 1993 and fine screening has been installed to remove the problem caused by sewage solids and debris. This outfall will then discharge screened sewage, on the ebb tide, into an area used extensively for immersion sports. Whereas this solution does not achieve the ultimate requirements for this discharge, it represents a considerable improvement on previous conditions. The NRA is unlikely to object to very modest development within the catchment area (ie up to 10% increase) in advance of the final scheme, which is unlikely to be implemented much before 2006 (Issue 7, Section 7).
- **Burton:** The sewage discharge at Burton is given primary settlement but the outfall discharges directly into a zone of water contact recreation. A major residential development has recently been given planning approval and it is understood that Dŵr Cymru is considering diversion of the discharge to the treatment works at Neyland. Further details are awaited from Dŵr Cymru prior to the NRA position being finalised (Issue 7, Section 7).
- **Haverfordwest:** Several parts of the Haverfordwest sewerage system cause problems due to premature operation of combined sewer overflows (CSOs). In particular, Crundale Pumping Station is overloaded and has experienced overflows during dry weather conditions. Proposals to deal with this situation are awaited from Dŵr Cymru and until a commitment is received to deal with this problem then further development will be opposed (Issue 2, Section 7).

Within the town centre of Haverfordwest, overflows at Northgate and New Bridge have caused frequent problems. A scheme will be undertaken by Dŵr Cymru and their agents commencing in October 1993 to reduce the frequency of blockages and overflows at Northgate although an effective fine screen system may also be required. No proposals have been made to deal with the frequent blockages and overflows from the sewerage system to the Western Cleddau at New Bridge. These matters are to be subject to further dialogue with Dŵr Cymru (Issue 12, Section 7).

## STATE OF THE CATCHMENT

- **Spittal:** The discharge from Spittal STW presently has an unsatisfactory impact on a tributary of Rudbaxton Water, and for this reason further development in the catchment will be opposed. Dŵr Cymru will be completing improvements to the treatment at Spittal STW by April 1994. On completion of these works, and the determination and issue of a consent that will protect the environment by the NRA, opposition to further development will be removed (Issue 14, Section 7).
- **Letterston East:** The treated effluent from this works has an unacceptable environmental impact on the receiving watercourse. Until such time as a firm commitment to remedial measures is received from Dŵr Cymru, the NRA will continue to oppose further developments in the catchment area (Issue 14, Section 7).
- **Langdon:** Langdon STW, which serves Begelly and parts of Kilgetty and Pentlepoir, drains into the River Cresswell and has a severe impact on downstream water and biological quality. Dŵr Cymru are considering the possible diversion of flows currently treated at this works to the proposed new Saundersfoot and Tenby scheme. Until such a commitment is made, the NRA will oppose any further development that results in an increased discharge to the river (Issue 14, Section 7).

Further biological assessments of the impact of some works known to cause an impact, and others where improvements have been carried out (eg Ambleston, Puncheston, Keeston), have been undertaken during 1993. The information arising from this exercise will assist in further negotiations with Dŵr Cymru and decisions on catchment areas for which the NRA will oppose further developments.

### CURRENT STATE OF THE CATCHMENT WATER QUANTITY



**KEY**

-  STRETCHES OF RIVER THAT DO NOT MEET THE CURRENT WATER QUANTITY TARGETS
-  FISH FARMS

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5.2 WATER QUANTITY

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

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 to become problematic.

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

**Local Perspective**

*The largest water supply abstraction licence within the catchment, which is from the Eastern Cleddau at Canaston, has conditions related to the efficient operation of the Llysyfran Regulation Scheme. The work undertaken to raise the level of the spillway of Llysyfran Reservoir during the winter of 1992/3 will provide a system yield which should give security of supply to acceptable standards into the next century.*

*Applications for direct abstraction in summer for spray irrigation are only entertained if provision of winter storage is not feasible.*

**Issues identified**

Prior to the completion of a Regional abstraction licensing policy the identification of locations where in river needs are not being met cannot be specified. Comparison of prescribed or residual flows with 95 percentile flows gives an indication of the locations that should be the primary focus for study when satisfactory methods are available. They may not necessarily subsequently be identified as problems. The locations in this category are as follows:-

- The Syfynwy below Rosebush Reservoir due to the prescribed compensation flow (Issue 15, Section 7).

## STATE OF THE CATCHMENT

- The **Eastern Cleddau** below Pont Hywel due to the prescribed residual flow (Issue 15, Section 7).
- The stretches of river between the inflow and outflow of the fish farm abstractions. Licences of entitlement afford no control over the quantity of water abstracted under low flows. Discharge consent conditions requiring flow measurement, to protect the river, are yet to be enforced (Issue 16, Section 7).
- The **Eastern Cleddau** below Canaston. This is a very short distance to the tidal limit and there is a reserve of water available in Llysyfran Reservoir for river management purposes (Issue 17, Section 7).
- The **Western Cleddau** below Crowhill. This abstraction is at the tidal limit (Issue 15, Section 7).
- The **Cartlett Brook, Merlin's Brook, Pembroke River** and other watercourses draining directly into the Haven which are used extensively for spray irrigation. Licences of right and other direct abstractions do not contain conditions protecting 95 percentile flows (Issue 18, Section 7).

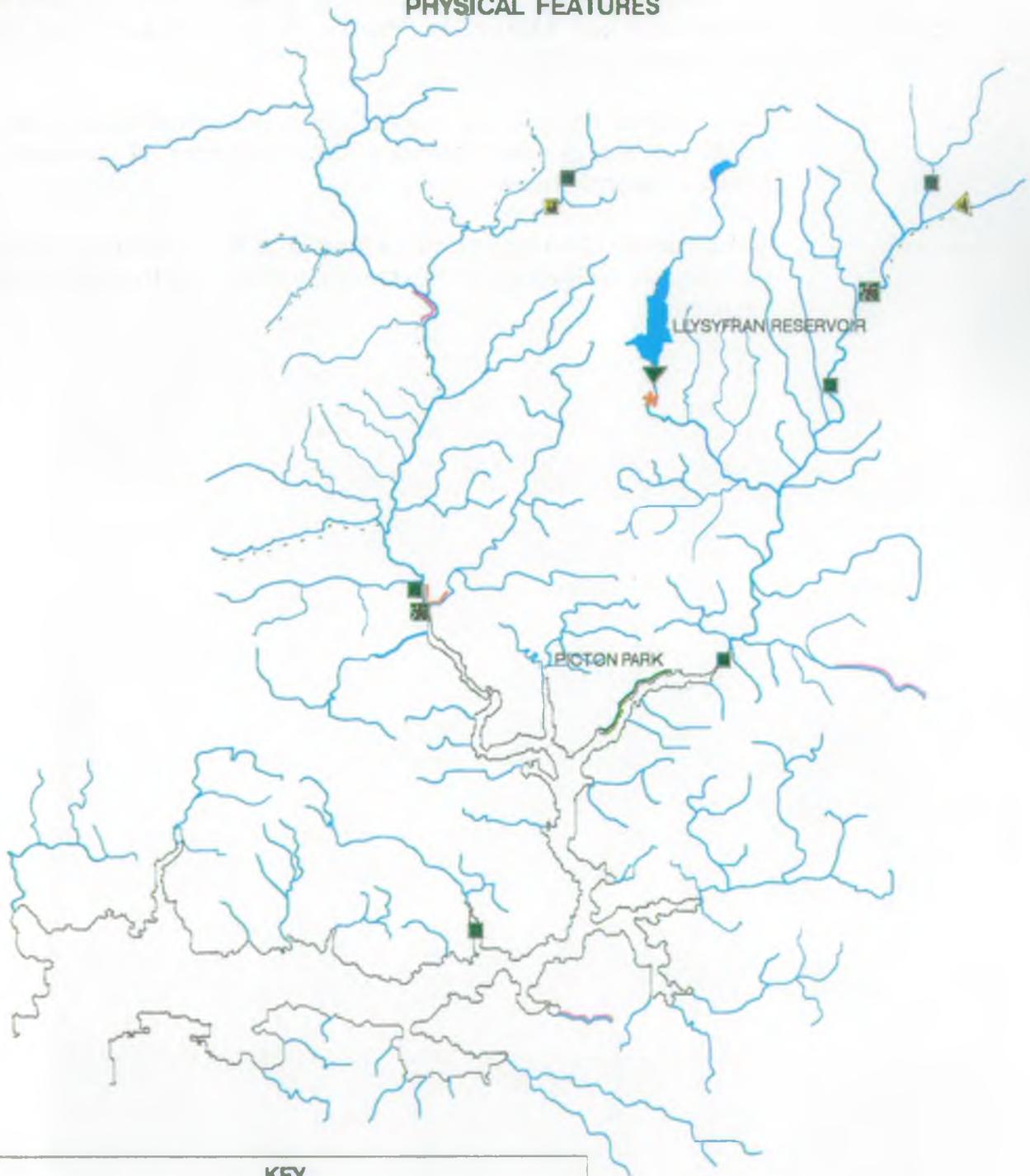
In addition, the following issues have been identified:

- Continuous flow measurement is only available for the two major rivers. The majority of applications for abstraction licences received, relate to small watercourses. There is a need for continuous measurement to assess low flow conditions reliably on one or more of the smaller watercourses (Issue 20, Section 7).
- Existing flow regimes and observed siltation in tributaries suggest that land use changes and associated drainage activity may have impacted on the catchment. In addition, the mean annual flood in the Western Cleddau, over the period 1977 - 1993, is 20% higher than that for the full record. These could be natural effects, but the cause(s) should be investigated (Issue 21, Section 7).
- Availability of river flow for abstraction or environmental needs such as fish migration, cannot be readily identified until a regional licensing policy has been developed (Issue 19, Section 7). The benefits of a policy based on the latest research will be the availability of:-

## STATE OF THE CATCHMENT

- (i) a consistent method for determining applications for licences to abstract that will balance the interests of the abstractor and the environment.
- (ii) a method for assessing whether the resources are already fully committed and thereby facilitating discouragement of potentially unsuccessful applications.
- (iii) a basis for identifying priorities for change if individual or groups of abstractors are leading to over-abstraction which is detrimental to the environment.

STATE OF THE CATCHMENT  
PHYSICAL FEATURES



KEY	
<b>OBSTRUCTIONS TO PASSAGE OF FISH</b>	
■ ARTIFICIAL	OBSTRUCTION PREVENTS PASSAGE OF FISH UNDER LOW FLOW CONDITIONS
■ NATURAL	
▲ ARTIFICIAL	BARRIER, PERMANENT BARRIER PREVENTING PASSAGE OF FISH UNDER ALL CONDITIONS
▲ NATURAL	
⋯	POOR SPAWNING GRAVELS
—	DAUGLEDDAU TRAIL MISSING SECTION
—	FLOOD DEFENCE SUB STANDARD
—	FLOODING RISK
★	FISH PASS
✱	FISH TRAP

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5.3 PHYSICAL FEATURES

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**General** Since Physical Features targets are the most subjective (Section 4.3) it follows that much of the assessment of the state of the catchment must be similarly subjective. 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.

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

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

**Local Perspective**

*Issues Identified*

- Further consideration needs to be given to flooding risks, despite the flood protection works undertaken over the last 10 years, at the following locations:

**Cartlett Brook, Haverfordwest:** Existing flood defences were overtopped in 1986 and property in Cartlett and parts of Haverfordwest flooded. Flood protection standards are estimated to be less than 1 in 50 years (Issue 22, Section 7).

- **Western Cleddau, Haverfordwest:** In 1987, some 52 properties in Haverfordwest town centre flooded as floodwater left the channel and occupied the floodplain. Flood protection standards are below the Authority's target for urban areas (i.e. 1 in 100 years), and are estimated to be 1 in 50 years and 1 in 70 years for the west and east bank respectively (Issue 23, Section 7).

It is recognised that other isolated properties, sited within the flood plains of the Cleddau catchment, have been flooded from time to time. It would not be cost-effective, however, to provide protection for these dwellings.

- The government has identified that the main NRA input to development plan preparation should be achieved using the results of surveys (required of the NRA by S105(2) Water Resources Act 1991) to identify the extent of lands liable to flood, and highlight any likely flood defence problems. These surveys have yet to be undertaken in the Cleddau catchment (Issue 24, Section 7).

## STATE OF THE CATCHMENT

- The availability of suitable gravels for redd excavation by salmonids is severely restricted in the upper Western Cleddau catchment, because of siltation, resulting in overuse of the limited gravels available (Issue 25, Section 7).
- Habitat degradation has occurred in the upper Western Cleddau as a result of historical grant-aided land and field drainage work to improve agricultural land, reducing wetland areas and their associated wildlife (Issue 26, Section 7 - see also Section 6, Conflicts).
- The upstream migration of salmonids is impeded by a number of natural and artificial obstructions (see map 35). The feasibility and desirability of easing fish passage to waters upstream should be considered, taking account of cost/benefit, landscape issues and the Region's brown trout policy (genetic concerns). (Issue 27, Section 7).
- The Vicars Mill fish farm abstraction is not adequately screened against the ingress of wild fish. In one year, over 7,000 smolts were trapped in the leat. This matter needs to be progressed to a satisfactory conclusion as soon as possible. (Issue 28, Section 7).
- The potable abstraction at Canaston is not screened against the ingress of wild fish. An electric fish screen was installed some years ago, but it is not clear whether it can be made to function effectively (Issue 29, Section 7).
- Llysyfran reservoir, constructed for water supply purposes, cut off a large area of the Syfynwy catchment from spawning salmon and sea trout. The fisheries protection scheme has not been implemented successfully because the trap, used to collect broodstock, has not functioned effectively. The siting of smolt release ponds, to be created with financial assistance from Dŵr Cymru, also needs urgent consideration (Issue 30, Section 7)
- The NRA has yet to agree formally with CCW a "standard of service" for SSSIs (eg water levels to be maintained at a specified height, minimum return periods for cutting vegetation) (Issue 31, Section 7)
- 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 32, Section 7).

## STATE OF THE CATCHMENT

- The planned long distance footpath, proposed by the Pembrokeshire Coast National Park Authority, around the upper estuary has yet to be completed. Approximately 110km of the trail, using managed routes through private land, and minor roads, have now been opened for public use. Agreement on the final length of some 3km, in the vicinity of Picton Park and Slebech Park, will enable the circuit to be completed. Some existing stretches are currently the subject of review because they impinge on conservation areas (Issue 33, Section 7).
- While there is now good access to the tidal reaches of the river, there is limited public access to the freshwater reaches. Some consideration should be given to the adequacy of the existing footpath network in an important tourist area (Issue 34 Section 7).

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## **6.0 CONFLICTS BETWEEN USES.**

This Section considers the Issues in the catchment that are related to conflicts between competing Uses (including Functions of the NRA). Suggestions are made for the resolution or reduction of the conflicts.

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**6.0 CONFLICTS BETWEEN USES**

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**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 Cleddau catchment.

**Local Perspective.**

The Cleddau catchment is recognised as an area with a very high conservation status. Some impact through human intervention is inevitable, especially from industry, agriculture, sewage disposal and tourism. Nevertheless it is of the utmost importance that the river corridor is managed positively to conserve the landscape and the riverine environment. Where appropriate, steps should be taken to reverse trends that are leading to a degradation of this environment.

Some conflicts may seem largely unavoidable. For example, the major conflict in the Haven is between uses requiring good quality water with low levels of micro-organisms (bathing, water contact sports, conservation, amenity, angling, fisheries) and those that affect the quality of the water mass (industry, sewage disposal, shipping, etc.). There are, nevertheless, opportunities to reduce the level of conflict by developing an appropriate controlling framework, providing that all the agencies and users work together in pursuit of an integrated plan.

Set out below are significant areas of conflict identified within the catchment. It is suggested that a change in mode of operation by the use listed second (in the margin) should be considered: options are given in Section 7.

**Conflicts Identified**

***Flood Defence/ Development*** Proposed development on the flood plain of the Western Cleddau through Haverfordwest threatens to lower existing flood protection standards which are already considered to be sub-standard. In general, development on the flood plain, or adjacent to and within the river system, conflicts with the need to maintain both existing flood defences and the general river system. It also affects the NRA's ability to construct new defences if required, and may result in structures that are visually intrusive and ecologically barren (Issue 35, Section 7).

***Fisheries,  
Conservation,  
Pollution Control  
Flood Defence etc/  
Development***

The A40 London to Fishguard road has been designated a "Euroroute" and consequently will require upgrading within the catchment. This must be achieved in a manner which ensures the NRA's statutory interests, and the river corridors in general are safeguarded (Issue 36, Section 7).

***Fisheries &  
Conservation/  
Agriculture.***

Land drainage capital schemes, undertaken in the upper Western Cleddau catchment in the past to improve drainage and productivity, significantly modified the river ecosystem and affected extensive salmonid nursery and spawning areas. This artificial drainage system requires regular desilting and aquatic weed control in order to preserve its effectiveness.

These routine works conflict with the desire to restore the river to as natural a condition as possible, having regard to the agricultural interests. The need to maintain these schemes to current standards should be reviewed with a view to re-instating habitats wherever possible (Issue 26, Section 7).

***Fisheries &  
Conservation/  
Agriculture***

There is a conflict between the intensive farming activity throughout much of the catchment and the high water quality required in unclassified reaches of the river system. The low dilution available in these minor tributaries makes the impact of any organic input significant. This causes a general deterioration of biological quality in those areas which are particularly important as spawning and nursery areas for salmonid fish. As an extreme case, a large discharge can cause significant chemical and biological impact, including fish kills, which may extend along several kilometres of river (Issue 4, Section 7).

***Fisheries/Fish  
Farming, Potable  
& Agricultural  
Abstraction***

Abstractions for fish farming, potable water and spray irrigation result in low river flows (see Issues 15,16,17,18, Section 7). The impact of these low flows on fish migration is unknown but is an issue that will be addressed once the Regional Licensing Policy has been determined (Issue 19, Section 7).

***Amenity, Angling  
& Boating/  
Agriculture &  
Fish Holding***

Llysyfran reservoir, a Country Park much used by walkers, fishermen and boat users (fishermen, sailors, windsurfers, canoeists) has problems with farm effluent polluting some inflowing streams. This can cause severe discolouration and foul smell, apart from any effect on nutrient levels in the water mass. There is also a cage rearing complex on the reservoir to support the put & take fishery. The presence of blue/green algae has been recorded almost consistently since the survey began in 1990, albeit at very low levels in winter. The health risk presented by toxins to recreational water users cannot be quantified at present (Issue 8, Section 7).

***Salmonid Fisheries/  
Sea Fishing*** Illegal fishing continues to be a problem in the catchment, particularly in the tidal reaches where fishermen take salmon and sea trout illegally using nets. Controls introduced by MAFF (designation of bass nursery areas) and the South Wales Sea Fishery Committee (1992 Bye-laws) may assist, by restricting sea fishing in the Daugleddau and Pembroke River estuary (Issue 37, Section 7).

***Conservation &  
Amenity/Boating*** Conflict with recreational users at conservation sites is potentially a serious problem in the Daugleddau and may well also affect amenity uses. Motor boats and jet skis are being operated in the area which is internationally important for birds and which is favoured by walkers seeking tranquillity.

The National Park Authority, supported by the Milford Haven Port Authority and other public bodies, has appointed a water warden to help control these activities, and enforce a zoning system (see below) (Issue 38, Section 7)

***Bathing/Boating/  
Water Contact  
Sport*** Conflicts between recreational users (water-skiers, windsurfers, etc.) exist in the Haven. A survey undertaken in 1987 (I.Marshall, UWIST) found that motor craft caused most complaints, for exceeding speed limits and endangering swimmers, sailors, craft and moorings by operating, sometimes with skiers, too close to the shore and other users. The rapid increase in the popularity of windsurfing provoked similar comment and inexperienced sailors were also reported as causing significant problems, especially since the opening of Neyland Marina. Those statutory organisations with an interest, including local authorities, PCNP, CCW and the NRA, have assisted the Milford Haven Port Authority in producing the Milford Haven Waterway Recreation Plan. This plan zones activities (re-inforced by bye-laws) to reduce conflict and minimise disturbance in more sensitive areas. A water warden service came into operation in June 1991 for a trial period and the service has proved to be successful (Issue 38, Section 7).

***Fish Farming &  
Shellfisheries/  
Oil Industry,  
Sewage Disposal,  
Fish Farming*** Fish farms and shellfishermen face a range of problems with water quality. Both have had their product and equipment contaminated with oil, whilst the shellfish farm is particularly vulnerable to dispersed oil. Other problems include chemical inputs such as TBT and possible hazards from sewage effluent (micro-organisms, debris etc.) and spillages. The NRA has carried out preliminary investigations during the summer of 1993 on certain ecotoxicological effects within the Haven, particularly on the surface layer. The results are not yet available but it is planned to extend this work within the Haven in future years (Issue 39, Section 7).

## CONFLICTS BETWEEN USES

*Conservation/  
Navigation  
(Dredging)*

A conflict may exist between the needs of navigation in the Haven and those of wildlife. Concern has been expressed by the CCW that dredging operations in the Haven may be decreasing water clarity and increasing siltation down tide from the dumping site, thereby affecting fauna and flora close to the sea-shore (Issue 40, Section 7).

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## 7.0 ISSUES AND OPTIONS

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7.0 ISSUES AND OPTIONS

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

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.

## ISSUES AND OPTIONS

ISSUE NO. 1	Elevated BOD and ammonia, and reduced DO levels as a result of agricultural activities in E and W Cleddau, cause stretches to fail FEC1 target.		
OPTIONS	Responsibility	Advantages	Disadvantages
<p>Targeted catchment control work in appropriate catchments. Identify farms for remedial waste management works.</p> <p>Propose interim target of FE2 and FE4 in affected stretches.</p>	NRA/Farm Owners	Will achieve improvements in long term.	<p>Costs to farmers are unknown. Costs to NRA dependent on extent of pollution prevention activities.</p> <p>Will not achieve FE1 targets in short term.</p>

ISSUE NO. 2	Elevated BOD and ammonia levels as a result of agricultural activities in the catchment, and as a result of sewage discharges from Crundale Pumping Station cause unclassified tributaries and the Cartlett Brook to fail the FE Class 1 target.		
OPTIONS	Responsibility	Advantages	Disadvantages
<p>Improvement required to Crundale Pumping Station.</p> <p>Catchment Control work is required.</p> <p>Set interim targets of FE2.</p>	<p>NRA/Dŵr Cymru</p> <p>NRA/Farm Owners</p> <p>NRA</p>	<p>Longterm improvements in WQ to achieve FE Class 1.</p> <p>Long term improvements in WQ to achieve FE Class 1.</p> <p>Will protect existing quality.</p>	<p>Costs: Unknown</p> <p>Cost to farmers unknown. Cost to NRA dependent on extent of problem.</p> <p>Not achieve FE1 targets in short-term.</p>

## ISSUES AND OPTIONS

ISSUE NO. 3	Elevated BOD and ammonia levels as a result of agricultural activities, and a STW discharge on the Narberth Brook, cause it to fail its FE Class 1.		
OPTIONS	Responsibility	Advantages	Disadvantages
Narberth STW outfall was relocated to E. Cleddau in 1992. Has reduced loadings of sanitary determinands to the brook. This now allows determination of extent of agricultural problems.	NRA/Farm Owners	Achieve long term improvements in Water Quality.	Costs to farmers unknown. Costs to NRA dependent on extent of pollution prevention measures.
Propose interim target of FE2.	NRA	Protect existing Water Quality.	Will not achieve FE1 targets in short term.

ISSUE NO. 4	Farming activities impact on the catchment, ranging from chronic localised problems to acute problems causing fish kills, biological, fisheries and aesthetic impacts.		
OPTIONS	Responsibility	Advantages	Disadvantages
Extension of existing programme of farm inspections/liaison to include all catchments already identified by NRA.	NRA	Improvement of water quality & pre-empting pollution incidents.	Cost: Depends on number of visits. Major resource implications.
Improved farm effluent handling storage systems.	Farm Owners	As above, and 50% grant-aid available to farmers.	Cost to farmers unknown.

ISSUES AND OPTIONS

ISSUE NO. 5	Elevated BOD and ammonia levels with reduced DO concentrations as a result of localised sewerage problems causing Merlins Bridge to fail its FE Class 1 target.		
OPTIONS	Responsibility	Advantages	Disadvantages
<p>Improvements to local sewerage system in 1992 reduced sewage discharged from CSO to brook.</p> <p>There are proposals for the St. Ivel Treatment Works (which discharges to the sewer but spillages/accidents can enter the brook via surface water drains) to be reconstructed on an alternative site in 1994.</p> <p>Set target of FEC3 to be achieved by 1998. This interim target will allow determination of the extent of any agricultural problems in the catchment.</p>	<p>NRA/DCC</p> <p>NRA/DCC/St Ivel</p> <p>NRA</p>	<p>Result in improvement to WQ.</p> <p>Indirect improvements to WQ in stream by reconstruction and relocation of treatment works.</p> <p>Ensure improvements in WQ.</p>	<p>Costs £198k.</p> <p>Costs unknown</p> <p>Not achieving FE1 target in short term.</p>

ISSUE NO. 6	Elevated BOD and low pH in River Syfynwy downstream of Rosebush Water Treatment Works.		
OPTIONS	Responsibility	Advantages	Disadvantages
<p>Improvements to Rosebush Water Treatment Works are planned. Due for completion in 1994. Setting and enforcement of appropriate consent standards to achieve compliance with the FE1 target by 1998.</p>	<p>NRA/Dŵr Cymru</p>	<p>Achieves improvements in WQ.</p>	<p>Costs. Total scheme £3.5m of which approx £700k is for washwater recovery system.</p>

## ISSUES AND OPTIONS

ISSUE NO. 7	Poor aesthetic quality in much of the Haven, because of the presence of sewage solids and debris. Highly variable bacteriological quality, frequently exceeding EC Bathing Waters Directive Standards, in high amenity areas.		
OPTIONS	Responsibility	Advantages	Disadvantages
Installation of sewage treatment at crude outfalls. £11m being spent by DCC before 1995 on Milford Haven, Pembroke/Pembroke Dock. No confirmed scheme for Dale.	Dŵr Cymru	No discharge of identifiable sewage. Improved water quality in Haven estuary.	Cost £11 million (plus scheme for Dale).

ISSUE NO. 8	Occasional blue-green algae blooms at Llysyfran Reservoir, with possibility of eutrophication.		
OPTIONS	Responsibility	Advantages	Disadvantages
Development of Action Plan during 1993/4 for Llysyfran catchment, together with programme of farm inspections/liaison 1994/5 onward.  Improved farm effluent handling/storage systems.	NRA    Farm Owners	Quantification of problem and identification of problem sites.   Improvement in water quality, reduction in nutrient inputs and pollution incidents. 50% grant-aid for farmers.	Cost of Action Plan: Unknown.  Cost: Depends on number of site visits.  Cost to farmers unknown.

## ISSUES AND OPTIONS

ISSUE NO. 9	Risk to potable water abstractions on Eastern and Western Cleddau from pollution incidents arising from agricultural activity within the catchment.		
OPTIONS	Responsibility	Advantages	Disadvantages
Continuation of present programme of farm inspections/liaison in sensitive sub-catchments already identified by NRA.	NRA	Maintenance and improvement of water quality & pre-empting pollution incidents.	Cost: Depends on number of visits - ongoing.
Completion of time of travel work in the W. Cleddau catchment.	NRA	Intake protection, more accurate information to Dŵr Cymru.	Cost of remaining flow/reach work and report.
Improved farm effluent handling/storage systems.	Farm Owners	As above, and 50% grant-aid available to farmers.	Cost to farmers unknown.

ISSUE NO. 10	Very low level positive pesticide results at potable water intakes on Eastern & Western Cleddau.		
OPTIONS	Responsibility	Advantages	Disadvantages
Development of a comprehensive monitoring programme for pesticides/herbicides in addition to existing programme.	NRA	Quantification and identification of sources within the catchment.	Cost: Unknown Resource implications
Improved methods of pesticide/herbicide handling/storage/ application within the catchment.	Farm Owners, Local Authorities and other users.	Improvement of water quality & pre-empting pollution incidents.	Cost: Unknown
Continue liaison between NRA, Dwr Cymru & Environmental Health Depts., of District Councils.	NRA/Dŵr Cymru/ District Councils.	To enable detection of pesticides at potable water intakes.	

## ISSUES AND OPTIONS

ISSUE NO. 11	Risk to potable water intake at Canaston on Eastern Cleddau from A40 road drainage.		
OPTIONS	Responsibility	Advantages	Disadvantages
Installation of 20m <sup>3</sup> on-line storage, together with oil interceptors, at each of two A40 junctions. Feasibility of diverting discharges downstream of intake should be assessed.	Dyfed County Council/Welsh Office.	Protection of intake 200m downstream from chemical spill entering river via road drains.	Cost: Unknown.

ISSUE NO. 12	Combined sewer overflows (CSOs) to the Western Cleddau in Haverfordwest.		
OPTIONS	Responsibility	Advantages	Disadvantages
Implementation of remedial measures in the sewerage system identified by the NRA. Uprating capacity of some sewers & installation of adequate screening.	Dŵr Cymru	Improvement of water quality and amenity value.	Cost: Unknown

ISSUE NO. 13	Biological quality, and fisheries status, is poorer than expected in the River Syfynwy downstream of Llysyfran Dam.		
OPTIONS	Responsibility	Advantages	Disadvantages
Investigate cause of problem, and assess cost and desirability of taking remedial action.	NRA	Improvement of biological quality.	Cost: Unknown.

## ISSUES AND OPTIONS

ISSUE NO. 14	There is an unacceptable impact on water quality and biological quality downstream of some Dwr Cymru operated STWs, resulting in NRA opposition to further developments in their catchments.		
OPTIONS	Responsibility	Advantages	Disadvantages
Improvement of treatment at some STWs to comply with environmentally protective limits.	Dŵr Cymru	Improvement of water and biological quality, and removal of NRA opposition to development	Cost: Unknown

ISSUE NO. 15	Prescribed flows below Dŵr Cymru licences of right (Syfynwy, E. Cleddau & W. Cleddau) are less than 95 percentile flows.		
OPTIONS	Responsibility	Advantages	Disadvantages
Desk study to identify if existing conditions do create an environmental problem and, if so, data collection and/or feasibility study of possible solutions.	NRA	Increased knowledge of catchment. Protection of the environment.	Studies will take a period of time and cost-effective solutions may not be apparent.  Cost: Desk Study £2k

## ISSUES AND OPTIONS

ISSUE NO. 16	Abstractions at fish farms continue in low flows causing flows between inflow and outflow to fall below 95 percentile flow.		
OPTIONS	Responsibility	Advantages	Disadvantages
Desk study to identify if existing conditions do create an environmental problem and, if so, data collection and/or feasibility study of possible solutions.	NRA	Increased knowledge of catchment. Protection of the environment.	Studies will take a period of time and cost-effective solutions may not be apparent.  Cost: Desk Study £2k
Enforce discharge consent conditions which require flow measurement.	NRA	Protection of flows and water quality	Cost: Unknown

ISSUE NO. 17	Flow downstream of the Canaston abstraction, on the E. Cleddau falls below the 95 percentile flow.		
OPTIONS	Responsibility	Advantages	Disadvantages
Desk study to identify if existing conditions do create an environmental problem and, if so, investigate most effective use of reserve of water in Llysyfran for river management purposes.	NRA	Increased knowledge of catchment. Protection of the environment.	Cost: Desk Study £2k.

## ISSUES AND OPTIONS

ISSUE NO. 18	Abstractions licences for spray irrigation do not protect 95 percentile flows.		
OPTIONS	Responsibility	Advantages	Disadvantages
Grants to encourage winter storage for spray irrigation would assist in conversion from summer to winter abstraction.	MAFF	Less demand on summer water. Protection of the environment.	Cost: Unknown depends upon demand.
Co-operatives between farmers to ensure existing satisfactory winter storage is fully utilised.	NFU/FUW/NRA	Less demand on summer water.	

ISSUE NO. 19	The state of the Catchment, in water quality terms, cannot be adequately assessed until a Regional licensing policy is available.		
OPTIONS	Responsibility	Advantages	Disadvantages
Implement the Regional licensing policy in the Cleddau catchment as soon as possible.	NRA	Improved understanding of resource balance.	Timescale

ISSUE NO. 20	There are no flow measurement facilities on smaller watercourses.		
OPTIONS	Responsibility	Advantages	Disadvantages
Hydrometric review of the catchment to assess benefits and cost of installing additional flow measurement facilities.	NRA	More accurate flow assessment to enable better determination of licences and consents.	Cost: £10k

## ISSUES AND OPTIONS

ISSUE NO. 21	Flow regimes appear to have changed in the catchment in recent years, possibly as a result of land use changes.		
OPTIONS	Responsibility	Advantages	Disadvantages
Desk study to assess available data, including take up of agricultural land drainage, to determine if there is a change in hydrological regime.	NRA	Increased knowledge of catchment.	Cost: £5k

ISSUE NO. 22	Flood protection standards on the Cartlett Brook, in Haverfordwest, are sub-standard.		
OPTIONS	Responsibility	Advantages	Disadvantages
Study to investigate problem and identify possible solutions.	NRA	Increased flood protection.	Cost: £10k

ISSUE NO. 23	Flood protection standards on the Western Cleddau in Haverfordwest are sub-standard.		
OPTIONS	Responsibility	Advantages	Disadvantages
Study planned to identify possible solutions.	NRA	Increased flood protection	Cost: £10k

ISSUE NO. 24	S105 Surveys, to identify the extent of lands liable to flood, have yet to be undertaken.		
OPTIONS	Responsibility	Advantages	Disadvantages
Undertake surveys. National timetable is under consideration. Priorities to be set in consultation with Local Authorities.	NRA	Flood plain & flood defence problems identified, to enable NRA to advise Local Authorities for Local Plans	Cost: Unknown

## ISSUES AND OPTIONS

ISSUE NO. 25	Availability of spawning gravels severely restricted in upper Western Cleddau.		
OPTIONS	Responsibility	Advantages	Disadvantages
Habitat improvement and/or re-creation. e.g. gravel raking, importation, stabilisation, improving fish access.	NRA	Increased natural-productivity of catchment.	Cost: Unknown. Maintenance requirement?

ISSUE NO. 26	Land drainage schemes, undertaken in the upper Western Cleddau catchment in the 1970s to enable improvements in agricultural productivity, damaged the river ecosystem.		
OPTIONS	Responsibility	Advantages	Disadvantages
In-channel & riparian habitat improvement to reverse impact of land use changes/river engineering schemes (review in progress).	NRA	Reverse trend of degradation to benefit of both fisheries and conservation	Cost: Unknown
Discussion with land-owners and Welsh Office to determine whether a modified maintenance regime can be implemented.	NRA/Welsh Office Landowners	Reduced cost of maintenance Allows desired improvements to proceed	Some land may be lost to agriculture
Give consideration to applying one or more of the schemes promoted under EC Agri-Environment Reg. EC2078/92, to create water fringe buffer zones throughout much of the catchment.	Welsh Office/ CCW/NRA	Allows restoration/improvement of riverside ecosystems	Some land may be lost to agriculture  Cost of compensating farmers

## ISSUES AND OPTIONS

ISSUE NO. 27	Obstructions to the passage of migratory fish.		
OPTIONS	Responsibility	Advantages	Disadvantages
Identify improvements where appropriate, and implement rolling programme of works.	NRA	Natural productivity of catchment will be improved	Cost: Unknown

ISSUE NO. 28	Effective fish exclusion screens have not been installed at the intake to Vicar's Mill fish farm.		
OPTIONS	Responsibility	Advantages	Disadvantages
Seek agreement with the owner on the installation of an effective screen.	NRA/Owner	Protection of wild fish stocks	Cost: Unknown

ISSUE NO. 29	Effective fish exclusion screens are not in use at the potable water intake at Canaston, E. Cleddau		
OPTIONS	Responsibility	Advantages	Disadvantages
Progress the testing of the existing electric screen, and take appropriate action to ensure an effective screen is operational.	Dŵr Cymru/NRA	Wild fish stocks are protected.	Cost: Unknown

ISSUE NO. 30	The fisheries protection scheme, instigated to offset the impact of Llysyfran Reservoir, has not been implemented successfully.		
OPTIONS	Responsibility	Advantages	Disadvantages
Determine effective mitigation measures to replace existing procedures and implement.	NRA/Dŵr Cymru	Restore productivity of catchment	Cost: Unknown. Resource implications unknown

## ISSUES AND OPTIONS

ISSUE NO. 31	"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

ISSUE NO. 32	The invasive plant, Japanese Knotweed, is present in many parts of the catchment.		
OPTIONS	Responsibility	Advantages	Disadvantages
Implement effective and co-ordinated control measures within the catchment.	NRA/PCNP/DCC/CCW/Local Authorities & land owners	Environmental, and access improvements	Financial and resource implications unknown. Likely to be a long term commitment.

ISSUE NO. 33	A long distance trail around the upper estuary, being promoted by PCNP, has yet to be fully implemented (Slebech & Picton Park)		
OPTIONS	Responsibility	Advantages	Disadvantages
Continue negotiations with landowners on remaining lengths to enable full circuit to be opened.	PCNP & Landowners	Full circuit complete, providing excellent access around the waterway	Cost: Unknown

## ISSUES AND OPTIONS

ISSUE NO. 34	Limited public access to freshwater reaches of the Eastern & Western Cleddau.		
OPTIONS	Responsibility	Advantages	Disadvantages
Consider the adequacy of the existing footpath network and take appropriate action.	Local Authorities	Better public access to river in important tourist area	Cost of provision and maintenance  Possible disruption to other users, including landowners/occupiers

ISSUE NO. 35	Development of floodplains, especially in Haverfordwest, conflicts with flood defence requirements.		
OPTIONS	Responsibility	Advantages	Disadvantages
Close liaison between NRA and Local Authorities to ensure protection standards are not compromised.  Keep river banks free from development.	NRA/Local Authorities	No reduction in existing flood protection. Developer pays, not public funds.  Ensures existing banks & defences can be maintained and new defences constructed. Banks will be more attractive.	Cost to developer  Reduction in land available for development

ISSUES AND OPTIONS

ISSUE NO. 36	The A40 London to Fishguard road has been designated a Euroroute and will require upgrading at various locations, in close proximity to watercourses. This will require the NRA to safeguard its interests.		
OPTIONS	Responsibility	Advantages	Disadvantages
<p>Close liaison between the NRA and Welsh Office to ensure NRA interests are protected.</p> <p>Ultimately, representations to Welsh Office/Public Inquiries if matters not resolved to NRA satisfaction.</p>	<p>NRA/Welsh Office</p> <p>NRA/Welsh Office</p>	<p>NRA interests are taken into account as scheme developed and implemented. Environment &amp; property protected.</p> <p>Every effort made to protect NRA interests.</p> <p>Developer may have reduced costs if NRA representations unsuccessful</p>	<p>Cost of mitigation works dependent on scheme.</p> <p>Cost of dealing with issues at Public Inquiry high.</p> <p>Late changes to schemes can be costly and not as effective.</p> <p>NRA interests may not be adequately protected.</p>



## ISSUES AND OPTIONS

ISSUE NO. 39	A range of water quality problems impact on fish farms and shell fisheries, in the Haven, including oil spillages, TBT, chemical spillages & sewage.		
OPTIONS	Responsibility	Advantages	Disadvantages
Monitor the ecotoxicological effects of discharges and background levels to enable implementation of necessary controls.	NRA in consultation with MAFF/HMIP	Identification of causal factors and sources contributing to effects.	Cost of monitoring and any remedial work/controls identified.

ISSUE NO. 40	Impact of dredging and spoil dumping operations on sub-littoral fauna and flora within the Haven.		
OPTIONS	Responsibility	Advantages	Disadvantages
Continuation of monitoring of impact of dredging activity by CCW & NRA, in consultation with MAFF.	CCW/NRA/MAFF	Quantification and identification of problems.	Costs not quantifiable

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## APPENDICES

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## APPENDIX 1

**THE GROUNDWATER PROTECTION POLICY**

The preservation of groundwater quality and quantity is a major objective of the NRA. Limiting the risks 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 a national framework policy for the protection of groundwater which will effectively manage groundwater protection in the Cleddau 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 cover. 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 NATIONAL BIOLOGICAL CLASSIFICATION SCHEME (PROPOSED)

A National biological classification scheme is currently being prepared by the NRA (DoE 1992)\*. The diversity of the aquatic macroinvertebrate fauna can reflect water quality and is useful in detecting intermittent reductions in quality, and pollution caused by chemical parameters that are not monitored. These events may not be detected by routine water quality monitoring because of their infrequent occurrence and short duration.

The proposed classification scheme would allow rapid comparison between chemical and biological quality for a given river and therefore highlight areas where disparity between the two occurs for further investigation.

**The Cleddau Catchment**

Data from biological surveys carried out during 1992 were classified using the prototype classification system. This scheme called BAPC (BMWP\*\* Averages which Parallel the Chemical grading system), classifies sites according to the ratio of observed and predicted BMWP scores derived from family level identification invertebrates. A class (a-f) was assigned to each site where biological information existed. This was then compared with the respective chemical classification for the site. This was determined using the General Quality Assessment scheme which has recently been developed by the NRA for the general classification of river water quality (DoE 1992)\*. A description of the proposed biological and water quality classifications is provided overleaf.

\* DoE/WO 1992: River Quality, The Governments Proposals: A Consultation Document.

\*\* BMWP - Biological Monitoring Working Party

**GENERAL QUALITY ASSESSMENT SCHEME FOR RIVERS**

CLASS	CHEMICAL CLASSIFICATION			BIOLOGICAL CLASSIFICATION	AESTHETIC CLASSIFICATION	NUTRIENT STATUS CLASSIFICATION
	DO % SAT 10%ILE	BOD mg/l 90% ile	Ammonia mg N/l 90%ile	EQ1 (BAPC) (indicative - to be finalised)	(Basic Amenity Score (indicative - to be finalised)	- to be developed
A	80	2.5	0.2	1.0	10	
B	70	4.0	0.6	0.8	8	
C	60	6.0	1.3	0.6	6	
D	50	8.0	2.5	0.4	4	
E	20	15.0	9.0	0.2	2	
F	<20	-	-	<0.2		

## APPENDIX 3

## GLOSSARY OF TERMS AND UNITS USED

**ABSTRACTION**

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

**ACIDIFICATION**

The detrimental effect of acid rain on soils and freshwater.

**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).

**AMMONIA**

A chemical which is often found in water as the result of the discharge of sewage effluents. It is widely used 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 and so on.

**AQUIFER**

Most rocks contain holes, cracks and fissures. When these are interconnected they can store and allow water to pass through them. These rocks are known as aquifers and the water contained within them as 'groundwater'.

## **BASE POOR SOILS**

Soils which only very slowly release into the water the dissolved chemicals or minerals which normally result in a hard water. They are therefore unable to neutralise the effects of acid rain.

## **BOD and BOD (ATU) - BIOCHEMICAL OXYGEN DEMAND**

These are measures of the amount of oxygen consumed in water during the breakdown of organic matter. They therefore give a relative measure of organic pollution.

The simple BOD value can be misleading because much more oxygen is taken up by ammonia in the test than in the natural water. This effect is suppressed by adding a chemical, Allylthiourea (ATU), to the sample of water taken for testing; hence BOD (ATU). Without ATU, the BOD is "uninhibited".

## **CATCHMENT**

The area of land draining to a defined point. In this plan, this is shown on map 1.

## **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.

## **CONSENT**

A Discharge Consent is a statutory document issued by the NRA to indicate any limits and conditions on the discharge of an effluent to a controlled water.

Another statutory document issued by the NRA is the Flood Defence Consent. It authorises works to the bed of banks of a river which have been approved by the NRA.

## **CONTROLLED WATERS**

All rivers, lakes, groundwaters, estuaries, and coastal waters to a distance of three nautical miles from the shore.

**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 in to less dangerous substances. They are classified as List I or List II.

**DETERMINAND**

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

**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 used to classify waters.

**DRY WEATHER FLOW (DWF)**

For sewage works, this is calculated by adding estimates of the domestic sewage discharge ( which is the population multiplied by the per capita consumption) plus any industrial discharges plus infiltration in to the sewer.

For the river, the Dry Weather Flow is taken to be as the 95-percentile flow ( or Q95) which is the river flow exceeded for 95 percent of the time.

**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.

**EIFAC STANDARDS**

Water quality standards for freshwater fish, recommended by EIFAC, the European Inland Fisheries Advisory Commission.

**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.

**FAUNA**

Animal life

**FLORA**

Plant life.

**FRY**

Fish which are less than 1 year old.

**GAME FISH**

Salmonid fish, i.e. trout and salmon.

**GAUGING STATION**

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

**HABITAT**

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

**HANDS-OFF FLOW (HOF)**

A condition is often included in an abstraction licence which says that the abstraction must stop when the flow in the river drops below a certain flow (or level). This is known as the hands-off flow, because below this flow, the abstractor must keep his 'hands off' the river.

**LIST 1 AND LIST 2 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 1 substances are considered to be the most harmful. Pollution caused by these must be eliminated.
- \* List 2 substances are less harmful and pollution caused by these must be reduced.

**m<sup>3</sup>/d**

Short for cubic metres per day. There are 1000 litres in a cubic metre, and 1000 cubic metres in a megalitre (MI). In Imperial Units, there are 220 gallons in a cubic metre. It is often used as a measurement of flow.

**MACROINVERTEBRATE FAUNA**

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

**MAIN RIVER**

Also known as 'Statutory Main River'. It is a legal definition which defines particular rivers and streams which are defined 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 Flood Defence Consents. Any proposal that could interfere with the bed or banks or affect the flow of the river requires formal Flood Defence consent from the NRA.

**MINIMUM CONTROL LEVEL (MCL)**

Another term used when referring to abstractions or regulation of rivers. When the river falls below a certain level, an activity would have to stop (eg an abstraction) or, perhaps an activity would have to start (eg discharge from a reservoir to add water to a river with very low flows).

**MI/d**

Short for megalitres per day, a standard international unit 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. This is often used as a measure of flow.

**MONTHLY NATURAL HISTORIC FLOW**

The natural flow in a river varies considerably. Rivers levels may rise quickly in response to rainfall and fall quickly when rain stops. Prolonged periods without rain will cause low river levels. The 'monthly natural historic flow' is used in this plan to signify this natural variation in flow

and the extent by which it varies from month to month.

## **PARR**

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

## **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. For example, it must authorise abstractions, effluent 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'.

## **PROTECTED RIGHTS**

When considering whether to issue an abstraction licence, the Authority must not issue a licence which affects other peoples legitimate rights to use that water. These rights are known as 'protected rights'. Protected rights do not include every existing use of the water. They do include all licensed abstractions, riparian rights (including livestock watering) and small abstractions for domestic supplies.

## **Q90**

The flow which is equalled or exceeded 90% of the time on average. Based on statistics derived from recorded flows, it is the flow below which the river often falls as early as May, but more often from June onwards.

## **Q95**

The 95-percentile flow is the flow which on average is exceeded for 95% of the time. It generally occurs in the summer, and can be regarded as a typical flow in a dry summer. It is not a drought flow.

## **QUALITY OBJECTIVE**

The statement or category of water quality that a body of water should match, usually in order to be satisfactory for use as a fishery or water supply.

**QUALITY STANDARD**

A standard which must be met. It may be the maximum concentration of a substance in the water, a concentration that is not to be exceeded for more than 5% of the time, or some similar description depending on the circumstances.

**REACH**

A length of river.

**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.

**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.

**RULE CURVE**

Rule curves are used as a simple means of defining whether there is spare water in a reservoir, whether water should be taken sparingly from the reservoir, or whether some other action is required or possible. The amount of water that is taken from a reservoir for water supply can depend on the amount of water stored in it and the time of year. For example, the usual aim is to have a reservoir full in the early spring; in autumn the aim is not to draw down the reservoir so far that it won't be refilled by the winter rains.

**SALMONID FISH**

Game fish, e.g. trout and salmon.

**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.

**SPRING RUN**

Salmon return from the sea to freshwater rivers when adult. 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 runs occur; in spring and in autumn. The spring run fish are generally larger than later-run fish, and are often more prized by anglers.

**SSSI**

'Site of Special Scientific Interest'.

**STATUTORY WATER QUALITY OBJECTIVE**

A Quality Objective given a statutory basis by Regulations when made under the Water Act of 1989.

**SURFACE WATERS**

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

**TARGET CLASS**

The quality class which a water should achieve by a specified date. The target may be expressed in terms of chemical or biological quality. Some rivers may already be within their Target Class, others will require improvement.

**TELEMETRY**

River level stations record the levels every 15-minutes electronically at the gauging station. The telemetry system is a computer system that can contact these stations and ask it to send the level data back to the computer over the public telephone system. The computer then stores the data in its memory. The level data can then be converted to flows automatically by the computer. Some rain gauge data is obtained in the same way.

**TURBIDITY**

The cloudiness of water.

**UNDERGROUND STRATA**

A term used to signify geology under the surface soil layer. If groundwater exists, or if water is being discharged to the ground, the geology underneath the soil layer is known in the various Acts of Parliament as 'underground strata'.

**WETLAND**

Wet areas of a river catchment where the plants and animals that live there are dependent on that 'wetness' for their survival.

**90-PERCENTILE FLOW**

See Q90 above.

**95-PERCENTILE FLOW**

See Q95 above.

**95-PERCENTILE STANDARD**

A level of water quality, usually a concentration, which must be achieved for at least 95 percent of the time.

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