RIVER TAFF
CATCHMENT MANAGEMENT PLAN
CONSULTATION REPORT

NRA

National Rivers Authority
Welsh Region

TAFF CATCHMENT MANAGEMENT PLAN

CONSULTATION REPORT

April 1995

National Rivers Authority
Welsh Region

Further copies can be obtained from :

The Catchment Planning Coordinator
National Rivers Authority
Welsh Region
Rivers House
St Mellons Business Park
St Mellons
Cardiff
CF3 OLT

or

The Area Catchment Planner
National Rivers Authority
Welsh Region
Abacus House
St Mellons Business Park
St Mellons
Cardiff
CF3 OLT

Telephone Enquiries :

Cardiff (01222) 770088

THE NRA'S VISION FOR THE TAFF CATCHMENT

The River Taff is one of the best known rivers in Wales, especially as it flows through Cardiff, the capital city. The fast flowing valley rivers in this catchment have experienced major changes over the last 200 years. Before the industrial revolution the rivers were noted for their rural tranquillity, remoteness and quality of salmon fishing; they were described by B H Malkin in 1803 as having:

> *"perfect clearness, uncontaminated, unless in heavy floods, by the least tinge of muddy soil or any other fortuitous discolouring".*

They then suffered a severe degradation due to industrialisation and huge population growth within the catchment. Effluents from the iron and steel works, coal mines, power stations, coke ovens and sewers, poured into the rivers. Rapid improvements have been occurring since the 1970's due to pollution control legislation and the decline in heavy industry. Wildlife, including migratory fish and otters, is now returning to the river; the Taff Trail attracts many visitors who enjoy the many features of the catchment; anglers, canoeists and rowers use its waters for recreation.

The NRA's vision is to manage the uses of the catchment so as to continue this improvement in a sustainable way. Our key objectives are:

* to reinstate significant and self sustaining runs of salmon and sea trout.
* to sustain and, where possible, improve stocks of brown trout and coarse fish.
* to ensure that all those who wish to use the catchment for recreational purposes can enjoy doing so with the mutual respect and consideration.
* to maintain all flood defences in order to protect people and property.
* to maintain and improve the conservation value of the catchment.
* to ensure that any development proposals have no detrimental effect on the water environment. Early discussions with developers and contractors are essential.
* the continued improvement in water quality by effective regulation of industry and investment in sewage and sewerage infrastructure.
* to reduce the amount of litter and sewage-derived debris along the river banks.
* to manage the water resources so as to ensure to support the supply of potable water to South East Wales.

The views of local people and their representatives will be respected. We will need the help of the local communities and hope to build upon existing relationships and develop new ones in pursuing these goals. Through close liaison, regular reporting on our progress and our determination to fulfil our role, we intend to maintain the impetus for action in the Taff catchment.

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THE TAFF CATCHMENT MANAGEMENT PLAN

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1.0 THE PURPOSE OF CATCHMENT MANAGEMENT PLANS (CMPs)

1.1 THE ROLE OF THE NRA

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 aims to harmonise conflicts between competing water users as well as meeting its general duties that include: -

- Maintenance and improvement of water quality by control of pollution in surface and groundwater.
- Flood defence for people and property.
- Flood warning.
- The proper management of water resources by conservation, augmentation and control.
- 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. Therefore, we have consequently chosen to promote our ***vision*** and management proposals via published Catchment Management Plans (CMPs).

1.2 WHAT THIS PLAN IS DESIGNED TO DO

This consultation document presents a number of issues and options for the future management of the Taff catchment, and is based on a detailed study carried out by the NRA during 1994. A number of proposals are presented for comment and it is intended that, following consultation with you and other river users, an action plan will be presented which will seek to manage conflicts in river use and optimise the overall benefits to all river users within the catchment.

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

This consultation document is divided into 2 parts:

Part I: Presents the range of management issues, and options to address them, that have been identified by the NRA;

Part II: Provides background information on the approach we took in developing this plan, using information on identified river Uses (including those to be incorporated in the new Water Quality Objective (WQO) scheme) and the statutory and informal targets required to support them. The targets are expressed in terms of water quality, water quantity and physical features.

We hope that you find the information in this consultation document informative and thought provoking. Let us know whether you agree or disagree with our current proposals: remember this is not just our document, it is also yours: without your help we cannot produce a final workable Action Plan that will be of benefit to you and all users of the Taff Catchment.

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

The Area Catchment Planner,
National Rivers Authority,
Welsh Region
South East Area
Abacus House
St Mellons Business Park
St Mellons
CARDIFF CF3 OLT

2.0 AN OVERVIEW OF THE TAFF CATCHMENT

FOLD OUT TO SEE MAP 1: THE TAFF CATCHMENT
(TO BE READ IN CONJUNCTION WITH ALL OTHER MAPS)

MAP 1. TAFF CATCHMENT

2.0 AN OVERVIEW OF THE TAFF CATCHMENT

2.1 Introduction

This plan covers the catchment of the River Taff, including the rivers Cynon, Rhondda, Clydach and Tâf Bargoed. It is one of the most well known river systems in the South Wales valleys .

The River Taff rises on the Old Red Sandstone escarpment of the Brecon Beacons and flows in an approximately south easterly direction for over 60km to join the Severn Estuary at Cardiff. The river falls an average 11 metres for every kilometre in river length which, although steep, is typical of most of the South Wales coalfield rivers. The main river and its major tributaries flow in steep, narrow valleys. The resulting high water velocity it produces makes for a turbulent river which erodes the bed and banks.

The River Cynon joins the Taff at Abercynon, and the River Rhondda, with its two tributaries the Rhondda Fawr and Fach, joins further downstream at Pontypridd (Map 1). From here on to the sea, no further major tributaries join the Taff, and after passing through the deep gorge cut through limestone near Taffs Well, the river flows through the Cardiff plain to Cardiff Bay.

2.2 Infrastructure

The main communication links, such as railways and main roads all occupy the narrow valley floors (Map 2) and main sewer lines run down many of the river channels in the catchment. The towns of Merthyr Tydfil, Pontypridd, Aberdare and the city of Cardiff all lie on the banks of the Taff or its tributaries. Housing and industry have extended in ribbon development along the river frontages.

2.3 Land Use

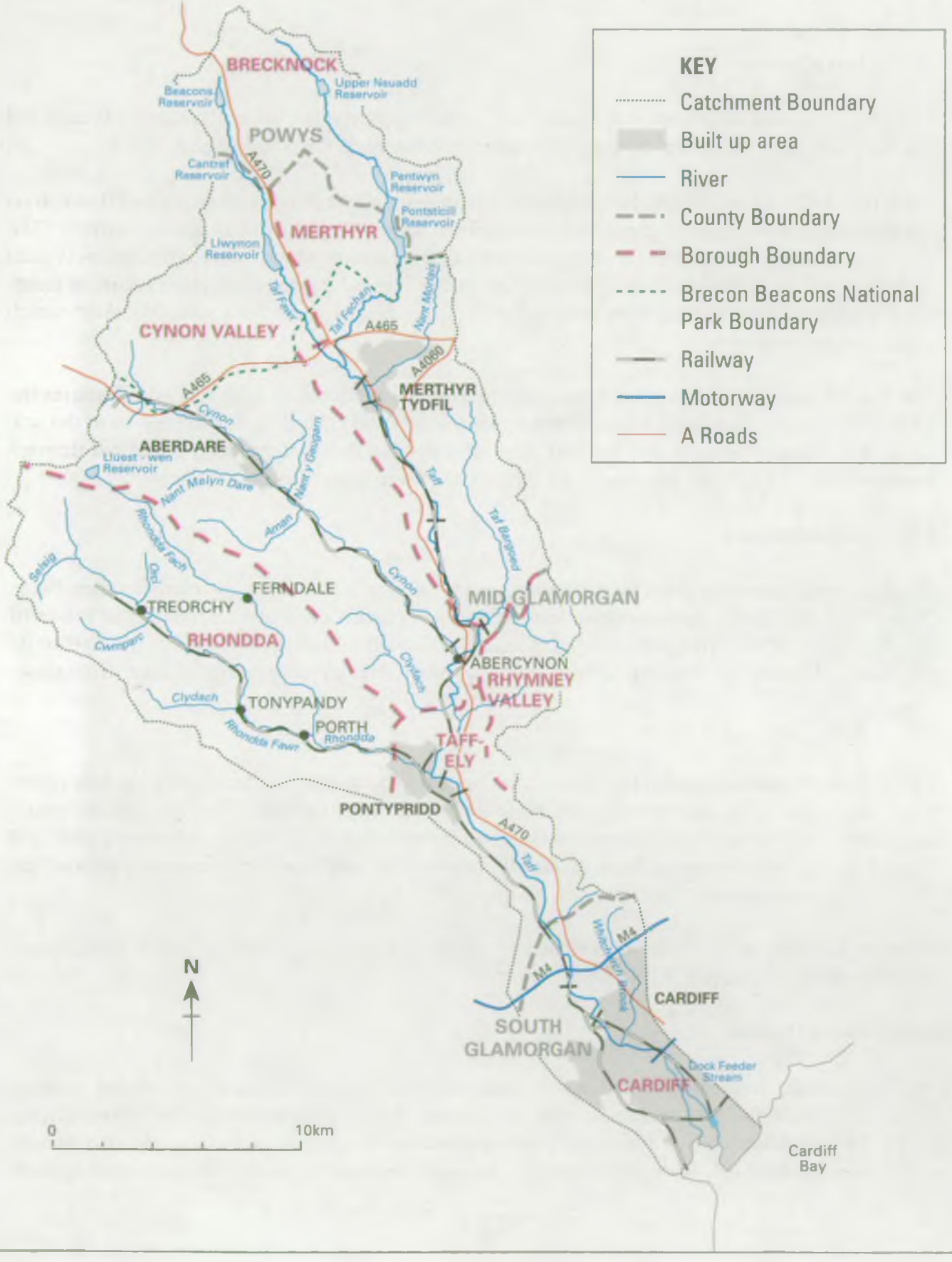
This catchment was dominated by the heavy industries of coal, iron and steel. The decline of the heavy industries in the 20th century has led to an overall improvement in the state of the whole catchment, the water quality has improved and the ecology is becoming richer. Merthyr Tydfil and Cardiff are the main industrial bases remaining, but many sizeable industrial estates are dispersed throughout the catchment.

Other land uses include hill farming and forestry are present throughout the catchment, particularly in the headwaters. Tourism is important.

2.4 Flood Defence

The high rainfall, steep contours and heavily urbanised valley floors (which prevent water soaking into the soil) make the Taff catchment prone to flooding. Most of the major centres of population of the Taff catchment which have had flooding problems in the past now have flood defences constructed by the NRA or its predecessors. These are designed to protect the properties against

MAP 2. INFRASTRUCTURE



floods of up to 100 years average annual return period.

The areas liable to flooding, which are still undefended at the present time, are usually fairly small and are areas where costs of protective measures exceed the value of the benefits of the works.

The most recent severe events of flooding were in December 1992, December 1979 and December 1960. The highest tide level this century occurred in February 1990, reaching a level of 7.95 metres above ordnance datum. Consequently, the NRA currently recommends that even in areas sheltered from the open sea, future residential and commercial developments should be protected to 8.6 metres above ordnance datum. This also allows for the predicted effects of global warming.

The Cardiff Bay Barrage will reduce the risk of tidal flooding. The removal of accumulations of river borne sediments within the bay area will be the responsibility of Cardiff Bay Development Corporation.

It is a popular misconception that high tides affect flood levels in upland areas of the catchment. In fact, even the highest tides will not affect flood levels upstream of Blackweir in Cardiff.

2.5 Hydrology

The Taff receives very high rainfall, from 950mm per annum in Cardiff to 2400mm on the Brecon Beacons. This rainfall, combined with the mountainous catchment and steep river channels, contribute to high and rapid flows of water down the rivers. In drier periods, flows can recede quite rapidly as there is only modest water storage in the soils and rocks.

The two large reservoir systems in the catchment, the Tâf Fawr and Tâf Fechan, have a significant effect on the river flows. During early winter floods, the reservoirs store flood waters, thus reducing flood peaks in the upper Taff.

2.6 Hydrogeology

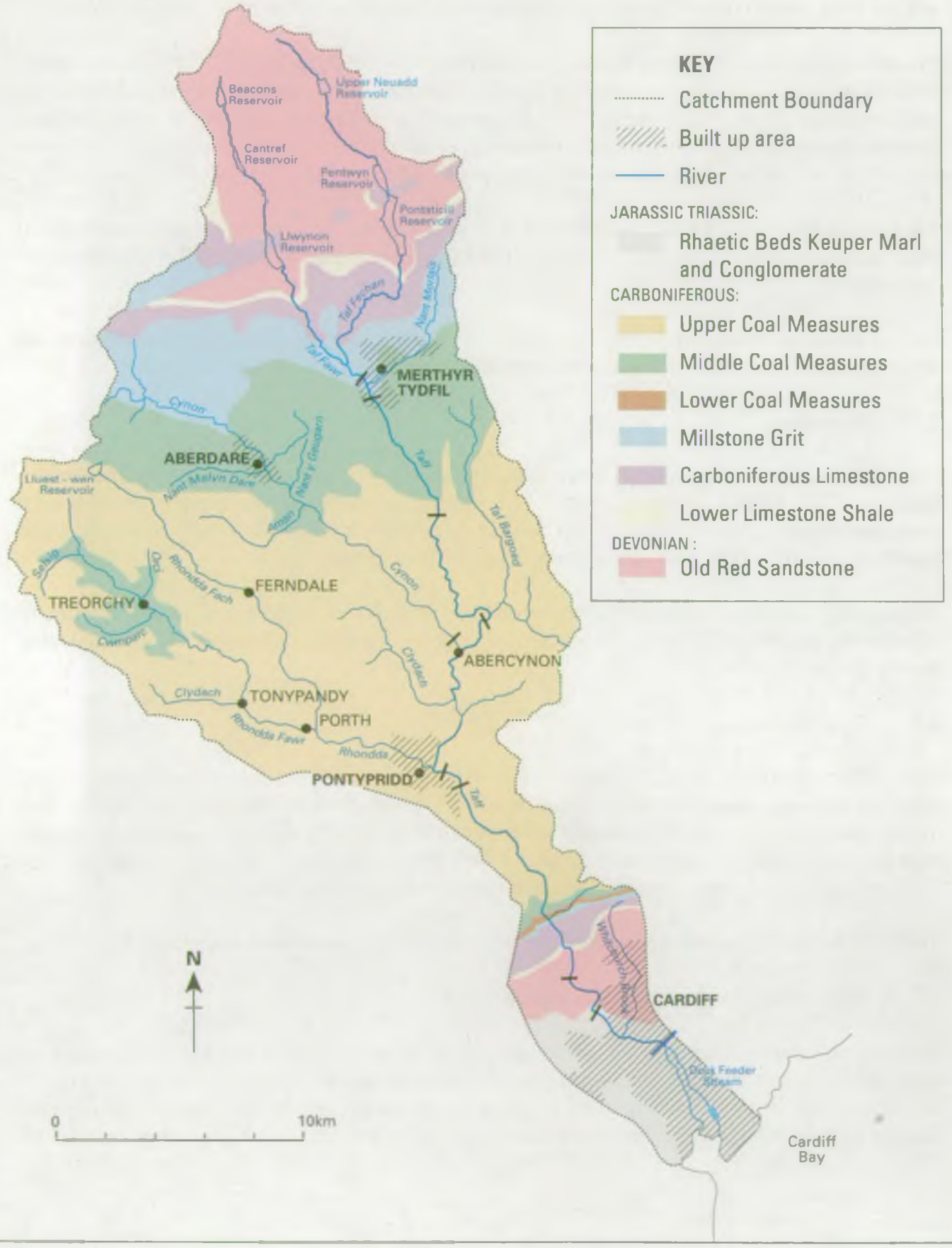
The Taff flows over the South Wales synclinal basin (Map 3) and, because of this folding of the rocks, the relatively young coal measures are exposed. Consequently, the area is renowned for coal mining, and a complex pattern of groundwater flow has evolved along the shafts and adits of the old mineworkings. The coal measures constitute a locally important groundwater resource of variable yield and quality. In places, iron-rich groundwaters emerge from the old mines.

There are warm groundwater springs at Taffs Well which have, in the past, been used for bathing.

2.7 Fisheries, Conservation & Recreation

A diverse and healthy coarse fish population exists in the lower River Taff, and there are productive brown trout stocks in the middle and upper reaches. Estuarine species, such as mullet, are very much in evidence and the twaite shad (present in only a few rivers in the UK) is thought to be present. Salmon and sea trout populations are rapidly increasing in the Taff following many decades of industrial pollution.

MAP 3. GEOLOGY



The majority of residents live close to the river, which inevitably leads to a high recreational demand; walkers, cyclists, anglers, naturalists, canoeists and boaters all use the Taff river corridor.

Although very urbanised, the Taff is surprisingly scenic in many parts and home to much wildlife such as otters, kingfishers and dippers. There are numerous Sites of Special Scientific Interest (SSSIs) throughout the catchment including Cardiff Bay which will support notable populations of wading birds until the barrage is completed.

2.8 Water Quality

Whilst the chemical monitoring data shows that the surface water quality of the whole Taff catchment is generally good, there are substantial lengths of river where the invertebrate populations are worse than would be expected. This indicates intermittent pollution probably caused, in most locations, by sewage inputs from combined sewer overflows (CSOs) and leaking sewer pipes. Many of the CSOs are unscreened so discharges also result in the introduction of a significant amount of non-biodegradable litter which can accumulate on the river banks, causing a considerable aesthetic impact and affecting wildlife. Sporadic inputs of contaminated run-off or spillages from industrial areas can occur and minewater discharges from abandoned mines are also evident.

Despite these problems, the main rivers Taff, Rhondda and Cynon and most of their tributaries are of sufficiently high quality to support a salmonid fishery.

The Taff estuary currently receives crude sewage discharges but maintains a good chemical quality because of the vast volumes of diluting seawater. The crude sewage discharges will be removed prior to closure of the Cardiff Bay barrage. Diffuse and intermittent polluting inputs to the catchment upstream will, however, continue to be significant factors likely to affect overall water quality in the impoundment.

2.9 Monitoring

Water Quality

Routine water quality samples are taken monthly at 67 sites throughout the catchment. Additionally, 54 discharges are routinely sampled and analysed to ensure they meet standards set for them by the NRA. Inspections of trade premises, industrial sites and sewage works are carried out as part of the NRA's pollution prevention programme.

Monitoring for dangerous substances are undertaken at Blackweir. The levels of cadmium in the sediment are monitored at Cilfynydd and Upper Boat to provide data for European Directive returns to the Department of the Environment. This is done at Cilfynydd because known users of cadmium discharge to the sewage treatment works there.

Biological Monitoring

Routine biological monitoring is undertaken at 58 of the water quality sampling points. Each site is normally sampled twice during the year as part of a rolling programme. An assessment of the

biological quality is made by determining the presence of species of insects and other small aquatic life which are sensitive to varying water quality. Other biological surveys are carried out to discover the impact of sewage treatment works, farms and other industrial discharges on the river.

River Levels, Flows and Rainfall

The NRA operates 10 gauging stations to measure river levels. Flows are calculated from 7 of the stations, and are used by the NRA to manage the water resources of the catchment and to control and regulate abstractions. Two of the stations are used to monitor compensation water releases from the large reservoirs in the Tâf Fawr and Tâf Fechan valleys. All the stations are used for flood warning purposes. River and stream flows are measured at a number of sites by one-off spot gaugings. The NRA does not currently monitor groundwater within the catchment but this situation is under review.

Rainfall is measured continuously at 7 sites in the catchment. A further 8 gauges, which usually measure daily rainfall totals, are read by private observers. Data from many of the sites are collated by the NRA and sent to the Meteorological Office at Bracknell.

Habitat Surveys

The NRA contributed to an ecological survey of the river corridor of the Taff and its principal tributaries in 1992. This was undertaken as part of the Taff Litter Project managed by Keep Wales Tidy.

A survey of otter habitat on the main River Taff between Merthyr and Cardiff was also carried out in 1992 by Otter Project Wales. This was supplemented with surveys of the headwaters by the NRA in 1993.

Fish Stocks

Rod catches of adult salmon and sea trout are reported by anglers, and fish traps at Blackweir and Radyr weir are also operated to count the numbers returning to the river from the sea. The distribution and abundance of juvenile salmon and trout is assessed by electrofishing in the upper tributaries. Records of angling club fishing matches are used to measure the status and performance of the coarse fisheries. Elver catches are monitored through catch returns.

Flood Defence

All flood alleviation schemes in this catchment are frequently inspected for damage such as river erosion, and vermin burrowing.

2.0 KEY DETAILS

Catchment Area: 526 km^2

Highest Point: 886m (Pen-y-fan on the Brecon Beacons)

Populations: (solely in the Taff Catchment)

County Councils	**Borough/ City Councils**	**1991**	**2001 (Predicted)**	**2011 (Predicted)**	**2021 (Predicted)**
Mid Glamorgan	Cynon Valley	62, 927	64, 202	63, 306	62, 529
	Merthyr Tydfil	58, 553	60, 245	59, 837	59, 104
	Rhymney Valley	5, 879	5, 868	5, 844	5, 773
	Rhondda	77, 029	73, 276	72, 116	71, 232
	Taff Ely	38, 703	41, 205	40, 817	40, 318
South Glamorgan	Cardiff	94, 200	105,333	109,095	113,135
TOTALS		337,291	350,129	351,015	352,091

Flood Defence

Length of Statutory Main River: 143 km
Length of Flood Defences: 34 km

Water Quality

% River Length in GQA Class (based on 3 years data 1991-1993)

Class A 48
Class B 42
Class C 6
Class D 3
Class E 1

Water Resources

Average Daily Flow:	Taff:	1610 megalitres per day
	Cynon:	370 megalitres per day
	Rhondda:	470 megalitres per day

Gross licensed abstraction:	335 megalitres per day
Estimated volume of water abstracted and not returned:	33 megalitres per day

(1 megalitre is 1 million litres or 1000 cubic metres)

Fisheries

Average annual declared salmon rod catch 1988-1994	57
Average annual declared sea trout rod catches 1988-1994	139
Average annual salmon run size (minimum estimate) 1992-1994	422
Average annual sea trout run size (minimum estimate) 1992-1994	696
No. salmon/sea trout anglers (approx.)	100
No. trout anglers (approx.)	5000
No. coarse anglers (approx.)	5000
Target annual salmon run size	1000
Equivalent annual target declared salmon rod catch	200
Target annual sea trout run size	1500
Equivalent annual target declared sea trout catch	300
Target coarse fish open winning match weight	40lb

SECTION 3.0 ISSUES AND OPTIONS

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

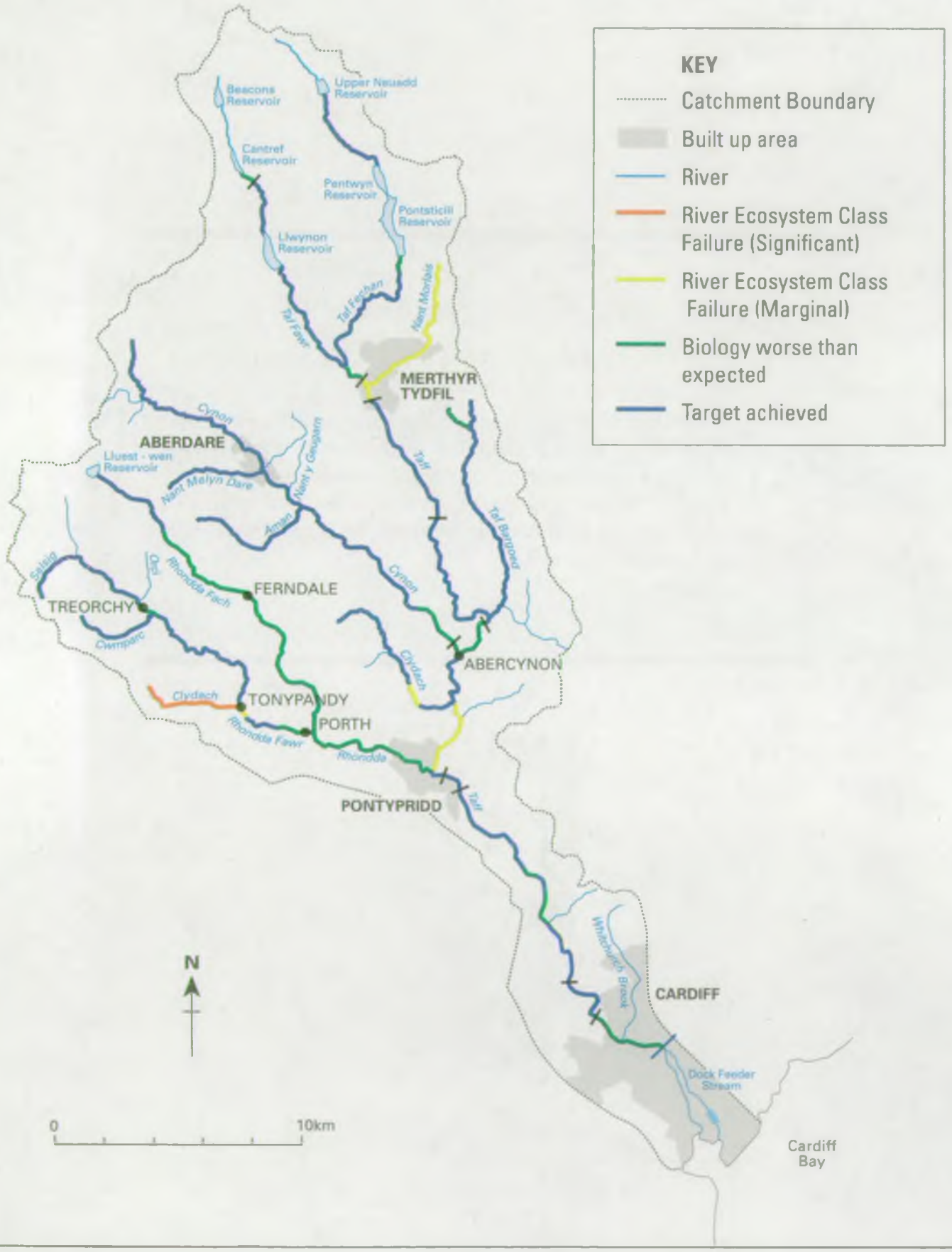
Section 3.1 identifies in detail, those areas of the catchment which have been identified as failing to meet specific targets to support identified Uses. Significant areas of conflict between Uses are also discussed. Section 3.2 presents these Issues along with options to address them, identified by the NRA.

The information that has been used to identify these Issues is provided in **Part II** of this report which lists the known Uses of the catchment and sets targets to support them. You should note that the Issues and Options do not constitute NRA policy but have been considered within the NRA's policy framework and that no priority should be inferred from the order in which they appear.

3.1 THE STATE OF THE CATCHMENT

The following section examines the ability of the catchment to support the Uses identified in Section 4, **Part II**, by assessing compliance with the targets set out in Section 5, **Part II**. In this way the key Issues in the catchment are identified. The potential solutions to these Issues are discussed in Section 3.2.

MAP 4. STATE OF THE CATCHMENT - WATER QUALITY



3.1.1 WATER QUALITY

General

The current state of the water quality of the Taff catchment has been assessed against the Use-related targets set in Section 5. 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 have 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. Biological data are also used to qualify the results of much of the water chemistry data assessment. 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 5 are not met.

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

Local Perspective

Map 4 identifies river stretches where water quality fails to meet the River Ecosystem Class targets (see Maps 13 and 26). Significant failures are where the NRA are 95% certain that a failure has occurred, marginal failures have a 50-95% certainty. The map also indicates where the biological monitoring has shown discrepancies with the chemical data. This may indicate either intermittent pollution and/or the effect of chemicals that are not routinely measured. Other factors, like the physical nature of the substrate could also be significant.

It should be noted that the stretches of river formally designated under the EC Freshwater Fish Directive (78/569/EEC), and the points monitored under the EC Dangerous Substances Directive (76/464/EEC) all comply with their water quality targets. The groundwater in the catchment is of variable quality.

Biological quality is worse than chemical in the lower Taff, reflecting the combination of problems occurring in the mid and upper reaches.

MAP 4A. COMBINED SEWER OVERFLOWS

ISSUE 1: **THE IMPACT OF COMBINED SEWER OVERFLOWS AND INADEQUATE SEWERAGE NETWORK ON THE WATER ENVIRONMENT**

The River Ecosystem Class failures (see Map 4) on the Nant Clydach (Rhondda), the Nant Clydach in Ynysybwl, the Nant Morlais and the Taff below the confluence with the Nant Morlais are either elevated Biochemical Oxygen Demand (BOD) or ammonia in the water caused by inadequate sewerage arrangements.

The Nant Clydach (Rhondda) sewerage is to be upgraded by Dŵr Cymru Welsh Water (DCWW) during 1995.

The NRA will be further investigating the water quality of the Nant Morlais to confirm the unsatisfactory areas of sewerage.

The biological analysis (See Map 4) has also indicated that there are large areas of the catchment, particularly in the Rhondda valley, where there are probably impacts of intermittent sewage discharges from CSOs and broken sewers. Other diffuse sources and urban drainage are also thought to be contributory factors. Within the Taff catchment there are about 300 CSOs of which more than half are considered to be unsatisfactory according to DCWW guidelines (see Map 4A). DCWW plan to invest £72 million over the next 5 years on improving the CSOs in Wales as part of their 2nd Asset Management Plan (AMP2). The majority of this investment will be in the South East Area of Wales.

ISSUE 2: **THE IMPACT OF CANTREF AND PONSTICILL WATER TREATMENT WORKS ON THE TÂF FECHAN AND TÂF FAWR**

The biological quality of both the rivers Tâf Fawr and Tâf Fechan below Cantref and Ponsticill Water Treatment Works (WTW) respectively, is worse than expected compared to the chemical quality. This is the combined effect of the general influence of river regulation schemes on the river's ecology (see Issue 10) and the intermittent effect of backwash water discharges.

DCWW are currently spending £23 million at Ponsticill and £3.5 million at Cantref during 1995 to improve drinking water quality. These schemes will include washwater recovery and sludge treatment plants. In the case of Cantref, washwater sludge will be conveyed to Llwynon WTW for treatment.

MAP 5. MINEWATER DISCHARGES

ISSUE 3: THE IMPACT OF MINEWATER FROM ABANDONED COAL MINES

With the closure of most of the coal mines in the catchment, cessation of pumping of minewater has resulted in recovery of the groundwater level. As a consequence, there are significant overflows from abandoned workings at 16 sites (Map 5). These discharges contain iron salts and cause staining of the river bed with iron hydroxide and the consequent aesthetic impact. In some cases there is also a biological deterioration with associated impact on the natural food of fish and smothering of spawning gravels; over 7 km of river are affected. The NRA has investigated utilisation of the mine discharges before they impact on surface waters. This could be done by either continuing pumping, intercepting and treating the water prior to release to the rivers, or using the water for industry or water supply. The review was jointly undertaken by NRA and DCWW and found that:

- they were small quantity discharges,
- their quality was variable and therefore difficult to treat and,
- there were no major water users close enough to use the discharges.

The NRA will continue to survey the catchment for new discharges and will seek to take advantage of all opportunities to implement remedial schemes. The NRA has also undertaken 2 R&D Projects on this subject. (see Appendix 5).

For mines abandoned after 31 December 1999, the current Environment Bill proposes to remove statutory protection from prosecution. This will ultimately enable the forthcoming Environmental Agency to deal with pollution from these mines. Nevertheless, discharges from existing mines abandoned before this date may continue to cause problems.

ISSUE 4: THE IMPACT OF ROAD DEVELOPMENTS ON THE WATER ENVIRONMENT

In the Taff catchment there are currently two major road construction schemes underway at Pontypridd and the extension of the A470 North from Pentrebach to Cefn Coed. Road construction can cause pollution problems. During preparation and construction, pollution can be caused by run-off contaminated with solids, cement and oil and careful planning and operation are required to minimise these problems. Use of ballast material that is not completely inert can result in leaching of soluble components if the potential is not realised and appropriate design is not undertaken to minimise the risk. The A470 extension passes through areas subject to extensive former mining activity. Special precautions have had to be taken to grout the mineworkings prior to road construction. The process of grouting has required care to be

exercised to minimise the impact of grout on surface waters as this material can travel through cracks and fissures in the ground and enter watercourses some distance from the point of injection. The NRA has undertaken research into the pollution problems associated with road building (see Appendix 5). This type of development provides an opportunity to restore degraded sections of the river to a semi-natural regime.

ISSUE 5: AESTHETIC EFFECTS OF WATERBORNE LITTER

Because of the densely populated and urban nature of the catchment the amount of litter in the river has reached problem proportions. Terrestrial and sewage derived litter are the main components. The latter will be reduced following the uprating of unsatisfactory CSOs as part of DCWW's AMP2 Programme.

The NRA has collaborated with Keep Wales Tidy, the local Authorities and other organisations over the last three years culminating in a full scale clean-up project in 1993 costing over £300,000, of which the NRA contributed £26,000. It is recognised that prevention is better than cure and the steering group is now concentrating on initiatives to stop litter getting into the river in the first place. Voluntary groups are being encouraged and assisted to adopt river stretches and produce river care management plans. Fly tipping black spots are being targeted and an education and publicity campaign is being promoted. The NRA has already provided £75,000 and will be contributing another £40,000 in 1995/6 towards this new work. This project also relies on grant aid from the Welsh Office. The NRA has also undertaken research into the assessment of litter and aesthetic pollution (see Appendix 5).

It is illegal to deposit litter in watercourses and the NRA policy is to prosecute fly tippers where the evidence can be obtained.

ISSUE 6: THE IMPACT OF LAND RECLAMATION SCHEMES ON THE WATER ENVIRONMENT

Several major land reclamation schemes are ongoing or planned within the catchment in the next 5 years. Due to the narrowness of the valley floor, these are almost always associated with watercourses and have a significant potential to cause derogation of ground and surface waters if they are not properly planned, designed and executed. The NRA will ensure adequate liaison with the planners and developers. Where rivers are to be diverted, culverted or otherwise affected, the NRA puts requirements on the developer to enhance, as far as possible, the wildlife habitat, conservation, fisheries and recreational value of the river. For example, at the derelict Deep Navigation Colliery near Nelson the extensive culvert through which the Tâf Bargoed

flows, is to be opened up. The new channel will be designed to be as natural as possible and it is hoped that passage for fish may also be facilitated.

A further threat to the water environment comes from any redevelopment or disturbance of contaminated land sites. This could result in the mobilisation or leaching of some of these contaminants into the water environment. Schemes will require special precautions to be taken to prevent problems arising from the contaminated land on the sites.

ISSUE 7: LACK OF ADEQUATE LEGISLATION TO CONTROL DIFFUSE /INTERMITTENT POLLUTION FROM INDUSTRY

The NRA wishes to see the implementation of regulations similar to the farming regulations, to control oil and chemical storage at industrial sites.

The Taff catchment contains many factories and industrial estates. All such sites have the potential to cause pollution in the form of contaminated surface water run-off and/or spillages of chemicals direct to a watercourse. Existing industrial sites need regular inspection by the NRA to advise on pollution prevention measures. New sites need to be controlled at the planning stage.

ISSUE 8: THE IMPACT OF CYNON AND CILFYNYDD SEWAGE TREATMENT WORKS' EFFLUENTS ON THE RIVER TAFF

A marginal water quality failure due to elevated BOD and the presence of sewage fungus on the river bed of the river below the Cynon and Cilfynydd Sewage Treatment Works (STW), indicate that an unacceptable impact is being made on the water environment. Dye tracing has confirmed that mixing of both effluents in the River Taff is poor.

In addition, the poor nitrifying (degradation of ammonia) capacity of Cynon STW causes elevated ammonia in the river which can reach critical levels during low river flows. DCWW have been requested to improve nitrification at the works and a scheme is included in the AMP2 programme before 2000.

ISSUE 9: DEVELOPMENT RESTRICTIONS AT HIRWAUN/PENDERYN

Currently the NRA is recommending to Cynon Valley Borough Council that development at Hirwaun and Penderyn is opposed until DCWW complete improvements to the local sewerage system.

There are 6 CSOs within Hirwaun which have been identified as being unsatisfactory (See Map 4A). These overflows are known to operate in dry

weather, cause aesthetic pollution, affect biological quality and have caused public complaints. Additionally, the sewerage system surcharges and has caused flooding of domestic property. The NRA has agreed a local arrangement with DCWW to relieve this situation but is anxious that a permanent solution is achieved within DCWW's AMP2 programme as early as possible.

3.1.2 WATER QUANTITY

General

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

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.

The NRA has considered carefully the available surface and groundwater resources within the Taff catchment and their degree of utilisation. The following Section and Map 6 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.

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

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

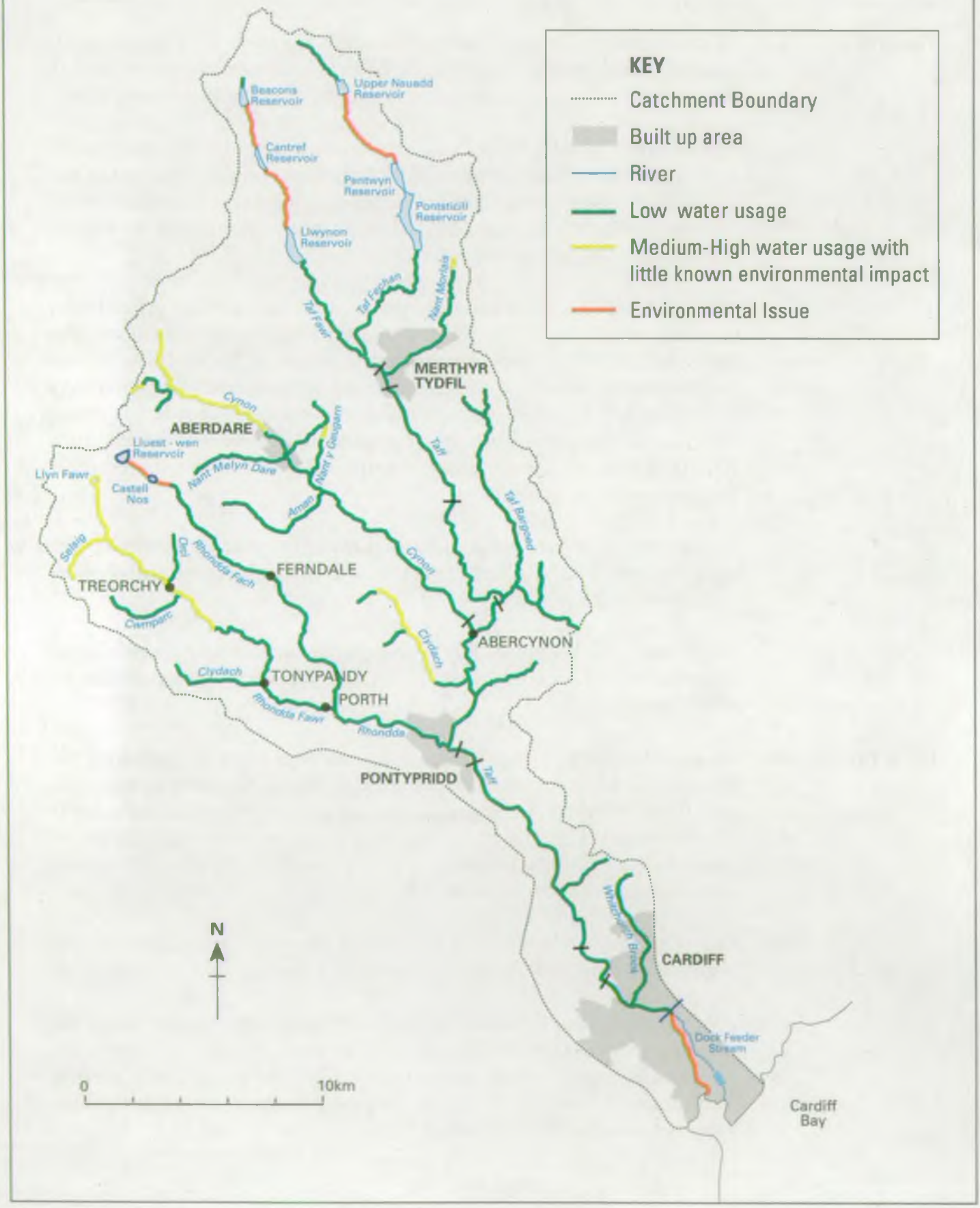
Local Perspective

An assessment of the impact of abstraction has been made by comparing the amount of water taken with the typical natural flow during a dry summer (the Q95 flow). This over-estimates the true impact of abstractions, as water is often returned locally after use. However, a definitive state of the catchment cannot be made until the licensing policy has been applied or the ecological need for the river flows has been determined. Work is in progress on this.

Map 6 shows, in blue, the stretches of river where the abstractions are low compared to the river flow and have minimal impact.

Losses from the stretches shown in yellow are potentially around half of the natural available flow (Q95) during a dry summer. For this to happen, the total licensed quantity would have to be abstracted. In practice this does not usually occur. On these stretches, environmental impacts from abstraction are either not evident or very localised.

MAP 6. STATE OF THE CATCHMENT - WATER QUANTITY



The most notable of these abstractions are those for public water supply in the Rhondda Fawr upstream of the Selsig, and at Penderyn in the upper Cynon. In the upper Rhondda it is difficult to quantify the amount of water loss from streams in summer because much of the water is taken from Llyn Fawr reservoir during low flows. A few smaller watercourses may run dry during a dry summer, but environmental impacts on the upper Rhondda itself are much smaller. Biological monitoring has not revealed any serious environmental degradation.

At Penderyn, the groundwater abstraction may well affect nearby surface waters, causing some local impact. To date, biological sampling has not revealed any significant environmental impacts.

Of the remaining sites of water loss, the impact upon the Selsig and Nant y Geugarn are likely to be very small. The effects of abstraction at Tower Colliery, and for public water supply on the Clydach are also thought to be small. This is difficult to verify because they are overshadowed by the effects of poor water quality in the streams. Substantial abstractions from ponds and catchwaters at Dowlais Top are not expected to have a major impact and much of the water is taken from the neighbouring Rhymney catchment. Periodic low flows in the Nant Morlais occur naturally in summer as water levels in the underlying limestone decline.

The stretches shown in red are where abstractions are thought to cause environmental deterioration.

ISSUE 10 : THE IMPACT OF IMPOUNDMENT ON THE WATER ENVIRONMENT

The rivers immediately downstream of dams are denied their natural flow from upstream. At Llwynon and Ponsticill, this is compensated for by a continuous release of water - a 'compensation flow'. This assists aquatic life, although the regularity of the artificial flow may have an impact on some species. however, there are no compensation discharges in the rivers between the reservoirs in the Tâf Fawr and Tâf Fechan valleys and downstream of Lluest-wen and Castell Nos reservoirs near Maerdy in the Rhondda Fach. Periodic drying can reduce the aesthetic value of the landscape, cause a loss of habitat for aquatic fauna and, in the upper Rhondda Fach, prevent fish spawning. Unfortunately, these reservoirs are relatively small, they supply local communities and are very difficult to replace. Providing compensation flows would severely reduce the available yield of these reservoirs.

ISSUE 11 : EFFECT OF ABSTRACTION AT BLACKWEIR

The unlicensed Dock feeder abstraction diverts a third of the typical natural dry summer flow from the Taff at Blackweir to Cardiff Docks. As conditions become drier, less and less flow is left in the river (which could already have been depleted by an additional 50 Ml/d from abstractions upstream). These reductions of flow over the weir and fish pass, allow fewer opportunities for migration of salmon or sea trout during low flows. Furthermore, the flow down the Dock Feeder itself is attractive to fish, which then remain in the Docks system.

At times during the very severe drought of 1976, the Taff was reduced such that only a series of interconnecting pools remained between Blackweir and the estuary. Although rare, such extreme conditions could result in damage to the aquatic invertebrates, fish and their habitats which would take over a year to recover.

Emergency measures were negotiated during the 1976 drought to allow increased flow to the estuary. With the forthcoming construction of Cardiff Bay barrage an agreement exists to guarantee an amount of water through the Barrage fish pass at all times. The flow through the dock feeder will therefore be controlled to allow sufficient water down the river and it is unlikely that the river will dry so drastically again.

Improved screening of the abstraction could also minimise the loss of salmon and sea trout smolts to the feeder when they migrate in the spring. However, coarse fish stocks in Bute Dock and feeder are supplemented by this ingress at the feeder and this would be reduced by improved screening.

3.1.3 PHYSICAL FEATURES

General

Since Physical Features targets are very subjective (Section 5.3), 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 risk has been assessed by studying the flood history over the past 25 years and the known distribution of flooding.

The following section and map 7 illustrates the current state of the catchment and identify areas where there are felt to be deficiencies.

ISSUE 12: FLOODING AT REAR OF CARDIFF ROAD, TAFFS WELL

Land protected by the embankment still floods during high river flows, due to a combination of sub surface leakage and backing up of surface drainage systems entering the river through the defences. Seepage problems are also known to occur on a large surface water culvert adjacent to the garage on Cardiff Road. Measures are being progressed by the NRA to try to remedy this.

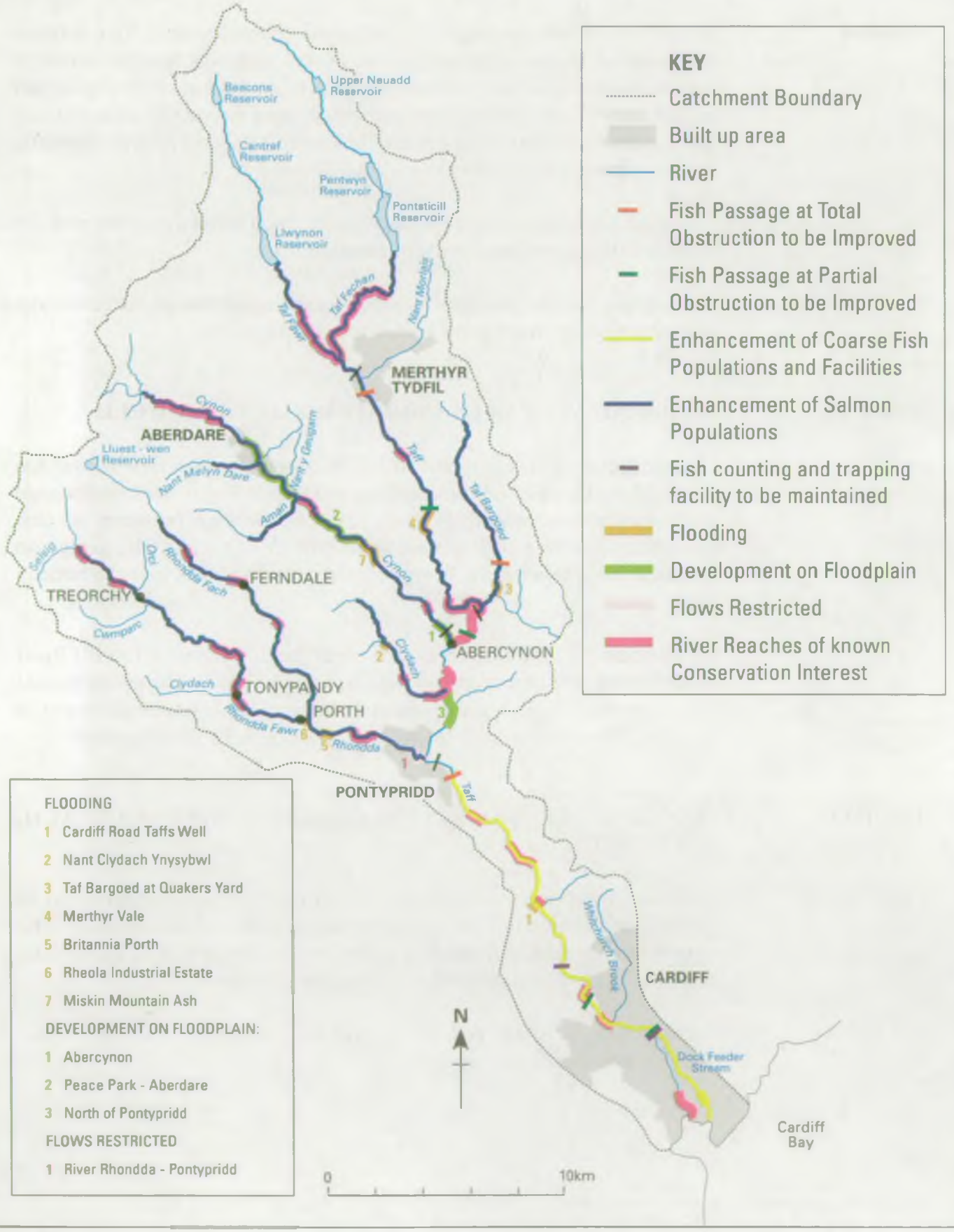
In December 1992 the basements of some of the properties on Cardiff Road were flooded as sewage overflowed from a trunk sewer. The sewage could not escape via the land drainage system because of the height of the water in the river. The problem has been referred to DCWW by their agents.

ISSUE 13: FLOODING OF HOUSES ALONGSIDE NANT CLYDACH, YNYSYBWL

The Nant Clydach is a small tributary of the River Taff which enters it on its western bank between the confluences of the Rhondda and Cynon rivers. The watercourse is short and steep in a confined valley which is flanked by residential areas which are subject to flooding problems.

Unfortunately, it is not possible to forewarn residents since the rivers response to rainfall is too rapid.

MAP 7. STATE OF THE CATCHMENT - PHYSICAL FEATURES



ISSUE 14: FLOODING FROM THE RIVER TÂF BARGOED AT QUAKERS YARD

The British Gas access bridge on Mill Street causes gross obstruction to flows and severe entrapment of debris leading to flooding on Mill Street. Flood waters pond onto Cardiff Road in the middle of the village. Approximately 12 properties are affected by flooding. Telemetric sensors were fitted to the bridge in 1993 to improve forecasting of likely flooding problems.

ISSUE 15 FLOODING AT MERTHYR VALE FROM THE RIVER TAFF

On Taff Street and Crescent Street, approximately 133 houses plus the club and the chapel flooded in 1979. The solution would involve the reconstruction of the long riverside retaining wall but this is too costly to justify.

ISSUE 16 FLOWS RESTRICTED IN RIVER RHONDDA AT PONTYPRIDD

In the first 200 metres of its length from the Taff confluence, the River Rhondda is greatly constrained by a complex of bridges supporting business premises in Pontypridd. One particular bridge supports the Marks & Spencers store and the low hydraulic capacity of this structure effectively dictates flood levels upstream. The properties on Mill Street are liable to relatively frequent flooding.

ISSUE 17: FLOODING FROM THE RIVER RHONDDA AT BRITANNIA, PORTH

Flooding occurred in 1979 to low lying properties in the Britannia/Eirw area. Subsequent investigations found that the flooding emanated from a combination of overtopping of the river and seepages through ancient masonry boundary walls fronting the river channel. The costs of refurbishment of these walls, plus doubts about the effectiveness of such repairs, led to the abandonment of a possible scheme to resolve the problems. Consulting Engineers looked at these problems in October 1993 and concluded that little could be done and Glamorgan Local Flood Defence Committee (GLFDC) accepted this conclusion.

ISSUE 18: FLOODING AT RHEOLA INDUSTRIAL AREA, PORTH

Flooding occurred to this area during the 1979 flood due to severe blockage of the main railway bridge down river from Rheola. The only satisfactory solution would be the replacement of the bridge but it is recognised that this is unlikely in the foreseeable future. However, in 1991, British Rail proposed modifications to the bridge which were approved by the NRA but have not, to date, been carried out.

ISSUE 19: FLOODPLAIN AREAS UNDER THREAT FROM DEVELOPMENT

The floodplain is an integral part of the overall river system and the NRA considers it essential that they are kept free from development for flood defence reasons. In addition, the NRA recognises the importance of protecting the existing aquatic environment and heritage features associated with them. Over the next 5 years, the NRA will be conducting a national survey of flood risk areas (in accordance with Section 105 of the Water Resources Act 1991) to further assist local authorities in their consideration of planning proposals and the need for flood alleviation works. The areas of floodplain under threat from development are:

- all low lying land flanking the River Cynon downstream from Pontcynon to the low lying road bridge crossing in Abercynon (the Abercynon Leisure Centre which is periodically surrounded by flood water to a depth of 0.5m).

- the wide, well established areas between Peace Park and Aberdare. Development of these is being pursued by the WDA and Cynon Valley Borough Council under the Cynon Valley Joint Venture Group. Any significant loss of these floodplains could severely exacerbate flood risks to Mountain Ash and impair the efficiency of recent schemes. The River Cynon channel in this reach has been grossly affected by mining subsidence such that the remaining capacity of the floodplain area is critical.

- the land which lies between Pontypridd and the confluence of the River Taff and Nant Clydach, has attracted considerable interest from developers in recent years. It is an important flood storage feature and its loss would increase the flood risk to areas downstream, including the recently constructed flood defences at Pontypridd.

ISSUE 20: FLOODING AT MISKIN, MOUNTAIN ASH

A number of properties, including the Miskin Arms Public House, flood due to water from a culverted stream which is often "backed-up" by floodplain flows from the River Cynon.

ISSUES 21-27: BARRIERS TO FISH MIGRATION

Due to its industrial history, there are a number of partial and total obstructions to the passage of migrating salmon, trout, sea trout, eels and some coarse fish species (See Tables section 3.2). The assessment of fish passage over such structures will help the restoration and recolonisation of the catchment to the natural and historic state. The most significant impediment to salmon and sea trout migration is Treforest Weir at Pontypridd. It is a total obstruction to migration. Once returning fish have access to the large spawning areas in the tributaries above, the annual stocking with fry and the transport of adult fish past the weir will become unnecessary. This will save annual expenditure of £10k. To remain efficient, fish passes require regular maintenance to remove leaves, branches, gravel and other debris and to repair damage caused during floods.

If a weir no longer serves its original purpose, its removal is preferable to providing a fish pass. Often, however, weirs provide stability to the river bed and removal may jeopardise the safety of other structures in the area. In such cases, removal of the weir may not be a viable option.

ISSUE 28: RESTORATION OF SALMON AND SEA TROUT FISHERIES

Provided the fish pass in the Cardiff Bay Barrage is effective in facilitating the migration of fish, the Taff catchment has the potential to be a very productive salmon and sea trout fishery. Stocking with fry in the tributaries and transporting of fish around Treforest Weir may continue until a fish pass at Treforest is implemented. The increase in such a valuable resource will lead to problems of illegal fishing, which can be tackled with effective enforcement strategies and legislation. However, restriction of fishing at locations such as weirpools to prevent over-exploitation of salmon, brown trout and sea trout, reduces fishing opportunities for coarse fish as well as game fish.

ISSUE 29: PROTECTION AND IMPROVEMENT OF NON-MIGRATORY FISH STOCKS

There are significant stocks of coarse fish in the lower Taff, especially in Cardiff. However, as it is difficult to accurately monitor the resident populations in such large rivers, the exact status of the coarse fish populations is unknown. Species such as barbel and grayling have been introduced in recent years to provide a greater variety of fishing. There is potential for substantial enhancement of coarse fish stocks and angling facilities between Radyr and Pontypridd.

High river flows are typical of the catchment and it is believed that these may lead to the "washing out" of coarse fish fry and poor recruitment in some years. The provision of new and the use of existing off-river spawning areas can help to alleviate this problem. Since a large pollution incident that destroyed coarse fish stocks in the Taff in the late 1960s, angling clubs have been permitted to transfer fish to the river from catches at other fisheries where the stocks may be unwanted - e.g. the Wye and the Usk. This practice will be reviewed in the near future.

The Taff is a very productive brown trout fishery and this is due in great part to supplementary stocking by angling clubs as well as improvements in water quality in the main river and tributaries. Measures will be undertaken to protect and improve natural production as far as possible, but it is likely that supplementary stocking will always be required in a catchment with such a high demand for angling.

ISSUE 30: BUTE EAST DOCK FISHERY IMPROVEMENTS

The Bute East Dock has the potential to be a successful international coarse match fishing venue due to its size, uniformity and location. Coarse fish stocks have been improved with stocking and this may continue. It may also be possible to increase the carrying capacity of the water by providing habitat improvement structures where fish can seek cover, food and spawning substrate. The railings along one side of the dock are close to the waters edge and inconvenience angling slightly but, more importantly, it is incompatible with international match fishing regulations. The Glamorgan Angling Club and Welsh international match organisers are attempting to resolve this situation. Sometimes the dock feeder is drained down for routine or emergency maintenance. On these and some other occasions, water and fish in the feeder may be bypassed around Bute Dock and lost to the sea. Some form of screen at the entrance to the bypass channel would be an expensive but effective way of reducing the loss of coarse fish from the system.

ISSUE 31: HABITAT RESTORATION

Due to the urban nature of the catchment many side streams and tributaries are culverted, often with the outfall above the receiving river level. This renders such tributaries inaccessible to spawning trout. Where local land development schemes encompass such culverts attempts are made to improve access for fish and to enhance the conservation value of the watercourse.

ISSUE 32: LACK OF INFORMATION ABOUT POSSIBLE SITES SUITABLE FOR HABITAT IMPROVEMENTS

While the NRA seeks to protect existing wildlife habitats, landscape and heritage features through its planning and regulatory functions and, where possible, seeks enhancement by means of these procedures, a more proactive and systematic approach is required to significantly improve conditions for aquatic and riparian wildlife.

Some survey information is available on areas of "poor" or "good" conservation value (see Map 7), but further investigation is required to identify priorities and sites with practical possibilities of enhancement.

ISSUE 33: LACK OF CONSERVATION STRATEGIES FOR RIVER WILDLIFE

The majority of animal species normally associated with a river such as the Taff are found within the catchment, but many are restricted or threatened by human activities. At present there are no strategies for the conservation of these species except for otters (a strategy for which is currently being prepared for the NRA by Otter Project Wales).

ISSUE 34: INVASIVE ALIEN PLANTS

Japanese Knotweed and Himalayan Balsam are alien plants widespread in the catchment. Although they are of limited benefit to some insects, these species pose a threat to the native flora and fauna and create problems on flood defence embankments. Currently, NRA control efforts are restricted to these flood defence schemes.

The NRA has undertaken research into the control of invasive riparian and aquatic weeds (see Appendix 5). The methods have been adopted by the NRA and a leaflet has been produced.

3.1.4 CONFLICTS BETWEEN USES

General

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

ISSUE 35: CONFLICT BETWEEN DIFFERENT RECREATIONAL USER GROUPS AND THEIR IMPACT ON WILDLIFE CONSERVATION

There is a limited but growing level of canoeing in the catchment which may occasionally cause conflict with anglers. Canoeists require the permission of the riparian owner to canoe in rivers crossing their land. Sometimes permission may not be sought, and even where it is, conflicts with anglers may arise.

In all but the upper reaches of tributaries, the NRA has reservations about the suitability of the water quality for water sports activities due to the presence of sewage effluents.

Where there is a demand, the NRA will assist in resolving issues between different user groups by acting as broker or by providing advice to the owners of facilities or stretches of river. The identification and development of a dedicated area for canoeing (eg whitewater/slalom course) would act as a focus for canoeing activities with reduced conflict elsewhere with angling and wildlife uses.

Occasionally there is concern over the impact of river engineering works, recreational activities, such as angling and canoeing, and general public access on the catchment's wildlife conservation.

ISSUE 36: IMPACT OF CARDIFF BAY BARRAGE ON THE TAFF

This barrage will cross the mouth of Cardiff Bay between Penarth Head and Alexandra Dock, impounding the Taff and Ely and creating a freshwater lake. It is hoped that the area will then become a focus for the regeneration of the bay area. But this major scheme will have far reaching implications for the rivers and their estuaries.

To achieve the desired water quality standard within the impoundment, direct discharges of crude sewage will have to be diverted, major CSOs will require substantial modifications. Once the lagoon has been created the Cardiff Bay Development Corporation (CBDC) will be responsible for maintaining the appropriate water quality standards for the uses to which it is put. This includes enhancing the dissolved oxygen levels, when required, by the provision of oxygenation equipment. The lagoon will be proposed for designation as a eutrophic sensitive water under the Urban Wastewater Treatment Directive, once the barrage has been built. If designated, qualifying discharges of sewage effluent upstream may then require nutrient stripping if it can be shown that this will effect the nutrient status of the impoundment and help prevent algal blooms. The contribution made by upstream CSO discharges to algal growth may, however, be overriding and make nutrient stripping of effluents ineffective and thus unnecessary.

The barrage will not be detrimental to the existing flood defences. In fact the ability to exclude the tides will eliminate the risk of tidal flooding that exists at present in the low-lying areas of Cardiff.

The barrage will increase siltation in the Taff estuary and removal of this material will be the responsibility of CBDC.

The Site of Special Scientific Interest - the flats of the Ely/Taff Estuary - will be inundated by freshwater once the barrage has been built. However, the water will develop an unique ecology. Mitigation measures to be carried out by CBDC have been agreed with CCW and RSPB.

There is provision to include a fish pass in the Cardiff Bay Barrage. Passage of adult and juvenile migratory fish such as salmon, sea trout, eels, shad and estuarine species such as flounder and mullet could be hindered. One of the objectives of an ongoing CBDC fisheries monitoring programme is to assess the effectiveness of the fish pass.

Regeneration of natural salmon and sea trout populations in the Taff is likely to take longer, and eel and estuary fish populations may also be reduced.

The freshwater lake and the lower Taff and Ely will, however, provide a very extensive coarse fishery and, provided that there is suitable access to the water, present more opportunities for angling.

Construction of the Cardiff Bay Barrage will allow recreational boating and commercial navigation at all states of the tide. Non water-contact based recreational activities such as pleasure boating, yachting, powerboating, angling, nature conservation and bird watching are likely to develop in the freshwater lake. Such interests may conflict with each other and also the lakeside interests of housing, development, tourism and walking. The

impoundment may also not be of sufficient water quality to promote water-contact recreation such as bathing, windsurfing, jet skiing and canoeing. However, the responsibility for resolving these issues will be with CBDC and the Local Environmental Health Department and will depend upon the actual water quality after impoundment.

The impoundment will accumulate litter and debris brought down by the rivers and CBDC propose to collect this material with a special craft and dispose of it. In addition, filamentous algae, algal scums and weeds will be collected before they become a problem.

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

General

This section of the plan considers options to address the issues that have been raised in the preceding section. The options as presented are the initial thoughts of the South East 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 or 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.

ABBREVIATIONS USED IN TABLES

NRA - National Rivers Authority
CBDC - Cardiff Bay Development Corporation
DCWW - Dŵr Cymru Welsh Water
CCW - Countryside Council for Wales
CSOs - Combined Sewer Overflows
ABP - Associated British Ports
LA - Local Authority
LPA - Local Planning Authority
STW - Sewage Treatment Works

ISSUE No.1 :	***THE IMPACT OF COMBINED SEWER OVERFLOWS AND INADEQUATE SEWERAGE NETWORK ON WATER QUALITY***		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Further investigate the Morlais Brook to confirm suspected reasons for water quality failure.	NRA	Identify areas for remedial measures.	Costs.
2. Identify other intermittent or diffuse sources of pollution.	NRA	Further improvements to biological and chemical quality.	Costs.
3. Renewal of substandard sewerage system where appropriate.	DCWW	Improved chemical, biological quality. Reduced sewage derived litter.	Costs to DCWW.

ISSUE No.2:	***THE IMPACT OF CANTREF AND PONSTICILL WATER TREATMENT WORKS ON THE TÂF FAWR AND TÂF FECHAN***		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Install washwater recovery and sludge treatment plants at water treatment works.	DCWW	Improve discharges to water environment.	Costs to DCWW.

ISSUE No.3 :	*THE IMPACT OF MINEWATER FROM ABANDONED COAL MINES*		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Treat or otherwise remedy minewater discharges	Collaboration between interested parties as opportunities arise	Aesthetic, biological and economic benefits.	No legal power at present. Costs.

ISSUE No.4:	*THE IMPACT OF ROAD DEVELOPMENTS ON THE WATER ENVIRONMENT*		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Minimise effects of pollution from road developments at the planning consultation phase.	LPAs/Highways Authority	Protect water environment.	Costs to Highway Authority.
2. Monitor and regulate roadwork schemes.	NRA	Protect water environment.	Costs to NRA.
3. Promote the restoration of degraded rivers during road construction.	Highways Authority/ NRA	Enhances river corridor.	Costs to Highway Authority.

ISSUE No. 5 :	*AESTHETIC EFFECTS OF WATERBORNE LITTER*		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Increase public awareness.	NRA/Keep Wales Tidy Campaign/LAs/ Public	Improvements to water environment. Reduced litter input.	Cost to NRA £40K for 1995/6. Other contributions £400K.
2. Improvements to CSOs.	DCWW	Improvements to chemical, aesthetic and biological quality of receiving watercourse.	Costs to DCWW.
3. Implement 'Friends of the River Taff' voluntary adoption scheme.	Taff Litter Project Steering Group	Improvements to water environment. Reduce litter input.	Relies on continued voluntary support.
4. Target litter fly-tipping blackspots.	Taff Litter Project Steering Group	Reduce litter input.	Costs to group members.

ISSUE No.6 :	***THE IMPACT OF LAND RECLAMATION SCHEMES ON THE WATER ENVIRONMENT***		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Minimise effects of pollution from land reclamation schemes by planning, design, implementation and control.	Promoting authorities/ developers/ NRA	Protect water environment.	Costs to developers and NRA.
2. Encourage the inclusion of enhancement of wildlife, conservation, fisheries and recreation in the reclamation schemes via the planning process on a regular basis.	NRA/Developer/ LPAs	Enhances the river corridor benefitting wildlife and public.	Costs to developer.

ISSUE No.7:	*LACK OF ADEQUATE LEGISLATION TO CONTROL DIFFUSE /INTERMITTENT POLLUTION FROM INDUSTRY*		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Target inspection of industrial premises	NRA	Prevention of pollution at source leading to improved water quality.	No regulations available currently to require eg. bunding of storage tanks at industrial premises. Costs to NRA.
2. Implement pollution prevention measures.	Identified industries	Prevention of pollution at source leading to improved water quality.	Costs to industry.

ISSUE No. 8:	*THE IMPACT OF CYNON VALLEY AND CILFYNYDD SEWAGE TREATMENT WORKS ON THE RIVER TAFF*		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Improve effluent mixing regime below both works.	DCWW/ NRA	Reduced aesthetic impact.	Costs to DCWW.
2. Increase nitrification capacity at Cynon STW.	DCWW	Improvement to water quality.	Costs to DCWW.

ISSUE No 9:	*DEVELOPMENT RESTRICTIONS AT HIRWAUN/PENDERYN*		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Improve sewerage system in Hirwaun/Penderyn.	DCWW	Improve water quality. Prevent localised flooding.	Costs.

ISSUE No 10 :	*THE IMPACT OF IMPOUNDMENT ON THE WATER ENVIRONMENT*		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Negotiate with DCWW to provide compensation water releases.	NRA	Provide flow for environmental benefits	Reduce water available for supply. Supply to the Rhondda in particular is difficult to replace. May prejudice the viability of the treatment works at Neuadd.
2. Reduce water demand	NRA/DCWW	May allow 'spare water' to be used for compensation	May not save sufficient water. Water demand may increase in the future, which makes long term solutions difficult.
3. Do Nothing	NRA/DCWW	Does not permit environmental improvements	Maintains present reservoir yield.

ISSUE No 11 :	*EFFECT OF ABSTRACTION AT BLACKWEIR*		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Enact agreement to restrict abstraction during low flows.	NRA/ ABP/ CBDC	Maintain flow over weir and in estuary, and through Blackweir and Barrage fish passes.	Reduced water in Bute East dock and feeder during low flows.
2. Screening on the Dock Feeder to reduce fish access.	NRA/ ABP	Can be done in conjunction with other options.	Costs.
3. Supplement flows in Taff or Dock from alternative source.	CBDC	Maintain water flow in Taff and level in Dock.	May be no suitable source. Costs.
4. Maintain adhoc emergency agreements.	NRA/ ABP	No cost.	No guarantee of maintaining flows to the estuary.

ISSUE No 12:	*FLOODING AT REAR OF CARDIFF ROAD, TAFFS WELL*		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Identify sources of leakage on surface water culvert and instigate measures to seal them.	NRA	Reduce flood risk.	Costs to NRA.
2. Improve surface water and foul sewerage systems.	DCWW/ Mid Glamorgan County Council.	Reduced risk of flooding and contamination of water.	Costs.

ISSUE No 13:	***FLOODING OF HOUSES ALONGSIDE NANT CLYDACH, YNYSYBWL***		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Regular maintenance of watercourse and walls to ensure optimum capacity is maintained within the river channel.	NRA/ Mid Glamorgan County Council	Reduced flood risk.	Continued maintenance commitment.

ISSUE No 14:	***FLOODING FROM THE RIVER TÂF BARGOED AT QUAKERS YARD***		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Remove the Bridge.	Landowner	Reduced flood risk.	No access to land on opposite bank.
2. Raise the bridge.	Landowner	Reduced flood risk.	Extensive and expensive road works.
3. Continued maintenance and removal of blockages.	Landowner/ NRA	Reduced flood risk.	Continued commitment on a regular basis.

ISSUE No 15:	*FLOODING AT MERTHYR VALE FROM THE RIVER TAFF*		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Provide a Flood Alleviation Scheme to protect people and property from flooding.	NRA	Reduced flood risk.	Justification on Cost/Benefit grounds unlikely.

ISSUE No 16:	*FLOWS RESTRICTED IN RIVER RHONDDA AT PONTYPRIDD*		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Continued maintenance of channel to ensure optimum capacity.	NRA	Reduced flood risk.	Continued risk of flooding from highest river flows. Continued maintenance commitment needed.

ISSUE No 17 :	*FLOODING FROM THE RIVER RHONDDA AT BRITTANIA, PORTH*		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Refurbishment and possible raising of walls.	Landowners	Reduced flood risk.	High costs to landowners.

ISSUE No 18:	***FLOODING AT RHEOLA INDUSTRIAL AREA, PORTH, RHONDDA***		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Replacement of Railway Bridge.	British Rail	Reduced flood risk.	High costs to British Rail.
2. Continued maintenance of channel to ensure optimum capacity.	NRA	Reduce flood risk.	Continued commitment. Does not resolve problem completely.

ISSUE No 19:	*FLOODPLAINS UNDER THREAT FROM DEVELOPMENT*		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Restrict development on floodplain.	NRA/ LPAs	Reduced flood risk to areas downstream. Protect the conservation interest. Less need to restrict run-off from upstream developments.	Reduction in development area.
2. Undertake comprehensive hydraulic analysis at Peace Park and Aberdare to ensure that development will not adversely affect surrounding and downstream area flood risk.	NRA/ Developer/ LPAs	Reduced flood risk.	High cost.

ISSUE No 20:	*FLOODING AT MISKIN, MOUNTAIN ASH*		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Modification/ replacement of culvert with possible provision of additional water storage area.	Landowner/ LA	Reduced flood risk.	High cost.

ISSUE No 21:	***BARRIER TO FISH MIGRATION - BLACKWEIR***		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Upgrade current fish pass.	NRA/CBDC	Improved fish pass efficiency.	Costs.
2. Raise weir pool level.	NRA	Improved fish pass efficiency.	Costs.
3. Implement byelaw restricting fishing in weir pool.	NRA	Reduced exploitation of salmon and sea trout.	Loss of game and coarse angling facility. Enforcement costs.
4. Fish pass and trap maintenance.	NRA	Fish pass and trap efficiency and maintenance.	Costs.
5. Removal of weir.	NRA/ ABP	Fish passage unobstructed. Byelaw restricting fishing not required.	Loss of water to Docks system. Costs. Loss of Dock Feeder facility. Loss of upstream deep water (good for coarse fishing).

ISSUE No 22: BARRIER TO FISH MIGRATION - LLANDAFF WEIR			
OPTIONS	Responsibility	Advantages	Disadvantages
1. Upgrade current fish pass.	NRA	Improved fish pass efficiency.	Cost.
2. Provide additional or new fish pass.	NRA	Improved fish passage.	Cost (greater than Option 1.)
3. Implement byelaw restricting fishing in weir pool.	NRA	Reduced exploitation of salmon and sea trout.	Loss of game and coarse angling facility. Enforcement costs.
4. Removal of weir.	NRA/ Cardiff City Council	Fish passage unobstructed. Byelaw restricting fishing not required.	Costs. Loss of deep water for rowing club. Loss of deep water for coarse fishing.

ISSUE No 23: BARRIER TO FISH MIGRATION - RADYR WEIR			
OPTIONS	Responsibility	Advantages	Disadvantages
1. Maintain current fish pass and trap.	NRA/CBDC	Fish pass efficiency and trapping facility maintained.	Maintenance costs.
2. Implement byelaw restricting fishing in weir pool.	NRA	Reduced exploitation of salmon and sea trout.	Loss of game and coarse angling facility. Enforcement costs.
3. Removal of weir.	NRA	Fish passage unobstructed. Byelaw restricting fishing not required.	Costs. Loss of water to Melingriffith feeder. Possible impact on river bed and railway track above. Loss of deep water for coarse fishing.

ISSUE No.24: BARRIER TO FISH MIGRATION - TREFOREST WEIR			
OPTIONS	Responsibility	Advantages	Disadvantages
1. Incorporate fish pass into hydropower scheme if approved.	Hydropower Co./NRA	Reduced cost to NRA. Liability for the weir not with the NRA.	Likely to be less effective than NRA fish pass. Affects performance of hydropower scheme.
2. Proceed with NRA fish pass proposals.	NRA/ Other collaborators	Likely to be more effective than hydropower fish pass. Collaborative scheme with other organisations who have agreed to contribute.	Possibly greater cost to NRA. NRA would be liable for the structure. Requires decision to proceed with the hydropower scheme.
3. Implement Byelaw restricting fishing in weir pool.	NRA	Reduced exploitation of salmon, sea trout and brown trout.	Loss of game and coarse angling facility. Enforcement costs.
4. Removal of weir.	NRA	Fish passage unobstructed. Byelaw restricting fishing not required.	Costs. Potential impact on river bed upstream, retaining walls, bridges and roads.

ISSUE No 25: BARRIER TO FISH MIGRATION - OLD MILL WEIR AT FIDDLERS ELBOW			
OPTIONS	Responsibility	Advantages	Disadvantages
1. Construct fish pass.	NRA/Others	Improved fish passage. Byelaw restricting fishing may not be required.	Costs. Weir ownership unknown.
2. Improve fish passage with minor modifications to weir to improve fish. passage	NRA	Reduced costs. Improved fish passage. Byelaw restricting fishing may not be required.	State of weir to be investigated. Weir ownership unknown.
3. Implement byelaw restricting fishing in weir pool.	NRA	Reduced exploitation of salmon, sea trout and brown trout.	Loss of game angling facility. Enforcement costs .
4. Removal of weir.	NRA	Fish passage unobstructed. Byelaw restricting fishing not required.	Costs. Potential impact on river bed and banks supporting road bridge.

ISSUE No.26:	***BARRIER TO FISH MIGRATION - ABERFAN WEIR***		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Minor modifications to weir to improve fish passage.	NRA/Merthyr Borough Council	Improved fish passage.	Costs.
2. Implement byelaw restricting fishing in weir pool.	NRA	Reduced exploitation of salmon, sea trout and brown trout.	Loss of game angling facility.
3. Removal of weir.	NRA	Fish passage unobstructed. Byelaw restricting fishing not required.	Costs. Potential impact on river bed and retaining walls upstream.

ISSUE No 27:	***BARRIER TO FISH MIGRATION - MERTHYR WEIR***		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Construct fish pass.	NRA	Fish passage to spawning grounds improved.	Costs. Fish may become vulnerable to illegal exploitation upstream.
2. Improve fish passage in conjunction with Local Authority improvements to River Taff.	Merthyr Borough Council, Mid Glamorgan County Council, Welsh Development Agency, Merthyr & Cynon Groundwork Trust, NRA	Fish passage to spawning grounds improved. Amenity and conservation value of the river enhanced. Reduced cost to NRA.	Costs. Fish may become vulnerable to illegal exploitation upstream.
3. Implement byelaw restricting fishing in weir pool.	NRA	Reduced exploitation of salmon, sea trout and brown trout.	Loss of game angling facility.
4. Removal of weir.	As in 2 above.	Fish passage unobstructed. Byelaw restricting fishing not required.	Costs. Pipe crossing exposed. Loss of cascade feature.

ISSUE No 28: RESTORATION OF SALMON AND SEA TROUT FISHERIES			
OPTIONS	Responsibility	Advantages	Disadvantages
1. Install fish pass at Treforest Weir	NRA/Hydropower Co.	Fish migration to spawning grounds facilitated. Fish available to anglers upstream. Fry stocking no longer necessary. Transport of fish from lower river traps no longer necessary.	Cost of fish pass. Fish vulnerable to illegal exploitation. Cost of protection of stocks (additional enforcement may be required).
2. Continue transporting proportion of fish from Radyr trap to river above Treforest.	NRA	Angling and natural spawning above Treforest possible without a fish pass.	Transport cost. Handling and transport stress to fish. Less natural migratory behaviour for fish.
3. Continue stocking with approx. 50,000 fry per year.	NRA	Adult run maximised whilst spawning habitat is inaccessible.	Cost of broodstock collection, rearing and stocking.
4. Implement byelaws to restrict fishing in weir pools.	NRA	Reduced legal and illegal exploitation of salmon and sea trout.	Enforcement costs. Loss of game and coarse angling facilities.
5. Consider designation of additional stretches under the EC Freshwater Fish Directive.	NRA	Statutory objectives give enhanced protection.	Possible cost implications of complying with standards.

ISSUE No 29 :	***PROTECTION AND IMPROVEMENT OF NON-MIGRATORY FISH STOCKS***		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Supplementary stocking with coarse fish between Cardiff and Pontypridd (Review Angling Club Practice of transfer from other rivers).	NRA/Angling Clubs	Fish stocks maximised.	Costs. Possibility of overstocking if populations not monitored.
2. Undertake survey of coarse fish populations and implement regular monitoring programme.	NRA	Status of populations known with greater accuracy.	Costs. Accurate sampling is difficult in such a large river.
3. Ensure developments and river engineering works do not degrade and, where possible, seek to enhance fisheries and habitat via the Planning Consultation System.	NRA/ Developers/LPAs	Fish stocks and habitat protected and enhanced.	Costs.
4. Implement byelaw to increase takeable size limit for trout.	NRA	Increased spawning and stocks.	Reduced angling catches in the short term.
5. Prohibit stocking with trout not originating from Taff.	NRA/Angling Clubs	Genetics of trout adapted to the Taff catchment protected.	Unnecessary at present, as stocks have a significant proportion and diversity of 'foreign' genetics.
6. Encourage catch and release and bag limits for brown trout.	NRA/Angling Clubs	Increased spawning and stocks.	Difficulty in communication links and changing established practices and attitudes.
7. Use of the Melingriffith feeder as an off-river spawning and nursery area.	NRA	Survival of coarse fish fry increased.	Costs.
8. Provide/seek additional off-river spawning sites upstream	NRA	Survival of coarse fish fry increased.	Costs.

ISSUE No 30:	***BUTE EAST DOCK FISHERY IMPROVEMENT***		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Assess fish populations more accurately and implement regular monitoring programme.	NRA/Angling Club	Status of fish stocks known more accurately.	Costs. Difficulty in sampling such a large body of water.
2. Supplementary stocking with coarse fish.	NRA/Angling Club	Fish stocks increased.	Costs. Carrying capacity is unknown, so possibility of overstocking.
3. Install fish screen at dock by-pass channel.	NRA/Angling Club/ ABP	Reduced loss of coarse fish.	Costs.
4. Provide habitat improvement structures.	NRA/Angling Club	Carrying capacity for fish stocks increased.	Costs.
5. Move dock railings or overcome their proximity to dock edge for international fishing matches.	Angling Club/ABP/ South Glamorgan County Council	Venue suitable for high profile international fishing competitions.	Costs.

ISSUE No 31:	*HABITAT RESTORATION*		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Promote the restoration of degraded habitats.	NRA/Funding organisation	Habitat actively improved.	Costs.
2. Require riverside developers to improve habitat as part of scheme.	NRA/Developer	Reduced cost to NRA/Funding organisations.	Less strategic and prioritised approach to restorations.

ISSUE No.32 :	*LACK OF INFORMATION ABOUT SITES SUITABLE FOR HABITAT IMPROVEMENTS*		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Further conservation of riparian and instream habitats during flood defence operations.	NRA	Incorporate into routine work over a period of time.	Not necessarily in priority areas.
2. Undertake River Habitat Survey	NRA	Assists in identifying degraded reaches.	Limited to river corridor.
3. Consultation and detailed site investigations to identify sites for habitat improvements.	NRA/LA/ Conservation Organisations	Identifies feasible opportunities in a systematic way.	Costs.

ISSUE No 33:	*LACK OF CONSERVATION STRATEGIES FOR RIVERINE WILDLIFE*		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Identify species requiring conservation strategy and draw up appropriate strategies.	NRA/CCW/ Conservation Organisations	Identifies need and priorities. Benefit to species conservation.	Costs.
2 Assist in the preparation of a priority Otter Catchment Management Plan.	NRA	Identifies need and priorities. Benefit to otter conservation.	Requires landowners agreement.

ISSUE No. 34:	*INVASIVE ALIEN PLANTS*		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Determine the current distribution of alien plants in the catchment and assess costs of control.	NRA/ LAs	Identify scale of problem and priorities.	Delay in implementation of control measures.
2. Determine control policy for alien plants.	NRA	Consistent approach.	Delay in implementation of control measures.
3. Undertake a control programme.	NRA/ LAs/ Landowners/ Fishing interests	Conservation and amenities benefit.	Potentially high costs and long term commitment.

ISSUE No 35:	*CONFLICT BETWEEN DIFFERENT RECREATIONAL USER GROUPS AND THEIR IMPACT ON WILDLIFE CONSERVATION*		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Liaise with angling and canoeing representatives to resolve conflicts.	NRA/ Angling Clubs/ Fishery Owner/ Riparian Owner/ Canoeing Orgs.	Relationship between canoeists and anglers improved and conflicts reduced.	Costs.
2. Improve communications with canoeists so that they are aware of legal position and potential conflict of canoeing without permission.	NRA/Welsh Canoeing Association/ British Canoe Union	Improved awareness.	Costs. Difficulty in communicating to all canoeists.
3. Individual canoeists to be regulated via a licensing or permit system:		Individual rather than block regulation would raise the profile of the obligations and rules to be followed by each canoeist. A visible permit or licence would identify those who are aware of the rules to simplify regulation.	
a) NRA to introduce a licensing system.	NRA	Legal canoeing enforced by an independent and public authority. Income to NRA.	As there is no right of navigation, there can be no navigation authority, so the NRA has no legal authority to introduce a licensing system. Administrative and enforcement costs likely to outweigh income.
b) Riparian fisheries representatives and canoeing organisations to introduce a permit system.	Fisheries/ Riparian Owners	Legal canoeing encourages and regulated by those it affects and with the legal authority. Possible income to respective organisations.	Requires commitment from canoeing and riparian interests to enforce regulations.
4. Identify and develop a dedicated site for canoeing.	NRA/ Welsh Canoe Association/ British Canoe Union/ Local Authority.	Use restricted to part of the river with minimal impact on other users.	Costs.
5. Provide advice to site owner and each user group to attempt to resolve conflicts.	NRA/Site Owner/ User Group.	Resources used with minimum conflict and greater understanding.	Costs.

ISSUE No 36:	*THE IMPACT OF CARDIFF BAY BARRAGE ON THE RIVER TAFF*		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Install a fish pass (which is approved by Welsh Office) as part of the barrage construction.	CBDC/Welsh Office	Ensures best designed fish pass.	Risk of impact on vulnerable species. Costs.
2. Continue monitoring the impact of the barrage on the behaviour of migratory fish.	CBDC/NRA	Determines impact of barrage on fisheries.	Costs.
3. Fishery protection and mitigation scheme.	NRA/CBDC	Protection of user interests.	Cost.
4. Promotion of recreational use of Cardiff Bay.	CBDC/Welsh Tourist Board/ Recreational User Groups	Recreational resource utilised.	Potential conflict between different users.
5. Eliminate continuous crude sewage discharges and modify CSOs within the bay area to specified standards.	CBDC/DCWW	Improved water quality.	Costs.
6. Remove accumulations of material from the impoundment as needed to maintain River Taff channel capacity.	CBDC	Maintain efficiency of existing flood defences.	Costs.
7. Review status of impoundment as a sensitive water under the Urban Wastewater Treatment Directive.	NRA/ CBDC	Reduce algal blooms.	May lead to the need for extra expenditure for CBDC/DCWW for nutrient stripping of upstream sewage effluents.
8. Remove litter, trash, weed and algae accumulations from impoundment.	CBDC	Maintain acceptable aesthetic quality.	Costs. Large amount of river borne trash and litter.
9. Contain leachate from Ferry Road tip and terminate discharges to estuaries.	CBDC	To maintain water quality standard.	Costs. Alternative disposal.

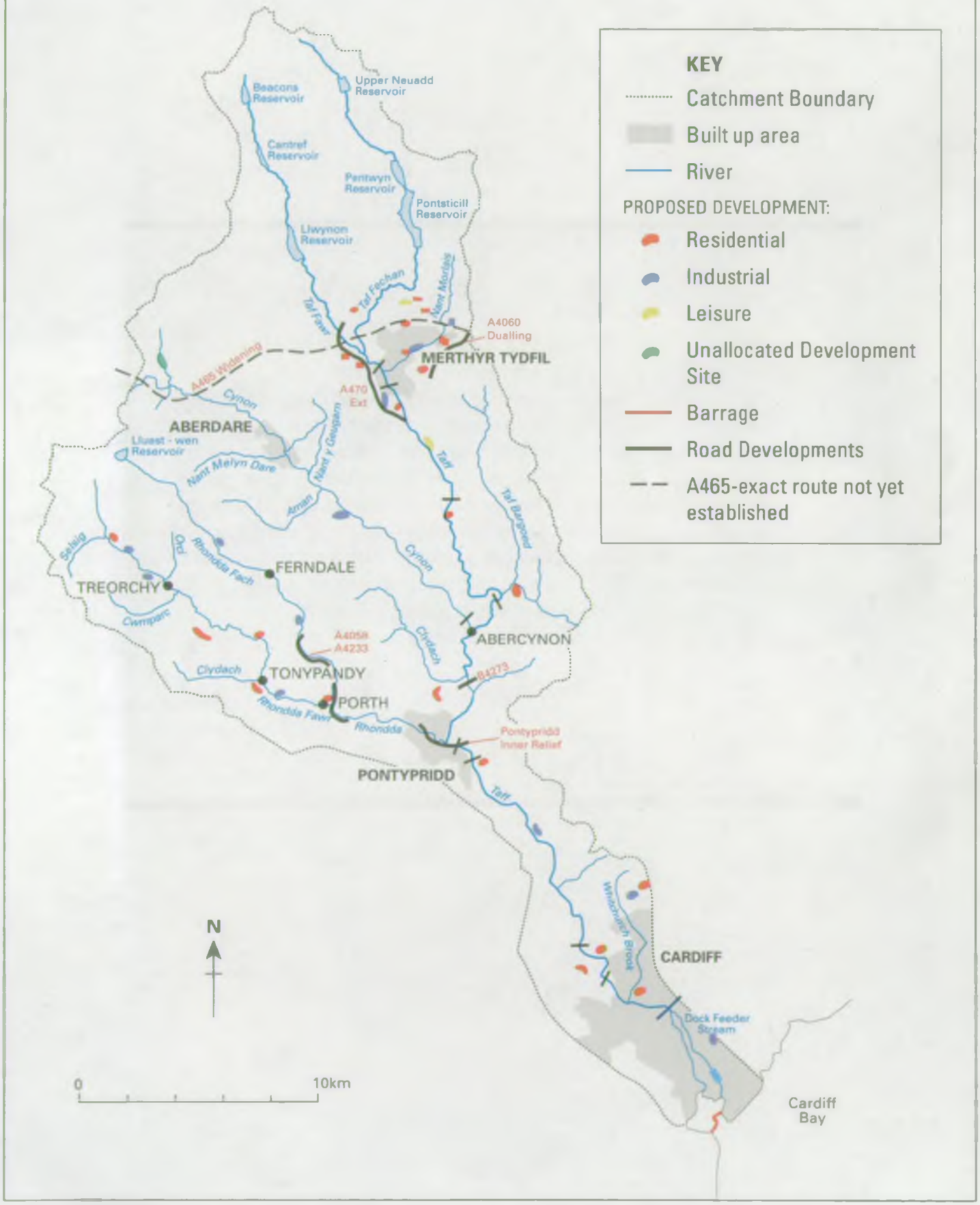
PART II

SUPPORTING INFORMATION

4.0 THE USES OF THE TAFF CATCHMENT

The following sections catalogue the legitimate Uses of the Taff catchment which fall under the control of the NRA in one way or another. A general description of the nature of the NRA's responsibility towards each is given, complete with a set of management aims and environmental quality targets. These are designed to protect both the environment and the requirements of other Uses. In Section 5 these specific targets are used to help us set overall targets, for the whole catchment, for water quality, water quantity and physical features, that reflect the NRA's view of the balance of interests between the different users of water.

MAP 8. PROPOSED DEVELOPMENT



4.1 URBAN DEVELOPMENT (including road and rail)

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 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.

While the NRA has statutory powers and responsibilities to protect the water environment, these can be complemented by effective control of land use to prevent anticipated problems at an early stage.

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 users 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 regarding development through the planning consultation process. Although the final decision on planning matters rests with the planning authority, government guidelines advise on the need to consider the NRA's concern in determining proposals.

The NRA has produced a series of Guidance notes for LPAs that outline methods of protecting the water environment. The NRA proposes that these should be incorporated into the LPAs' own Development Plans, whenever possible.

Local Perspective

The Taff Catchment is administered by Mid and South Glamorgan County Councils, Cynon Valley, Rhondda, Taff Ely, Rhymney Valley and Merthyr Borough Councils and Cardiff City Council (See Map 2).

The present status of Structure/Local Plans covering the Taff catchment is as follows:

Council	Plan Type	Coverage	Status
South Glamorgan County Council	Replacement	1991-2011/	Deposit draft issued January 1995
Mid Glamorgan County Council	Replacement	1991-2006	Deposit stage document
Merthyr Tydfil Borough Council	Local	1991-2006	Consultation Draft issued August 1994
Cynon Valley Borough Council	Local	1991-2001	Consultation Draft issued November 1994
Rhymney Valley Borough Council	Local	1991-2006	Deposit Plan issued 1994
Rhondda Borough Council	Local	1991-2006	Deposit Draft issued November 1994
Taff Ely Borough Council	Local	1992-2006	Draft Local Plan issued September 1993
Cardiff City Council	Local	1993-2001	Deposit Plan due to be modified by June 1995.

Over the last few decades, the pattern of development in the Taff catchment has changed with the demise of the mining industry, the development of new light industrial and business parks (Map 8), the expansion of existing industrial sites and a number of road improvements and by-pass schemes either being proposed or under construction. The road improvement schemes include:

A470(T) Pentrebach to Cefn Coed	Extension	Completion date 1997.
A4060(T) Mountain Hare to Dowlais Top	Dualling	Dependent upon Phase II East Merthyr Reclamation Scheme.
A465 Hirwaun to Abergavenny	Dualling	Commencement 1999.
A4058/A4233 Porth/Lower Rhondda Fach	Relief Road	Commencement 1996/97.
A4058 Pontypridd Inner Relief Road	Relief Road	Ongoing.
B4273 Cilfynydd Cross Valley Link	Link Road	Completion date unknown.

In addition to road schemes, the Cardiff Bay Barrage will have a major impact on development during the next 10 years, encouraging the regeneration of the docklands area by Cardiff Bay Development Corporation.

The Taff catchment has experienced a great deal of heavy industrial activity in the past and it is only within the last 30 years that the legacy of industrial scars has gradually been removed by the execution of land reclamation schemes. This was given considerable impetus following the Aberfan disaster in 1966.

Land reclamation schemes have generally been carried out on old colliery tips, steelworks and allied industrial sites. Many of these sites are close to the river and have difficult topography. The necessary disturbance of them during reclamation can cause serious water pollution by suspended solids and mobilisation of leachable components from contaminated land. Suspended solids contaminated run-off is traditionally controlled by settlement lagoons incorporating oil retention features. Control of soluble pollutants is more difficult but can be achieved and pollution minimised by good planning, design and operation.

Although only one major site at East Merthyr is currently underway there are several major schemes in the planning design stage which will be undertaken during the lifetime of this plan. These are: Merthyr Vale, Albion and Abercynon, Deep Navigation, Blaenrhondda (Fernhill), Phurnacite (Abercwmboi), Maerdy and Taff Merthyr. The scheme at the Phurnacite plant will require special precautions to be taken to prevent problems arising from the contaminated land at this site.

One particular problem associated with closure of the coal mining industry in the catchment is that of pollution caused by discharges of ferruginous minewater from abandoned mines (Map 5) which gives rise to discoloration and deposition of iron hydroxide on the river bed. Reclamation and redevelopment of the old mining sites can sometimes provide opportunities to remedy these discharges.

Currently, the NRA is recommending to Cynon Valley Borough Council that development at Hirwaun and Penderyn is opposed until DCWW complete improvements to the local sewerage system.

Aim

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 and the NRA's Guidance Notes, should be incorporated into developments.

Water Quantity

To protect inland waters (and groundwater which is a locally important source of water supply) from the detrimental effects of development, including afforestation 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 is paid for by the developer and not from public funds.

Conservation features associated with the water environment should not suffer any detriment, and wherever possible should be enhanced by development.

4.2 FLOOD DEFENCE

General

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

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

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

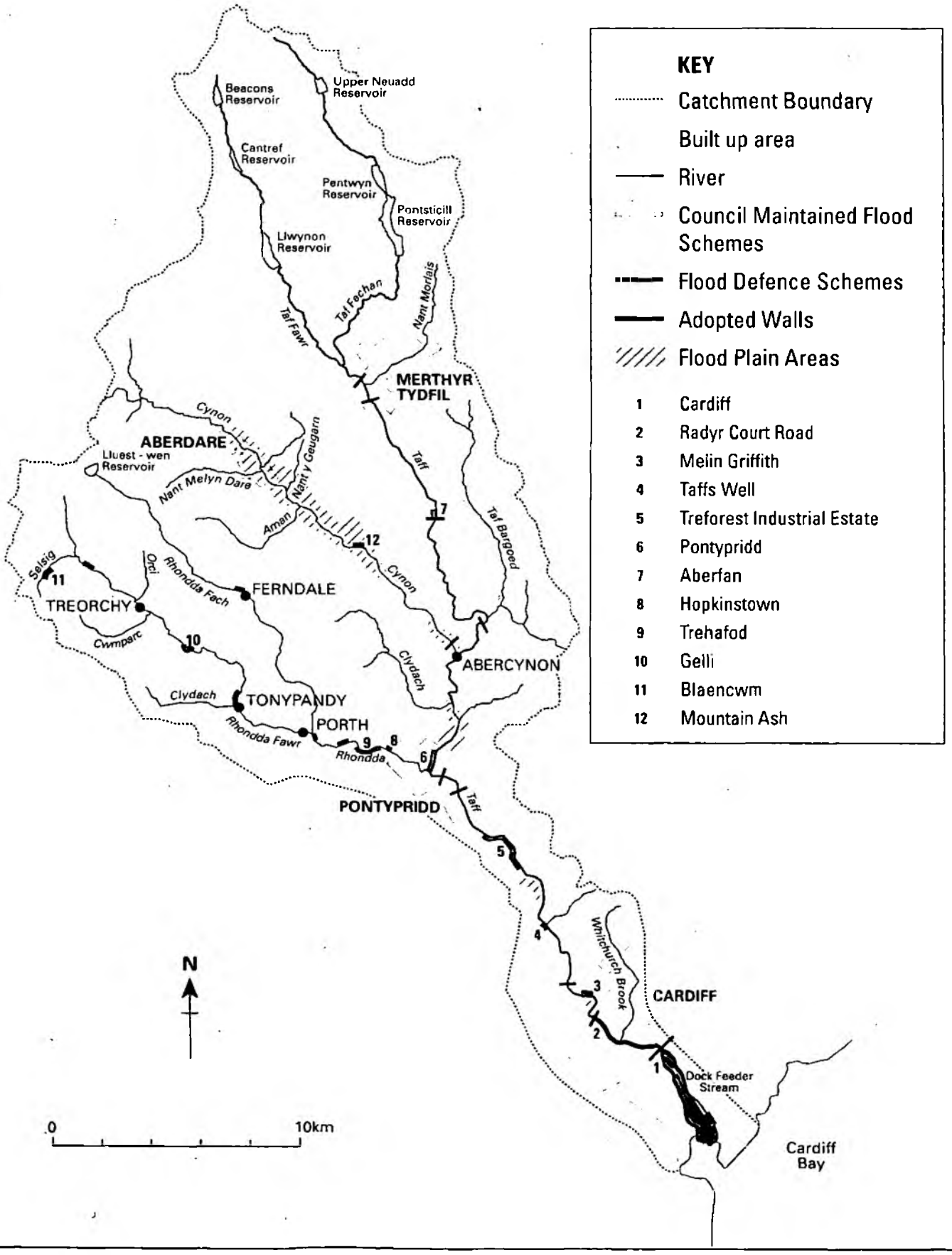
The Coastline of Wales has been divided into a series of Coastal Cells. The boundaries of each cell has been set to reflect the boundaries of the natural physical processes acting on that section of coast. Coastal Groups have been formed containing representatives of each Maritime District Council, the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

Recent Government publications such as the PPG on Coastal Planning and Circular 30/92 Development in Flood Risk Areas, place a requirement on local planning authorities to take account of coastal processes and flood risk in their determinations. The sources of information to assist these decisions will be the S.105 Survey presently under preparation by the NRA and the Shoreline Management Plan as agreed with the Coastal Group formulated from study work undertaken on the physical influences affecting the coastline.

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

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

MAP 9. FLOOD ALLEVIATION SCHEMES



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

The Land Drainage Act 1994 provides the Local Authority and where appropriate Internal Drainage Boards with powers to carry out flood defence works to ensure the proper flow of water. The 1994 Act also provides the NRA with additional consenting powers on ordinary watercourses.

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

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

Local Perspective

Defence against flooding is provided in four ways; maintaining river channels and building flood alleviation schemes, warning people of impending floods and controlling development in floodplain areas.

A summary of the flood alleviation schemes (Map 9) which are generally funded by Glamorgan Local Flood Defence Committee (GLFDC) and Welsh Office is as follows:

Cardiff

The Cardiff Flood Alleviation Scheme was constructed between 1980 and 1983 and extends from just downstream of Clarence Bridge, through the City to Llandaff Weir. This includes Pontcanna Fields and Bute Park which form an important flood storage area in times of extreme flooding. The design standard of this scheme is in excess of 1 in 200 years.

Radyr Court Road

A scheme to defence against repeated flooding of Radyr Court Road (which is the only access for vehicles to a newly developed residential area) was built in 1992/93 by South Glamorgan County Council. The GLFDC of the NRA and Cardiff City Council contributed to the cost of this scheme.

Melingriffith

A scheme to protect the low lying area including Forest Farm, some cottages and the Eurocast Industrial Site was completed in 1990.

Taffs Well

A major river improvement scheme, which involved the removal of a large weir across the River Taff, was carried out in the early 1970s. It extends from the garage on Cardiff Road upstream to the footbridge to the north of Taffs Well - a distance of some 500 metres.

In September 1989 a further scheme was commenced to protect basement areas of the houses between nos. 2 and 28 Cardiff Road from flooding.

Treforest Industrial Estate

This estate occupies both banks of the River Taff and suffered severe flooding in December 1960.

A major river improvement scheme, including the building of earth flood defences, was carried out in the late 1960s to late 1970s. The scheme extends from the old railway embankment at Oxford Street, Nantgarw, upstream to high ground to the north west of Hawthorn Comprehensive School - a distance of some 5 km.

The 1979 flood caused some severe damage to the banks but no properties were flooded.

Pontypridd

Widespread flooding occurred in Pontypridd during the major flood of December 1979 and an extensive series of investigations into the problem areas was carried out in the 1980s. Only two of the sites examined actually resulted in any form of protection being considered. These are at:

1. **Sion Street** - this suffered flooding on almost a two yearly frequency in the 1980s and early 1990s from the River Taff and the existing highway and foul sewerage drainage systems. The GLFDC, Mid Glamorgan County Council and DCWW jointly promoted a scheme to resolve all the flooding problems which was completed in July 1993.

2. **Pontypridd Town Centre** - the main shopping areas, namely Mill Street and Taff Street in Pontypridd, were flooded frequently between 1979 and 1993. An urgent review of scheme options was carried out in 1993 and the preferred one, which protects the town centre from flooding by the River Taff, was completed in 1994.

   As with Sion Street, flooding in this area was associated with an inadequate combined drainage system and this was addressed by DCWW as part of the scheme.

Aberfan and Troedyrhiw

Floods in 1979 inundated approximately 70 houses and a concrete products factory. A flood defence embankment was built at Aberfan in 1980, since then no further flooding has occurred. Flooding of 30 houses in Bridge Street at Troedyrhiw was associated with lack of capacity at the road bridge. A rock shelf was removed to improve the hydraulic capacity after the flood. The

comprehensive school on the left bank at the downstream end of the village is protected by a large flood defence embankment constructed post 1960 by Merthyr Tydfil Borough Council. It is maintained by the Council.

Hopkinstown

The A422 trunk road forming the main access route to the Rhondda Valleys, abuts the River Rhondda at Hopkinstown. The road, together with houses fronting it, has been prone to almost bi-annual flooding from the river and as a result of deficient surface drainage. Flooding has also affected lower parts of the Pwllgwaun area on the opposite bank of the river.

The Hopkinstown Flood Alleviation Scheme, which was completed in August 1993, effectively eliminated the river flooding. A separate highway drainage scheme was completed in December 1993. The whole scheme was jointly funded by Mid Glamorgan County Council and the NRA and cost in the order of £800,000.

Trehafod

The 1979 flood overtopped the banks of the River Rhondda just down river from Trehafod and floodwaters entered the low lying areas of Colliery Street and Great Street causing flooding to many properties. A major river improvement scheme was completed in 1985 and no problems have occurred since then.

Gelli

A combination of river walls of various forms of construction protected large residential areas of Gelli from river flooding until December 1979. The flood in that year reached peak levels equivalent to the tops of the walls, some of which moved bodily upon their foundations, whilst still maintaining their integrity. Nevertheless, flooding problems were experienced in the protected areas.

A major new flood alleviation scheme was completed in February 1983 (at a cost in the order of £3.4m). Some of the walled defences have top levels above the first floors of the properties.

Blaencwm

The village of Blaencwm flanks the Nant Selsig some 0.5 kms upriver from the Rhondda confluence. The village was severely flooded in 1979. Rhondda Borough Council and Mid Glamorgan County Council constructed a channel enlargement for Blaencwm in the mid 1980s in the course of a major land reclamation works. Subsequently GLFDC adopted the scheme for future maintenance purposes.

Mountain Ash

Part 1 of a 2-part scheme to improve the River Cynon through Mountain Ash was carried out by Cynon Valley Borough Council in 1992/93. This first part will not give full protection until river improvements in Part 2 are effected. The GLFDC contributed approximately £380,000 to this scheme and have agreed to assume maintenance responsibilities for the new channel and defences.

In the late 1980s Mid Glamorgan Land Reclamation Department carried out major channel improvements upstream of the road bridge in Mountain Ash. The channel will not be wholly effective until the constrictive main road bridge has been removed.

In addition to the walls at Hopkinstown, Trehafod and Gelli, which form part of the flood alleviation schemes, the NRA has accepted responsibility for some walls which its predecessors determined performed a flood defence function. The walls are situated at the rear of the Magistrates Court in Porth, David Street in Treherbert, Sherwood Street in Llwynypia, and Taff Street in Ferndale. Periodic examination of these structures is carried out to ensure that their flood defence capability is maintained.

There are areas of floodplain at Treforest , Pontypridd, Cilfynydd, Pontcynon, Abercynon and between Mountain Ash and Aberdare. These have an important role in the storage of flood waters and should be protected from development which would reduce this capacity, thereby raising the flood risks to other areas.

The flood warning system covers most of the main towns and the environs in the catchments of the rivers Taff ,Cynon and Rhondda.

Aims

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

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

To maintain effective drainage, taking account of environmental requirements.

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

Environmental Requirements

Physical Features

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

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

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

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

Adequate arrangements should be provided for flood warning.

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

MAP 10. SOLID WASTE DISPOSAL SITE

4.3 SOLID WASTE DISPOSAL (LANDFILL)

General

The disposal of domestic and industrial waste 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 and groundwater. 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 Environmental Protection Act 1990. The NRA is a statutory consultee on applications for landfill waste disposal licences.

Local Perspective

There are three active landfill sites receiving domestic, commercial and industrial waste (Map 10), these being: Bryn Pica at Llwydcoed (Cynon Valley Borough Council), Nantgwyddon at Gelli (Rhondda Borough Council) and Trecatti (Merthyr Tydfil Borough Council). The last named is also licensed to receive special waste and is one of the biggest landfill sites in Britain. Both Nantgwyddon and Trecatti are lined containment sites and discharge leachate directly to the public foul sewerage system.

There are also a significant number of sites in the catchment licensed for the disposal of inert waste. Properly operated, these do not pose a threat to the water environment. The current phase of the site at Bryn Pica is operated so that the resulting leachate is diluted and broken down as it passes through soils and rocks in the old opencast coal site. Surrounding streams are being monitored. No major problems have been detected, suggesting the major route for leachate movement is into underground strata. A groundwater monitoring program has been agreed with the NRA and is being implemented.

Opencast mining and quarrying in the area has resulted in numerous holes in the landscape of the Taff catchment. Some of these may be proposed as future waste disposal sites. The NRA's policy is that all sites, other than inert ones, should be contained and leachate effectively controlled and managed.

Aim

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

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

Environmental Requirements

Water Quality

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

Where appropriate waste disposal sites must comply with prohibition notices or discharge consent conditions. These will be enforced by the NRA and WRAs.

Water Quantity

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 rivers, estuaries or coastal waters.

Following the cessation of tipping, all aftercare provisions stated in the waste management licence must be carried out by those responsible.

4.4 FISHERIES

General

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

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

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

A third category:

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

is largely protected by the provisions of the EC Dangerous Substances Directive which applies to all controlled waters.

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

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

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

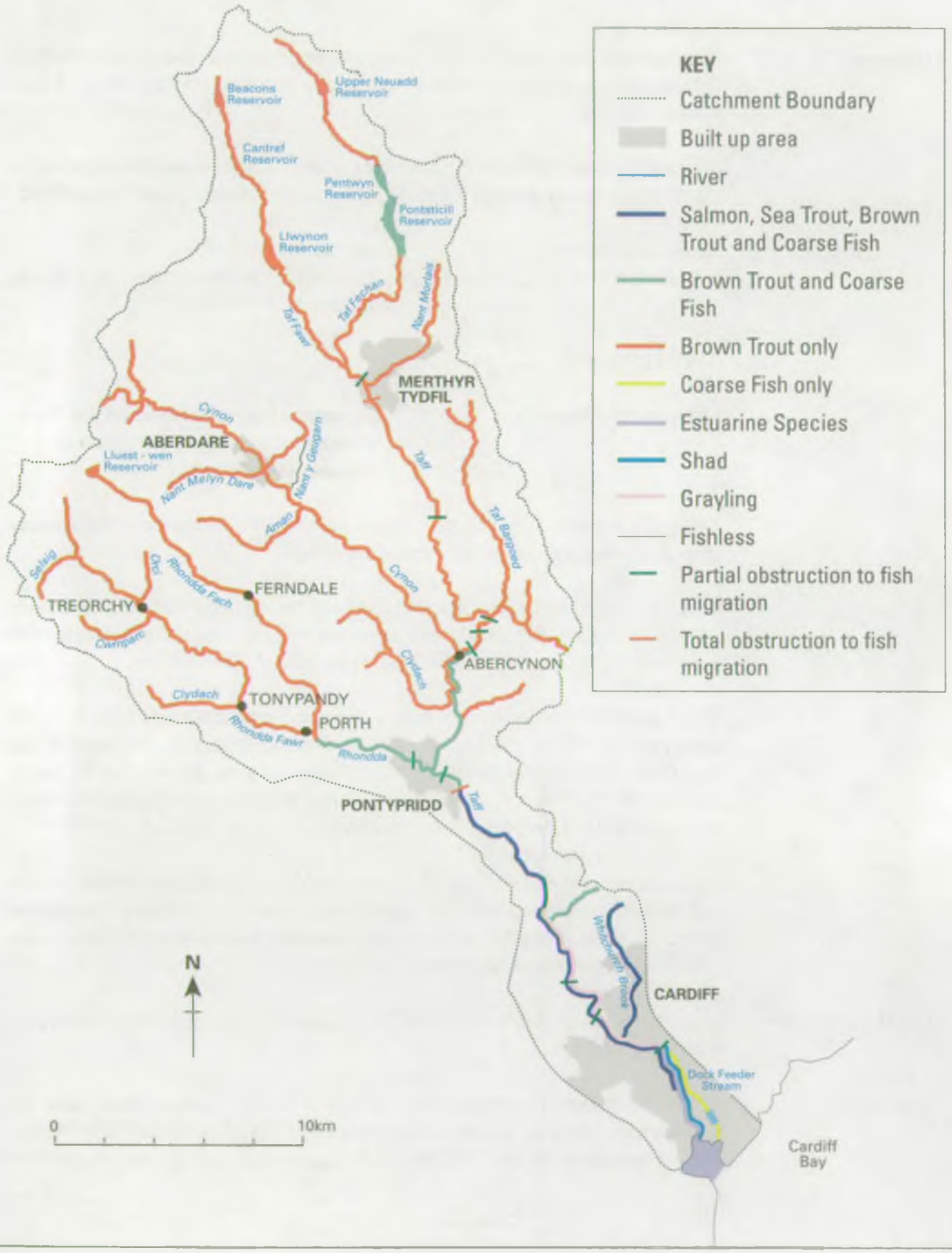
Local Perspective

The current distribution of salmon, trout, coarse fish and other species is shown on Map 11.

Salmon

Before the industrial revolution the Taff was a prolific salmon river. Due to improvements in water quality salmon started to re-appear in the early 1980s. Their populations in the Taff are now increasing rapidly due to further

MAP 11. FISH DISTRIBUTION



improvements in water quality, provision of fish passes at obstructions and an extensive stocking programme. Salmon are now found naturally from Cardiff to Pontypridd. Juvenile salmon are stocked to several tributaries.

Sea Trout

Sea trout stocks are also improving but without the assistance of stocking. They are present in the river as far upstream as Pontypridd.

Brown Trout

Brown trout are present throughout the whole catchment. Populations are very good in the middle reaches due to natural recruitment from the unpolluted upland tributaries since the water quality has improved, and stocking by angling clubs.

Coarse Fish

Coarse fish species are present in the main river from Abercynon to Cardiff and on the Rhondda between Porth and Pontypridd. Good populations exist between Pontypridd and Cardiff, in Pontsticill Reservoir, and in Bute East Dock and its feeder in Cardiff. Grayling and barbel have been introduced to the lower River Taff in recent years.

Other Migratory Fish

Twaite shad are occasionally found in the lower river, and in the summer, large shoals of mullet are regularly visible in the River Taff below Blackweir in Cardiff . Elvers enter the river in the spring and adult eels migrate to the sea principally during the autumn.

Freshwater Fish Directive

A significant length of the river catchment is designated under the EC Freshwater Fish Directive (78/659/EEC) as seen on Map 12. The Taff is designated as salmonid from Llwyn-on Reservoir to Quakers Yard and as Cyprinid from Radyr weir to Blackweir, a total distance of 24.7km.

The Rhondda Fawr is designated salmonid from Tynewydd to Tonypandy, a distance of 12.9km. The Cynon is designated salmonid from Penderyn to Abercwmboi, a distance of 12.2km. Four other stretches on some of the smaller tributaries totalling 14.1km are also designated salmonid fisheries.

Designation of additional stretches under the Directive will be considered by the NRA as part of this plan.

Aim

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.

MAP 12. FRESHWATER FISH DIRECTIVE

Environmental Requirements

Water Quality

Rivers	Waters should comply with the appropriate standards of the EC Freshwater Fish Directive (78/659/EEC).
Stillwaters	These waters should comply with the same standards as set for rivers.
Estuaries	These waters should comply with the appropriate standards identified for migratory fisheries element of the Fisheries 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	An appropriate diversity of natural instream and bankside habitats should be maintained to support the fish typical of the river type.
	Appropriate levels of riparian and instream vegetation should be maintained to provide adequate cover for fish.
	Artificial barriers should not obstruct passage of migratory fish.
	Natural or artificial barriers should not lead to excessive exploitation of fish.
	River maintenance and other works should be carried out in a way that causes the least detrimental impact on the fishery.

MAP 13. RIVER ECOSYSTEM ASSESSMENT

4.5 RIVER ECOSYSTEM

General

The River Ecosystem Use addresses the protection, maintenance and improvement of the basic water quality required to support different types of River Ecosystem. The Use has five classes with Class 1 being of the highest water quality. The details of the Use classes are defined in the "Surface Waters (River Ecosystem) (Classification) Regulation 1994". The Use applies to all watercourses in the catchment.

Within the classified stretches, the River Ecosystem Target Class will be used to replace the existing Long Term River Objective (LTRQO) based upon the old National Water Council (NWC) system.

These targets represent the long term aspirations for the catchment and may not, in some instances, be achievable in the short-medium term. Consistent with this, the targets, set for this Use, for river stretches covered by this CMP will reflect what can be achieved within its intended life of 5-10 years.

As the River Ecosystem is the first Use introduced under the Water Quality Objectives scheme (See Section 5.1), it is hoped that these "interim" targets will be translated into Statutory Water Quality Objectives during the lifespan of this CMP. Once set as formal objectives the NRA will have a duty to ensure compliance with them.

Local Perspective

The stretches assessed for River Ecosystem are shown on Map 13. The majority of the River Taff and its tributaries lie within classes RE1 and RE2 (See Appendix 2). The exceptions are:

Clydach (Rhondda) - RE5
Nant Morlais - RE4
River Taff downstream Cilfynydd - RE4
River Cynon at Penrhiwceiber - RE3
Clydach (Ynysybwl) downstream Lady Windsor - RE3
River Rhondda Fawr at Tonypandy - RE3
River Taff at Rhydycar - RE3

The Rhondda Fawr at Tonypandy is influenced by the Nant Clydach and likewise, the Nant Morlais impacts upon the River Taff immediately downstream at Rhydycar.

Aim

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

Environmental Requirements

Water Quality	Waters should comply with the appropriate standards of Surface Waters (Rivers Ecosystem) (Classification) Regulations 1994.
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 habitat should be maintained to support the Ecosystem typical of this river type.

4.6 GENERAL ECOSYSTEM

General

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

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

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

Local Perspective

The Taff and its tributaries are dynamic, upland rivers subject to flash floods and periods of low flow in the summer. They have also been substantially modified and restricted by walls, floodbanks and revetments. This, combined with the erosive nature of the river, has not allowed the development of an extensive or diverse aquatic and marginal vegetation. As a consequence, the flora is dominated by plant communities often associated with waste-ground, including Japanese Knotweed.

The aquatic animal community is reasonably diverse with some individual sites and tributaries, notably the Rhondda, being poorer.

The river supports a good range of riverine birds, including dipper, kingfisher, grey wagtail, heron and moorhen. Otters are known to make use of a considerable part of the catchment but water voles are probably absent. Mink are widespread.

The river supports good populations of brown trout and, in the lower river, a healthy and varied population of coarse fish. Stocks of salmon and sea trout are also increasing due to environmental improvements.

Dangerous substance monitoring is undertaken at Cilfynydd, Upper Boat and Blackweir (the tidal limit on the River Taff). Blackweir site is also used to monitor for the UK Red List substances and those selected pollutants identified by the Paris Commission.

The discharge from Cynon Sewage Treatment Works (STW) is monitored for all substances considered dangerous to health (List 1 and List 2) whilst that from Cilfynydd STW is monitored for List 2. DCWW Industrial Services have a waste disposal licence for on-site treatment of commercial effluents which they tanker into Cilfynydd STW. Whilst they must ensure that the conditions on the discharge consent are complied with, it represents an additional source of List 2 substances.

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

Environmental Requirements

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

Water Quantity 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 instream features and river plants and animals should be maintained and enhanced.

4.7 SPECIAL ECOSYSTEMS

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), Sites of Special Scientific Interest (SSSIs) and Special Areas of Conservation and Special Protection Areas designated under the EC Habitats and Birds Directives.

This Use is extended to sites that are valuable in conservation terms but are not formally protected 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 separate public consultation.

Local Perspective

Of the 21 designated SSSIs in the Taff catchment (Map 14), 13 have a wetland component. These include significant lengths of river, such as the Tâf Fechan and canals, bogs, parts of extensive moorlands and Taff estuary mudflats. The catchment discharges into the Severn Estuary, an area internationally recognised for its conservation value, being designated as a SSSI and Proposed Special Protection Area (SPA) and Ramsar Site. There are 8 County Wildlife Trust and Local Nature Reserves, the majority of which feature the aquatic habitat as a major element.

Aim

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

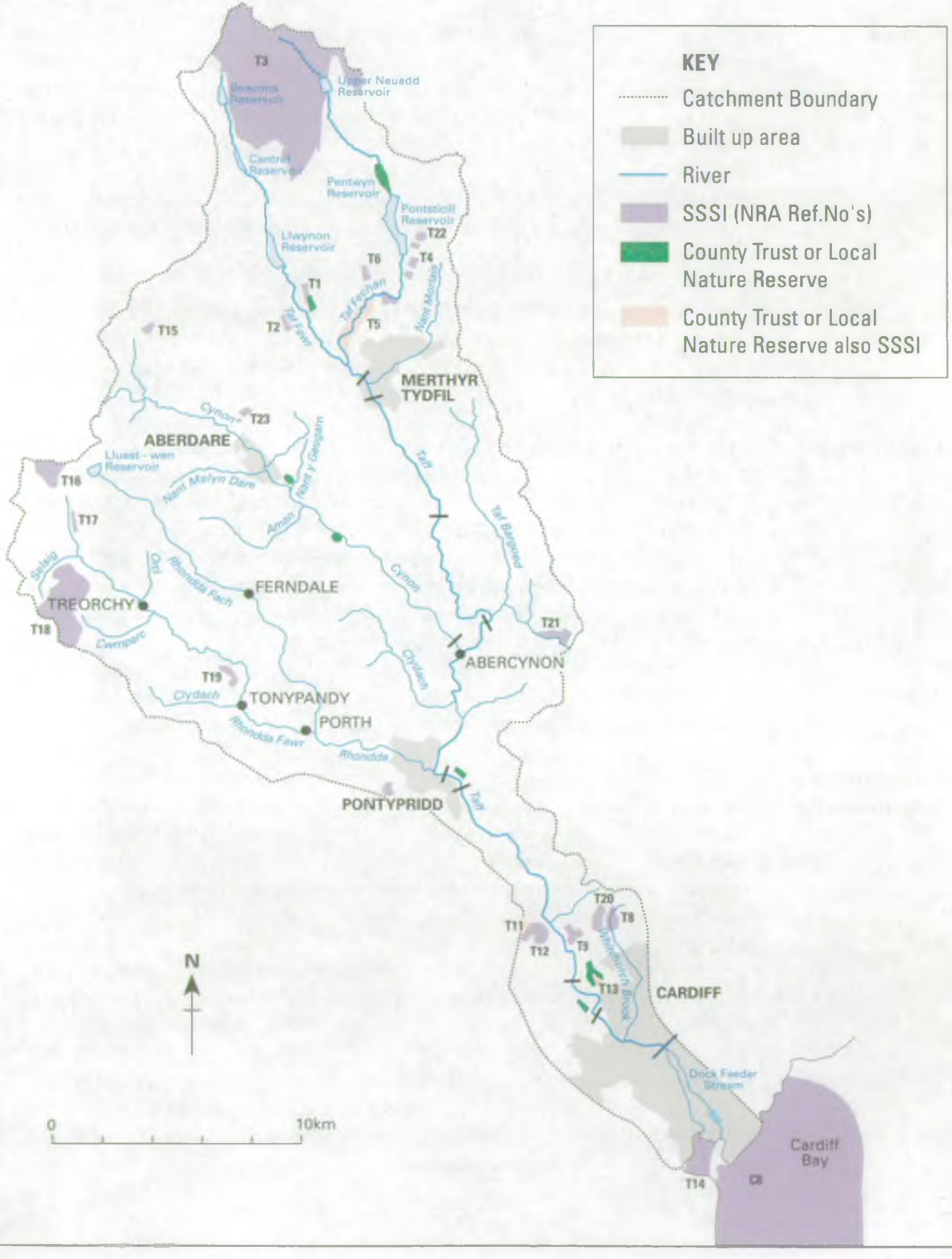
Environmental Requirements

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

At sites where quality is a key factor in the creation of a special ecosystem, the most stringent standards of water quality (i.e. River Ecosystem Class 1) will be applied, in addition to any other known water quality standards.

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.

MAP 14. SPECIAL ECOSYSTEMS



4.8 CONSERVATION OF NATURE, LANDSCAPE AND HERITAGE

General

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

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

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.

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

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

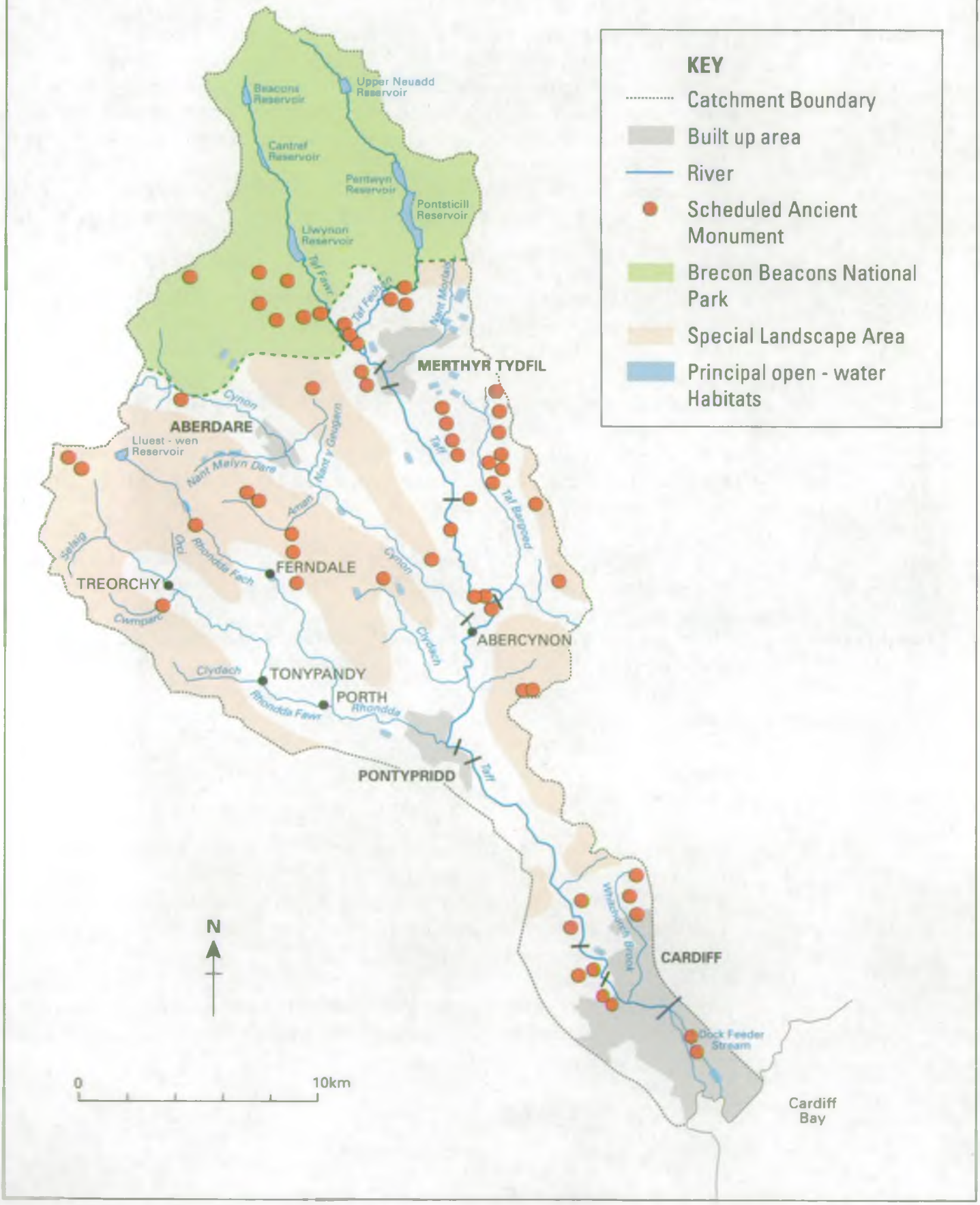
Local Perspective

The majority of the headwaters of the Taff catchment rise on acid grasslands or conifer plantations before descending down steep, narrow valleys which are heavily urbanised and industrialised. The grasslands that exist on the valley floors are mainly semi-improved or improved. Deciduous woodlands are generally small and scattered and dominated by oak. Alder and willow however are the predominant riparian trees, sometimes as part of small, relic, wet woodlands.

Open-water habitats are provided principally by reservoirs, both the major water-supply reservoirs of the upper Taff, some of which have significant associated marginal habitats, and the small ponds surviving from the industrial past, especially in the Merthyr area. Elsewhere, wetland habitats are scarce due to extensive development.

Ecological surveys indicate that sections of the river corridor of conservation interest are concentrated in the Upper Taff, the Quakers Yard area, the upper Cynon and the Nant Clydach (Ynysybwl).

MAP 15. NATURE CONSERVATION, LANDSCAPE AND HERITAGE



The River Taff upstream of Merthyr is within the Brecon Beacons National Park and the mix of hill, forest and water is scenically very attractive. Much of the upland area between the valleys and the broadleaved woodlands around Tongwynlais are also important in landscape terms and are recognised as Special Landscape Areas in County Structure Plans (Map 15). The catchment is also important for its industrial landscape.

There are numerous Scheduled Ancient Monuments (Map 15), the majority of which are not associated with the aquatic environment. There are a large number of sites and features of historical interest, which are not scheduled but are recorded, and an unknown number of unrecorded sites which may be vulnerable to development.

Aim

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

Environmental Requirements

Water Quality

Generally there will not be any specific water quality requirements to protect landscape or heritage sites although water around such public places should at least conform with the informal standards for Aesthetic Standards criteria.

Where water quality is a key factor, it should comply with the appropriate River Ecosystem class, while estuarial and coastal waters should conform with standards for the Protection of Sensitive 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

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

Where considered cost-effective by the NRA and other competent authorities SAMs should be protected from damage by flooding and/or drought.

4.9 ABSTRACTION

General

The removal of water from streams, rivers or groundwater by man is termed **abstraction**. The various uses to which the water is put are all grouped under this general heading. Abstractions are controlled by licences granted under the Water Resources Act 1991. The abstraction licensing process ensures that the NRA can manage water resources so as to ensure that the right balance is struck between the needs of abstractors and the environment.

Exemptions from the requirement for a licence include most types of water supplies to a single household, and small (not more than 20 cubic metres a day) general agricultural uses from surface water (excluding spray irrigation). Also, large areas of North and West Wales are exempted from the licensing requirement abstractions from groundwater (wells and boreholes), regardless of use. There are a number of other specific types of abstraction (eg. firefighting) which are exempt from the need for a licence.

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

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

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

Public Water Supply

Public water supplies are mainly taken from surface waters - rivers, streams and reservoirs - but groundwater sources can be important on a local scale. Private supplies are generally derived from springs and boreholes and their quality is monitored by the Local Environmental Health Officer.

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 2) forms the basis for the NRA's activities in this area.

Spray Irrigation

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

Fish Farming

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

Water Transfer

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

HydroPower

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

All hydropower abstractions require an abstraction licence.

Use of water for hydropower can result in appreciable changes in the flow regime which can have a large impact on the downstream channel and its flora and fauna.

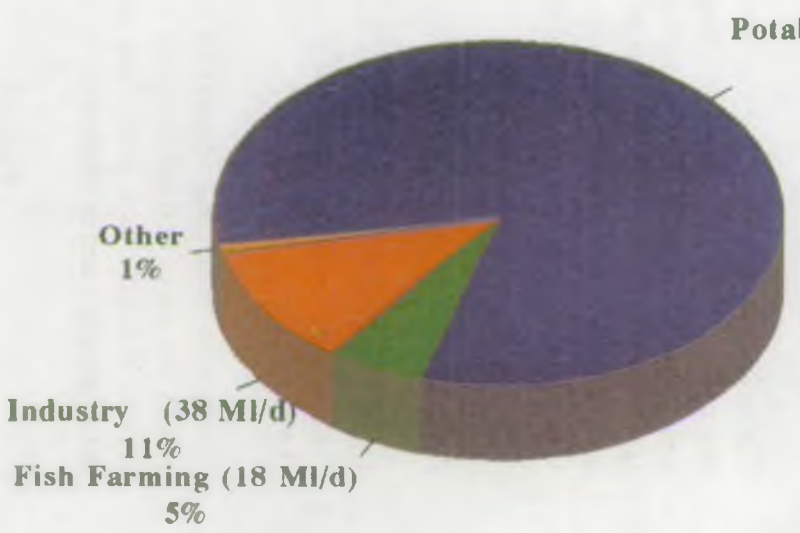
Amenity

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

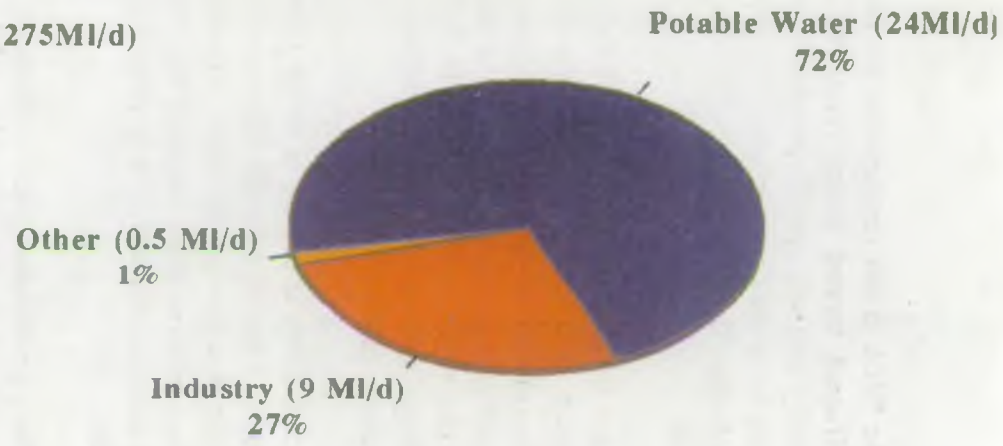
Fig 1: Summer Abstraction

Taff Catchment

Authorised Abstraction



Estimated Summer Water Loss



'Other' includes spray irrigation, recreation, agriculture, and domestic use
Ml/d means Megalitres per day

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

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

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

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

Local Perspective

Water Use

Water use in the catchment has reduced significantly, reflecting the decline in the traditional heavy industries in South Wales. Water use peaked in 1970 at 650 Ml/d, well in excess of the then authorised abstraction of 535 Ml/d. From then there was a steady decline in water use through the 1970s with the authorised abstraction falling to a little over 300 Ml/d by 1975 and then slowly rising to today's figure of about 335 Ml/d.

The pattern of abstraction is shown by Maps 16 to 18. There are quite large disparities between the quantities of water authorised for abstraction by licences and the actual amounts abstracted. For example, industry may hold licences which reflect water usage of earlier manufacturing processes that have been replaced by more water efficient processes; others may hold licences in anticipation of dry summers or to cope with future growth in water demand; others may no longer need the licence at all.

Water Loss

When protecting the health of the river, it is the quantity of water left in the river, not the amount taken out, that is important. Not all abstracted water is lost to the river. A proportion is returned, either directly to the river (at the site or via the sewerage system) or indirectly through the soil. Many licences have an environmentally protective flow condition (a 'compensation' or 'hands-off flow'). These measures reduce the impact of abstractions on river flows during the summer when the river is most vulnerable.

The net loss can be seen in Figure 1. The values shown assume the worst case, ie that all abstractors abstract their licensed volumes and that all abstractions from groundwater directly affect surface flows.

Public Water Supply

The main use of water abstracted within the catchment is for public water supply. The abstractions for public water supply in the catchment are shown on Map 16. Historically, each source supplied a particular community or group of communities. Today, water supplies to serve the catchment derive

MAP 16. ABSTRACTIONS FOR POTABLE SUPPLY

from local sources and a number of large sources within and outside the catchment.

The authorised public water supply abstraction is 275 Ml/d, representing 65% of abstraction in the catchment. 97% of this is from surface water sources and nearly three-quarters is from the Tâf Fawr and Tâf Fechan reservoirs, which store winter floods and also release compensation water throughout the year.

The various sources are operated together under the South East Wales Conjunctive Use Scheme, which allows water from a number of sources to be re-directed between demand areas as required. Consequently, water from the River Usk and Usk reservoir can be fed into Cardiff and, under drought conditions, be pumped up to the lower parts of the valleys. Similarly, water from Tâf Fawr reservoirs, which normally feed Cardiff, can be transferred eastwards to support Tâf Fechan reservoirs which in turn supports a number of small, high level reservoirs under drought conditions. The scheme is quite complex but aims to maximise the use of the existing resources.

One of the key features is that a large proportion of the water is not returned to the river. For example, most of the water abstracted in the Rhondda valley and from the Tâf Fawr and Tâf Fechan reservoirs is discharged via trunk sewers to Cardiff Bay. Water abstracted from the Cynon valley and part of Tâf Fechan (that which serves Merthyr and the Taff Valley above Cilfynydd) is however returned to the river via two major sewage treatment works at Cilfynydd below the Cynon confluence. However, the large abstractions which are lost are mainly from reservoirs and so the impact on summer low flows is small since discharges from the reservoirs compensates for the reservoirs in summer.

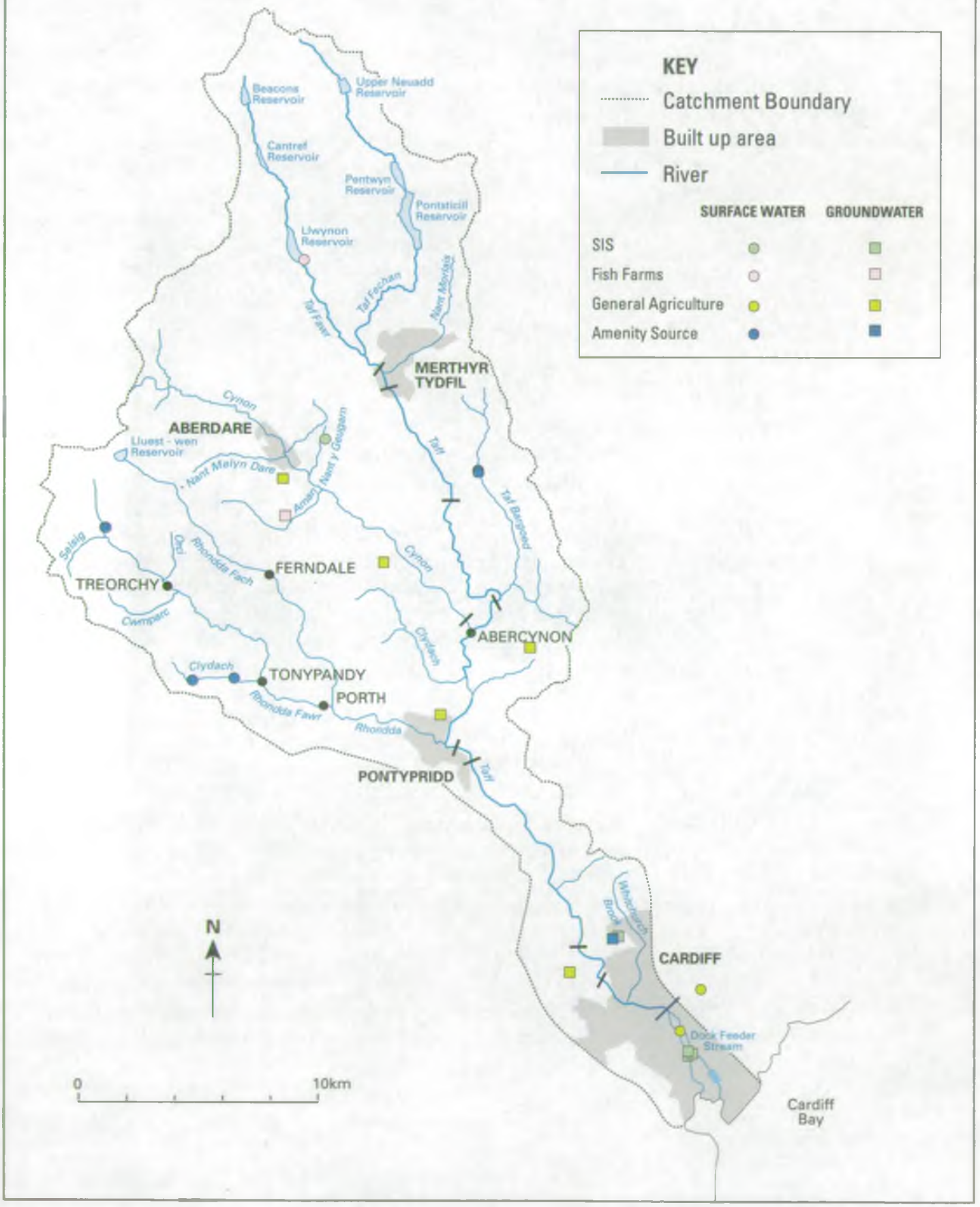
The total authorised and uncompensated abstractions (ie excluding abstractions from the Tâf Fawr and Tâf Fechan Reservoirs) is 73 Ml/d. Of this, only about 24 Ml/d (or 33%) is lost from the catchment.

There are only 2 licences for domestic potable supply abstractions. They are very small and have negligible impact on river flows.

Spray Irrigation

The topography of the Taff catchment does not lend itself to intensive crop production so spray irrigation is a very minor water use within the Taff catchment. There are 4 spray irrigation abstractions in (see Map 17) 2 for watering sports pitches and 2 for watering golf courses. 3 are from groundwater in the Cardiff area and have a minimal impact on local surface water features, the other is from the Cwmbach ditch near Aberdare and has local impact only.

MAP 17. ABSTRACTIONS FOR AGRICULTURE AND AMENITY



General Agriculture

There are 6 abstractions of which 5 are from groundwater. The volumes are very small and their impact is minimal.

Fish farming

There are two licensed abstractions for fish farming. The larger uses the compensation discharge from Llwynon reservoir, and has no impact on the river. The other, in the Aman catchment, relies on groundwater, and the water is discharged back to the river, thus helping at times of low flows. Fish farms which produce fish for the table do not require a licence. The impact of these is not known.

Amenity

There are 5 abstractions for amenity purposes, mainly for maintaining water levels in small ponds and lakes. The net effect of the abstractions, even on a local basis, is minimal.

Industrial

The industrial use of water is small compared with that in the heyday of heavy industry in the valleys. There are 15 abstractions (Map 18) from surface sources and 9 from groundwater, mainly in the Cardiff Area. Not surprisingly, they are located along the main rivers within the catchment.

The natural variability of flows in the catchment, and particularly the low baseflows resulting from the limited storage of water in the aquifers of the catchment means that the rivers do not provide a significant and reliable flow throughout the year. Most industry therefore now relies on mains water supplies.

There are 25 licences for industrial use. The total abstraction for industrial use is 38 Ml/d, of which about 9 Ml/d is lost from the catchment. The largest abstraction (15.5 Ml/d) is from Abercwmboi pond in the Cynon valley for the Phurnacite plant but is supported by groundwater from the old mine workings. Only about 25% is lost through evaporation, the remainder being returned to the pond. The next largest is 9 Ml/d at Dowlais Top by British Steel from a series of small ponds and reservoirs and is exported out of the catchment to Ebbw Vale. This abstraction has only a small, local effect since, in summer, stream flows are very low with some natural drying.

The remaining industrial abstractions have only a local effect on the rivers from which abstractions are taken.

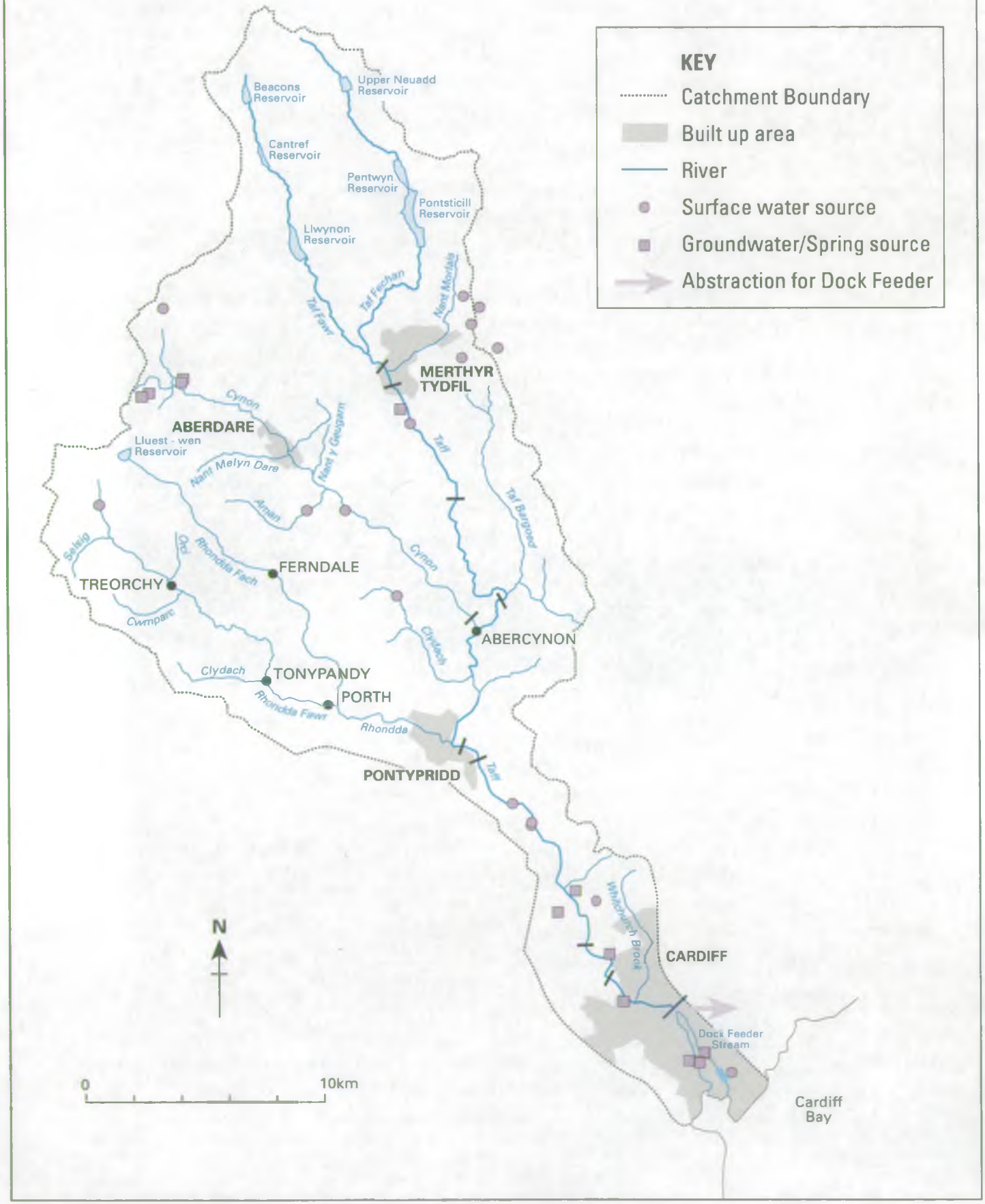
Hydropower

There are currently no abstractions for hydropower in the catchment. However, proposals are being considered for producing hydropower from Ponsticill and Llwyn-On reservoirs and on the Taff at Treforest weir.

Aim

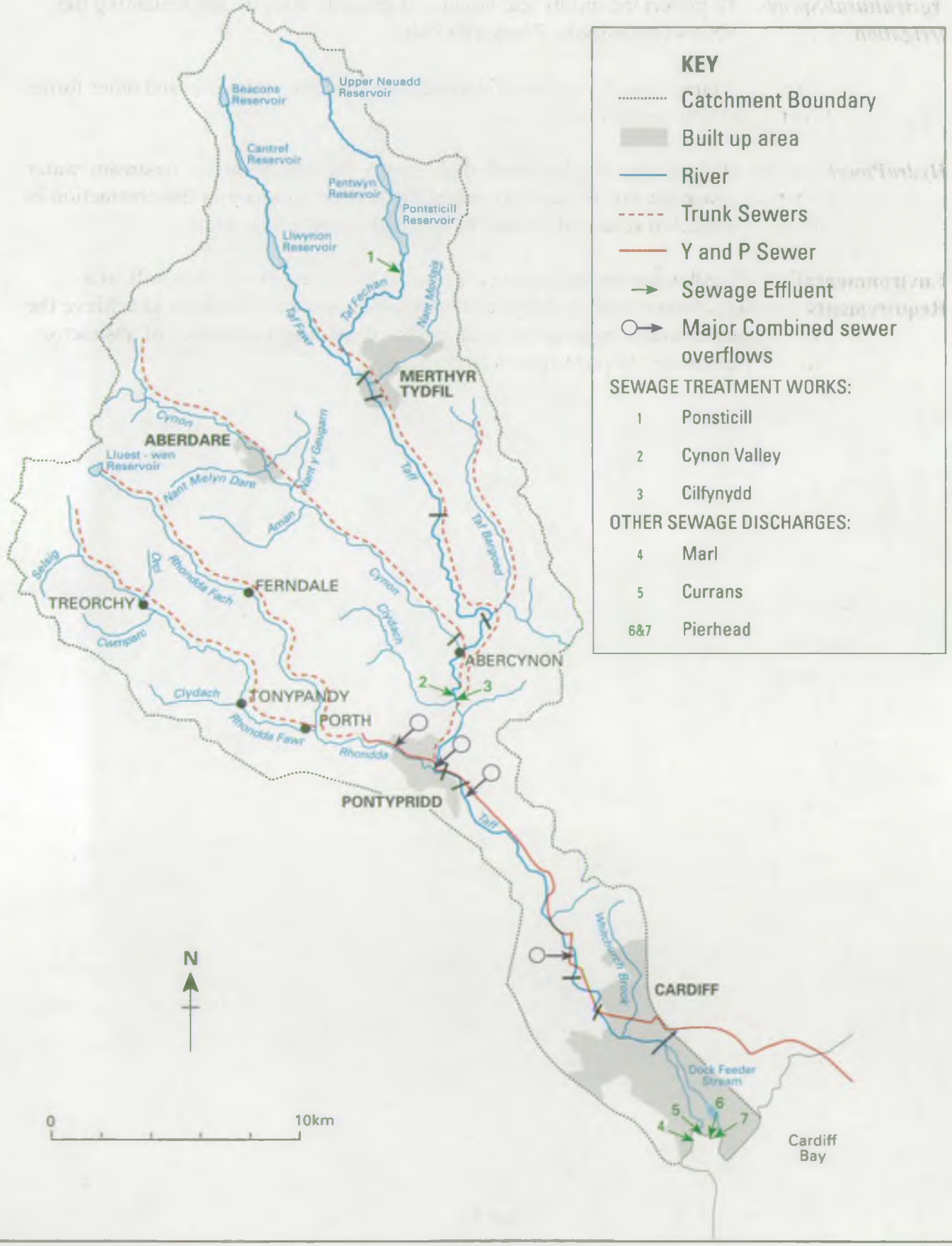
To manage the quality and volume of water resources so as to safeguard licensed and exempt abstractions and the environment. This includes the active enforcement of abstractions. The NRA will encourage abstractions to

MAP 18. ABSTRACTIONS FOR INDUSTRY



	be made as far downstream as possible and discharges to be made as close to the point of abstraction as is practicable.
Agricultural/Spray Irrigation	To protect the quality and volume of groundwaters by implementing the NRA's Groundwater Protection Policy.
	To minimise the impact on summer flows of spray irrigation and other forms of nett abstraction.
HydroPower	HydroPower developments that restrict the ability to use upstream water resources will be opposed unless the licence authorising the abstraction is subject to an agreed volume of derogation and a time limit.
Environmental Requirements	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 the protection from derogation.

MAP 19. SEWAGE EFFLUENT DISPOSAL



4.10 SEWAGE EFFLUENT DISPOSAL

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 occasionally discharged into rivers from overflows on the sewerage system. The overflows act as safety valves to stop the treatment works being overloaded or the sewerage system damaged and also to prevent flooding of property. They are designed to operate only under storm conditions when river flows are very high. 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 Welsh Water (DCWW) handles the bulk of sewage effluent discharged to freshwaters, although the greater number of STWs are privately owned.

Coastal sewage discharges which serve the majority of the population of wales, are also generally owned by DCWW although at present 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 DCWW's second Asset Management Plan (AMP2), which is being produced in close liaison with the NRA. This plan specifies the capital investment required for DCWW's assets (with regard to the terms of the EC Urban Wastewater Treatment Directive Consequently, the NRA has, over the past two years, assessed the environmental impact of every DCWW owned STW discharge and those from Combined Sewer Overflows (CSOs) in order to provide a basis for establishing AMP2 priorities. Any sewage effluent related issues identified within this CMP will be considered within the agreed AMP2 programme.

Local Perspective

The Taff catchment has a population of over 300,000. The principal treated sewage effluent discharges are from Cynon Valley STW serving the Cynon Valley from Penderyn to Abercynon and from Cilfynydd STW which serves the Borough of Merthyr Tydfil, with the exception of Pontsticill (which is served by its own STW). The total sewage effluent discharged to the freshwater part of the catchment (Cynon and Cilfynydd STWs) is 54,000 cubic metres per day.

The remainder of the catchment, including the whole of the Rhondda and from Pontypridd down to Cardiff, is served by a trunk sewerage system of

40 km length discharging macerated sewage through Cardiff Eastern outfall to the Severn estuary.

Within the Taff catchment as a whole there are about 300 CSOs of which more than half are identified as unsatisfactory according to the AMP2 Guidelines. In particular there is a serious problem caused by sewage derived litter escaping from unscreened overflows. (Map 19 for STWs and main trunk sewer locations).

Aim

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

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

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

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

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

4.11 INDUSTRIAL EFFLUENT DISPOSAL

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 authorization 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 sewerage undertaker (DCWW in Welsh Region) and is then subject to the sewage effluent treatment and disposal controls outlined in Section 4.10.

Local Perspective

Most industrial sites are concentrated around Merthyr Tydfil, Aberdare, Treforest and Cardiff but are also distributed throughout the catchment. With the decline of the coal industry, smaller industrial estates have been established in and around the former mining communities. The heavy industries of coal, iron and steel have been replaced by lighter manufacturing and service industries such as: domestic appliances, automotive, board, aerospace, clothing, cables, engineering, printing, office equipment, small iron foundries, plastic extruders, food and electroplating.

The majority of industrial process effluent is now discharged to the foul sewer for treatment at the sewage treatment works or discharges to coastal waters. Trade waste can enter the river as a result of the intermittent discharges from the CSOs to in the previous section.

One remaining process effluent discharge is from Coal Products Ltd., which still operates a smokeless fuel plant at Aberaman. This effluent goes into the River Cynon and is now regulated by HMIP. Other discharges which can be categorised as trade effluent are from the DCWW fish hatchery at Llwynon to the River Taf Fawr, and from smaller hatcheries operated by local angling clubs at Blaenrhondda, Tylorstown and Cwmaman.

MAP 20. TRADE AND MINERAL WORKING SITES

Discharges of filter backwash effluent from DCWW water treatment works occur at Tynewydd, Maerdy, Llwynypia, Perthcelyn, Aberdare, Pontsticill, Llwynon and Cantref (shown on Map 20).

The traditional problems posed by direct discharge of process effluent have been replaced to some extent by diffuse and intermittent pollution caused by contaminated surface drainage and spillages from the many and varied industrial premises. These are proving, in some cases, to be more difficult to control.

Aim

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

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

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

Environmental Requirements

Water Quality

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

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

Water Quantity

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

4.12 MINERAL EXTRACTION

General

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

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

Open cast mining can be of particular concern to 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 floodplains 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 licensed 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 a number of discharges to the river that are mainly associated with the mineral industries (see Map 20) and are influenced by rainfall.

Stone quarries are operated by ARC at Vaynor, Penderyn and Craig yr Hesg (Pontypridd), by Pioneer at Gelligaer and by Steetley and Tarmac at Tongwynlais. Quarries often have associated concrete batching plants giving rise to waste streams which are very alkaline, in addition to the general suspended solids and oil problems associated with quarry drainage.

Treatment, in the form of neutralisation, oil and solids separation is required before discharge.

The contraction of the coal industry has lead to diversification away from traditional providers of employment. However, there remains the last deep mine in the South Wales Coalfield at Tower near Hirwaun with its associated washery, minewater and site drainage discharges to the headwaters of the Cynon. Opencast mining occurs at the Great White Tip (phase 2 of the East Merthyr Land reclamation scheme) where site drainage can discharge to the Morlais Brook.

There is a private coal mine in the Rhondda which is operated intermittently. The coal from East Merthyr, other opencast sites and private mines, is processed and stocked at Cwmbargoed Disposal Point prior to transportation to Aberthaw power station by rail. Site drainage from this operation is acidic and is neutralised and settled in lagoons prior to its discharge to the headwaters of the Tâf Bargoed.

Aim

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

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

Environmental Requirements

Water Quality

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

There should be no deterioration in water quality above a consented discharge, from that assumed when the discharge consent was calculated.

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

Water Quantity

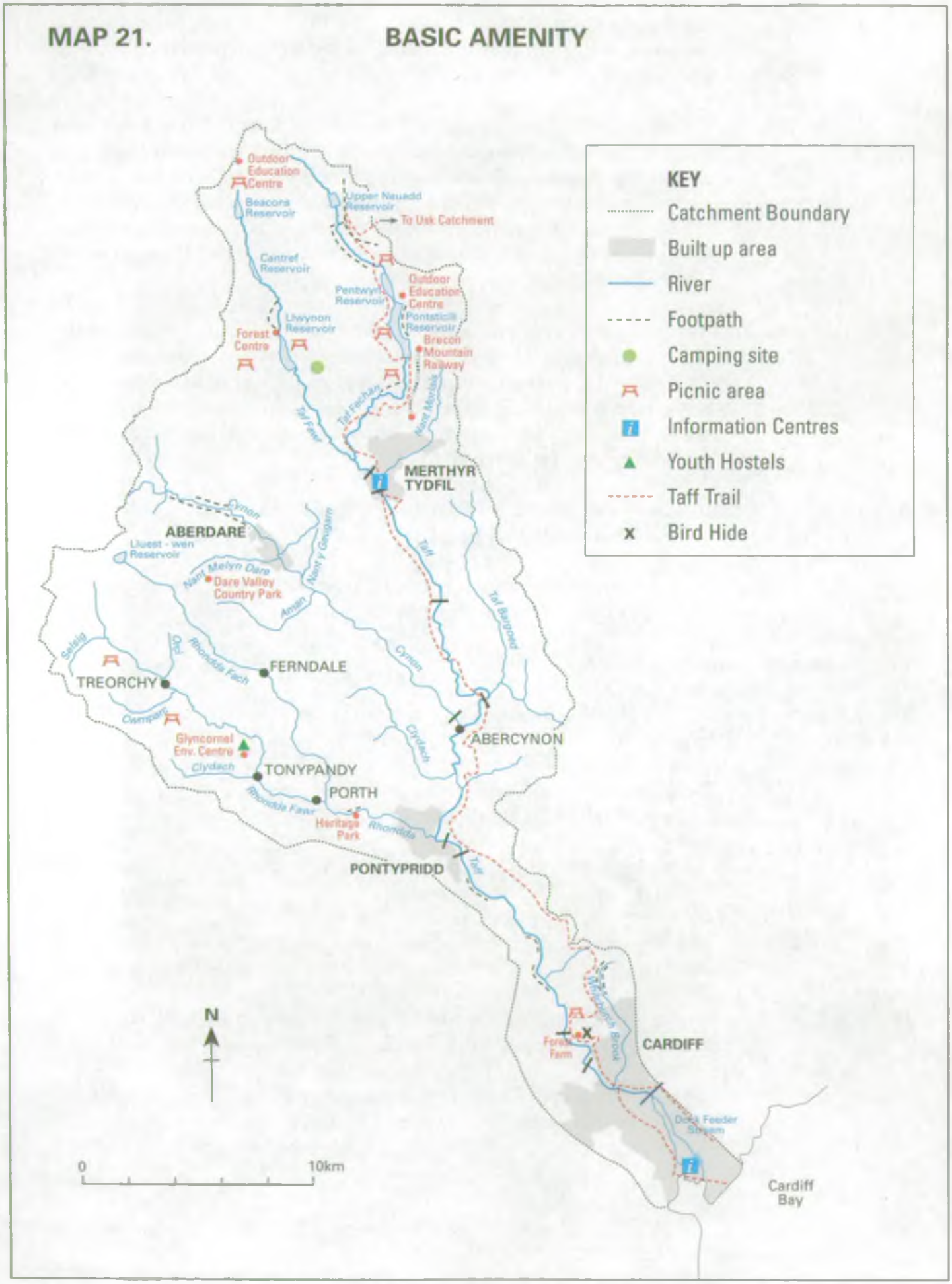
Mineral working and land reclamation should not have an adverse effect on surface and groundwater resources or the rights of water abstractors.

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.

MAP 21. BASIC AMENITY



4.13 BASIC AMENITY

General

Basic amenity relates to those activities that are principally land based but 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 River Taff has probably the highest profile of all the rivers in South Wales. The fact that it runs through the capital city of Wales and that many people live alongside it means that it has political significance unmatched by many other rivers. Nevertheless, it is only in recent years that the true value of the river for amenity purposes has been realised. The litter along the urban sections of the river are consequently a particular cause for concern.

The Taff Trail is a long distance path linking the City of Cardiff to Brecon (Map 21) and is specifically designed for cyclists and walkers to enjoy the many and varied features of the Taff Valley. Parts of the catchment are also in the Brecon Beacons National Park which provides an area for walking and birdwatching and other outdoor pursuits. There are also Country Parks, Nature Reserves and other features of historical and recreational interest throughout the catchment.

Aim

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

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

Environmental Requirements

Water Quality

Water quality should comply with the targets for Aesthetic Criteria which effectively define 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.

MAP 22. ANGLING

4.14 ANGLING

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 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 a legal requirement for fishing for any freshwater fish. The income generated by licence sales contributes to fisheries management costs.

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

Local Perspective

Angling takes place throughout the catchment (See Map 22). There is a high demand on and for angling facilities due to the large population in the catchment, most of which is closely associated with the river. Fishing rights on the river and its tributaries are in local authority or private ownership.

Salmon and sea trout fishing occurs mostly in Cardiff up to Radyr Weir, though these fish can now be caught as far upstream as Treforest Weir in Pontypridd. Brown trout fishing takes place in the main river, and the major tributaries: Rhondda, Cynon, Tâf Bargoed, Tâf Fechan and Tâf Fawr, and in many stillwaters throughout the catchment. Several angling clubs stock with hatchery reared trout to supplement natural stocks.

River coarse fishing takes place mostly on the River Taff between Pontypridd and Cardiff. It is a very productive coarse fishery, particularly between the weirs in Cardiff where angling clubs and the NRA have stocked a large number of fish over the past 25 years. Chub, roach, dace and gudgeon are the principal species. Grayling and barbel have been introduced recently to provide more varied fishing.

There are a large number of stillwater fisheries in the catchment. The most significant trout fisheries are on the reservoirs such as Llwyn-On. Cantref and Beacons on the Tâf Fawr whilst the major coarse fisheries are Pontsticill Reservoir on the Tâf Fechan and Bute East Dock in Cardiff. There are no canal fisheries in the catchment but the feeder between the Taff at Blackweir and Bute East Dock is popular with local anglers.

These river and lake fisheries provide recreational fishing for game and coarse anglers, and for pleasure, match and specimen anglers. Bute East Dock is being actively developed and promoted as an international coarse match fishing venue.

Aim

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

Environmental Requirements

Water Quality

The standards relating to Aesthetic Criteria 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.

4.15 WATER SPORTS ACTIVITY

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 Water Quality Objectives being developed by the DoE.

Identified Bathing Waters

To be identified by the Department of The Environment (DoE)/Welsh Office (WO) as falling within the terms of the EC Bathing Waters Directive (76/160/EEC), several criteria are taken into consideration including: high numbers of bathers, first aid facilities, life guards and toilets. Identified waters are required to achieve the mandatory total and faecal coliform 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 Use Waters

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

Local Perspective

There is a limited variety of water based recreational activity in the river and stillwaters of the catchment (Map 23) although the construction of the Cardiff Bay Barrage is likely to lead to an increase.

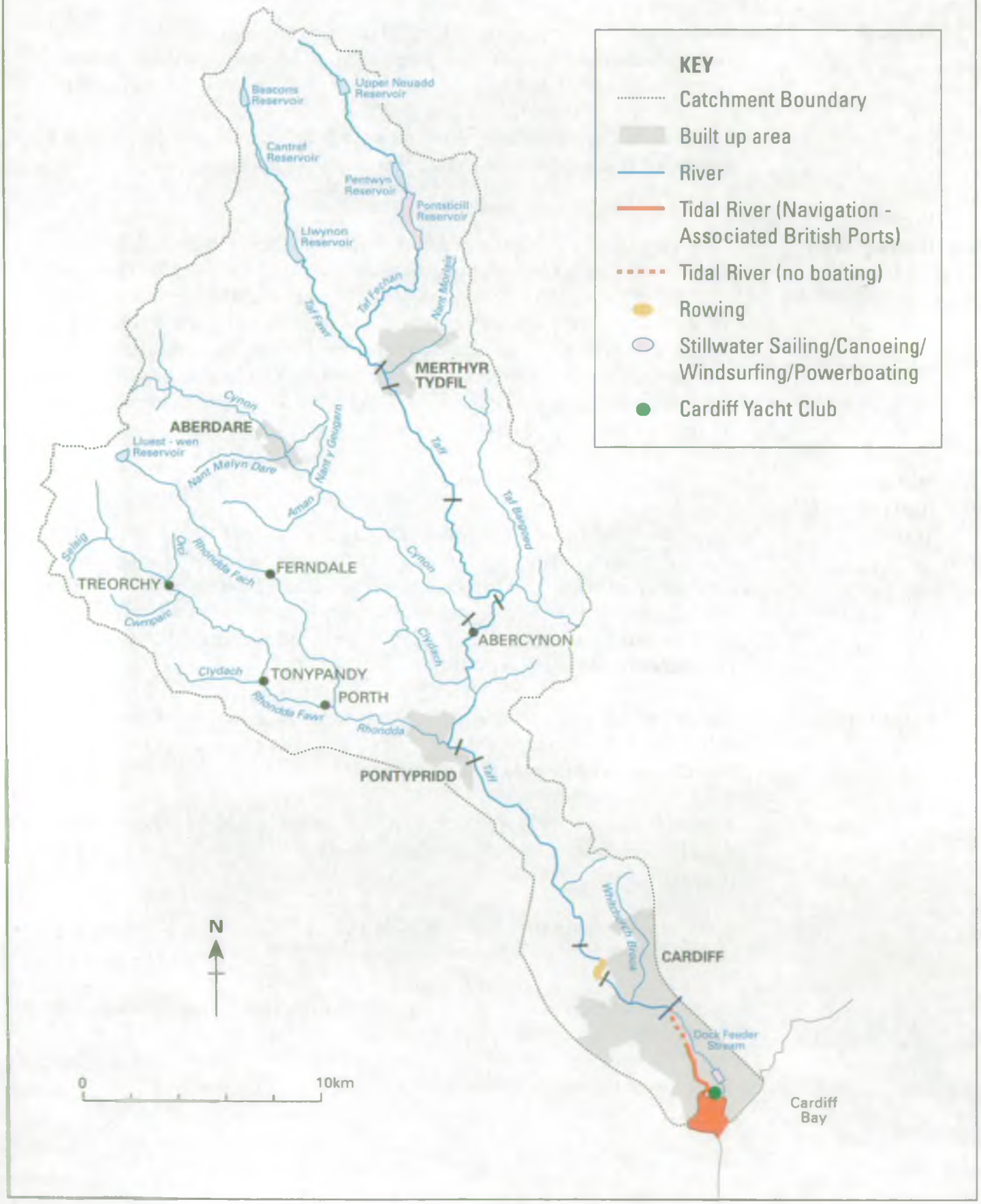
Canoeists use the river in some locations and access is subject to the riparian owners' permission. There is an active rowing club on the Taff at Llandaff in Cardiff.

A variety of watersports take place on Pontsticill reservoir - principally sailing and windsurfing with some canoeing.

At Bute East Dock, jet-skiing is common and the venue is sometimes used for powerboating competitions.

There are no identified bathing waters within this catchment.

MAP 23. WATER SPORT ACTIVITY, BOATING AND NAVIGATION



Aim To ensure that the catchment is maintained to an appropriate standard to support water sports to at least their current levels of use at existing locations.

Environmental Requirements

Water Contact/Recreational Use Waters:

Water Quality Where such marine waters are used for immersion sports, including bathing, the NRA will be guided by the mandatory standards contained within the EC Bathing Waters Directive in assessing water quality requirements for Catchment Plans. The NRA is unable to set bacteriological standards in CMPs for freshwaters where immersion sports or bathing take place but will apply the general Aesthetic Criteria used throughout this report.

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 contact/recreation waters.

4.16 NAVIGATION AND BOATING

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 or harbour authority who will liaise with the NRA. However, in the Dee estuary the NRA is the navigation authority. Elsewhere in tidal waters the NRA neither has control over nor responsibility for navigation.

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 byelaws to control navigational use of a river. The NRA must also pay regard to the needs of those rights of navigation that do exist.

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

Local Perspective

There is no public right of navigation in the freshwater length of the River Taff (see Map 23). Like most rivers, there is a right of navigation from the estuary up river to the tidal limit.

Associated British Ports (ABP) are the Navigation Authority in Cardiff Bay and administer navigation aids. The NRA has no jurisdiction over navigation on the Taff.

A large number of commercial and pleasure craft are moored in and use Cardiff Bay. Large shipping accesses the docks via Cardiff Bay and a channel is regularly dredged to maintain access.

On completion of the Cardiff Bay Barrage, ABP will cease to be the navigation authority with responsibility passing to the Cardiff Bay Development Corporation.

Cardiff Yacht Club is based within the bay near the docks entrance. It will be moved up river near the Royal Hamadryad Hospital when the Barrage is complete.

Aim

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

To encourage and support canoe access agreements on the River Taff.

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

Environmental Requirements

Water Quality

The provisions for Aesthetic Criteria 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

Where waters under the control of the NRA are used for navigation no obstruction to the passage of vessels should be created.

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

Areas used for boating should be protected from development that would constrain this use.

The encouragement and promotion of safe access points for boating, where appropriate.

Features required for navigation or boating should be maintained and enhanced where appropriate. This would include adequate freeboard and freedom from obstructions.

4.17 AGRICULTURAL ACTIVITY

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 sections. However, the highly polluting nature of agricultural waste normally precludes this option and the NRA's approach is aimed at control at source by minimising the volumes of effluent produced and stored. Often it is background pollution caused by large numbers of diffuse discharges that causes the most significant impact and these are of greater concern to 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

Farming is limited to the upland areas of the catchment and consists mainly of sheep farming with the occasional dairy, beef and pig farm. Agriculture does not have a major impact on the water quality of the catchment.

Aim

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

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

Environmental Requirements

Water Quality

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.

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

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.

MAP 24. FORESTRY

4.18 FORESTRY

General

The NRA accepts that well managed forestry, in appropriate areas, can make an important contribution to the environment and the economy. Forestry can, however, influence water quality and quantity through alterations to hydrological and chemical processes in water catchments, and by the import or export of chemicals. Adverse impacts include:-

- Increased sediment load and run-off rate to rivers that can increase the flood defence maintenance requirement and may also destroy key conservation features.
- Reduced water yield as the trees intercept more rainfall.
- Enhanced acidification in sensitive areas as the trees capture more acidic pollutants from the air.
- Pollution by fertilisers and pesticides applied to the crop.

These impacts can have implications for water supply, aquatic conservation and fisheries. Following the rapid expansion in afforestation over the past 40 years, further concerns are the increasing rates of clearfelling and replanting which can have similar adverse effects.

Consequently the NRA has worked closely with the Forestry Authority in the production of Forests and Water Guidelines which lay down standards for best practice designed to minimise impact of forest management on the water environment. The NRA is consulted informally on applications for new planting but has requested statutory consultee status on planting grants and felling licenses. While forest development is outside the normal planning process, some local authorities have decided to produced Indicative Forestry Strategies which will identify preferred and sensitive areas for forestry. The NRA will advise on water interests in relation to these strategies.

Local Perspective

There are almost 100 km² of forest plantations (Map 24) within the catchment operated by Forest Enterprise. This represents 20% of the total catchment area. None of the catchment is identified as being sensitive to acid waters as defined in the NRA forestry policy. Nevertheless, the NRA has recently scrutinised Forest Enterprise's long term proposals and provided appropriate comments. The NRA have undertaken several research projects into forestry and water quality (see Appendix 5).

Aim To protect the water environment from the potentially adverse effects of forestry and to maximise the environmental benefits.

Environmental Requirements

Water Quality The provisions of the Forest 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, including protection from derogation.

Forestry activities, afforestation and deforestation must not result in reduced reservoir yields or adverse effects on surface water flows or groundwater resources.

Physical Features The provisions of the Forest and Water Guidelines should be complied with in all cases to minimise the impact of forestry on the physical environment and to gain the greatest environmental benefit, particularly in riparian areas.

4.19 NET FISHING FOR SALMON, TROUT AND EELS

General

This Use is principally concerned with the use of nets and other types of gear to catch migrating eels, salmon and trout. Other than sea fish, migrating adult salmon and sea trout are the main quarry for net fisheries in Wales and these are restricted to coastal waters and estuaries. The number of these fisheries is closely controlled by Net Limitation Orders and Byelaws which are designed to maintain stocks. The NRA licenses salmonid net fisheries within the terms of the Orders and enforces Byelaws. 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, called putchers, which have significant heritage interest.

The capture of eels by nets 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.

Local Perspective

There are no licences to fish for salmon or sea trout within Cardiff Bay or in the Bristol Channel immediately outside the Bay. Netting for sea fish is also prohibited in these areas.

There is a limited elver fishery which operates in March, April and May in the Taff in Cardiff near the tidal limit.

Aim

To ensure that net fishing takes place in a manner that does not over-exploit fish stocks or interfere with other legitimate uses of the water environment.

Environmental Requirements

Water Quality

Since the well-being of fish is dealt with in the Fishery Use the protection of the working environment of commercial fishermen will be considered here. Consequently, water quality will be required to comply with the standards for Aesthetic Criteria.

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 enforce the provisions of the Net Limitation Orders and Byelaws to ensure that stocks of salmon and sea trout are not endangered by net fishing.

MAP 25. COMMERCIAL FISHING

To license and regulate net fishing for eels and non-salmonid freshwater fish to protect stocks.

To minimise conflict between the requirements of different fisheries.

Access points for net fisheries should be protected.

4.20 FISH FARMING

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 licences to abstract and consents to discharge effluent for freshwater fish farms (marine farms may require a consent to discharge, depending upon circumstances). Careful management of fish farms is required by all involved to control the impact and 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.

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

Local Perspective

There are four fish farms in the Taff catchment (Map 25). At Llwyn-On rainbow trout are reared by Hamdden Limited for restocking to the DCWW reservoirs. At the put and take fisheries operated by Aberdare Anglers at the Treneol Fish Farm near Aberdare, brown trout and rainbow trout are reared for restocking to their lake and river fisheries.

On the Rhondda Fach at Tylorstown, Maerdy & Ferndale Anglers rear rainbow trout for restocking their reservoir and river fisheries, and the Upper Rhondda Angling Association do likewise at the Dan-y-Bont farm at Blaenrhondda.

Aim

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 practicable.

Environmental Requirements

Water Quality

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

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

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.

That all conditions stated on the abstraction licence are complied with. This will be enforced by the NRA.

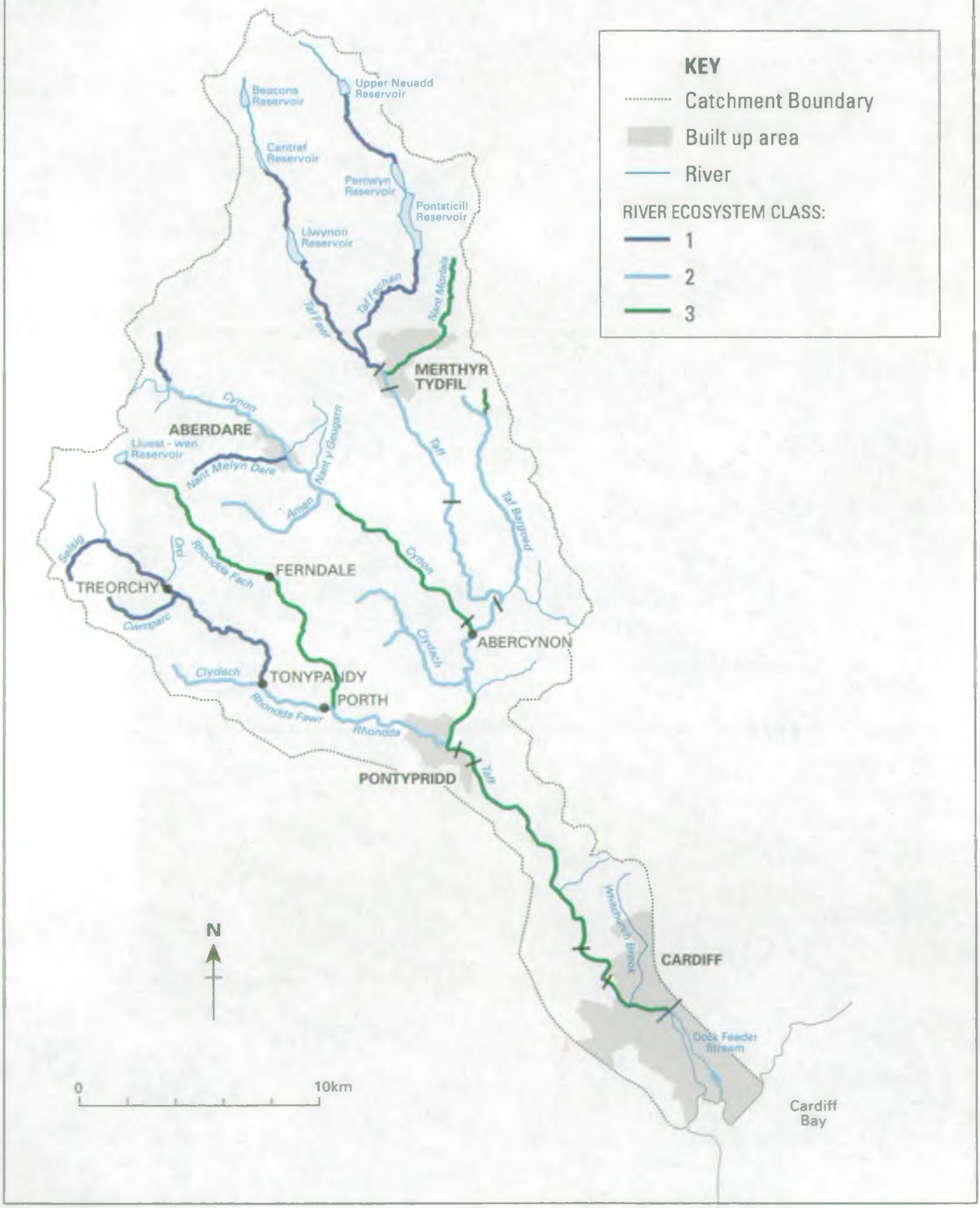
Physical Features

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

5.0 CATCHMENT TARGETS

In this section targets are set for Water Quality, Water Quantity and Physical Features, which are designed to protect the most sensitive Use for each part of the catchment. In this manner any other Uses that have less stringent needs are also protected.

MAP 26. WATER QUALITY TARGETS



5.1 WATER QUALITY TARGETS

General

The NRA uses two major schemes for the reporting of river water quality: the General Quality Assessment (GQA) scheme, which is used to make periodic assessments of the water quality; and the statutory water quality objectives (WQOs) scheme, which is used for the setting of water quality planning targets. These new schemes have replaced the National Water Council (NWC) scheme, upon which previous references to water quality have been based.

The General Quality (GQA)

The GQA classification provides a means of accurately assessing and reporting on the general state of river water in a nationally consistent manner. It is used to support periodic assessments of the quality of river water in order to report upon geographical and temporal trends in river water quality. The GQA scheme will ultimately comprise four components - general chemistry, nutrients, aesthetics and biology - each providing a discrete 'window' upon the quality of river stretches. At present only the water chemistry element is established.

Water Quality Targets for CMPs

For Catchment Management Plans the performance of waters is assessed against specific water quality targets. The targets are set to protect specific Uses of the catchment (including those that will ultimately be covered by the WQO scheme) and call on water quality standards that have been determined for each use. These standards are based on the existing sources of data, especially the River Ecosystem Classification regulations and EC Directive for Bathing Water, Freshwater Fisheries, Dangerous Substances and Urban Wastewater Treatment and are constructed to give a complete coverage of water chemistry.

Local Perspective

Groundwater

These resources are safeguarded by the implementation of the Policy and Practice for the Protection of Groundwater. The NRA's groundwater target is to establish a groundwater quality monitoring network by sampling water from boreholes within major, or locally important, aquifer systems.

Surface Water

The Taff's major tributaries, the rivers Tâf Fawr, Tâf Fechan, Cynon, Rhondda Fawr and Rhondda Fach have been assigned a River Ecosystem target class of 1 (RE1) in their headwaters (see Map 26 and Appendix 2).

Where the river and its tributaries flow through urbanised areas the target has been set lower at either RE2 or RE3 to reflect the effect of CSOs and urban drainage in the catchment. In the case of the River Taff below Cynon and Cilfynydd STWs the target has been set at RE3 down to Blackweir.

The target for the Tâf Bargoed below the former colliery sites at Trelewis, Taff Merthyr and Deep Navigation is also set at RE3 because of the influence of ferruginous minewater. The Cynon from Abercwmboi to Abercynon has been assigned a target of RE3 to reflect the influence upon this stretch from contaminated land at the former Phurnacite site.

Many of the river stretches have been designated as either Salmonid or Cyprinid fisheries under the EC Freshwater Fish Directive as referred to in Section 4.4 and the appropriate water quality targets apply. (Map 12).

Water is abstracted for public potable supply at specific points in the catchment as indicated on Map 16. The water is then treated at DCWW water treatment works. The EC Directive 75/440/EEC states that the extent of water treatment provided depends upon the quality of the abstracted water. More sophisticated treatment must be provided for poorer quality water. The onus is on the water supply companies to provide the correct treatment. Given the generally good water quality of the catchment the potable abstractions only require simple physical and chemical treatment followed by disinfection prior to being supplied to customers.

5.2 WATER QUANTITY TARGETS

General

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

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 also regularly monitors the compliance of abstractors with licence conditions and enforces as necessary.

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. The policy, when developed, will permit a review of the volume of existing abstractions in the catchment.

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

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

The NRA has powers to limit abstraction and take other conservation measures in periods of drought.

Local Perspective

Until it is possible to make a detailed assessment of the environmental needs of the river or to implement Regional Licensing Policy, the NRA intends to protect the natural 95-percentile flows of the rivers (Q95). In an average year, river flows would be less than the Q95 for only 18 days. These target flows apply when considering new abstractions from surface or groundwater.

Groundwater abstractions are included because, although the volume of groundwater use is limited, abstraction from it can reduce surface water flows. The extent to which this occurs in the catchment is unknown at present, and it is difficult to put restrictions upon a licence based upon groundwater levels. Therefore, it is preferable to base the water quality targets for groundwater upon the desired surface water flow.

As well as protecting ground and surface waters from over abstraction, the NRA intends to prevent the disruption of groundwater flows by the physical disturbance of aquifers. The flow of water underground is important in maintaining groundwater levels, which may support abstractions or environmental features. Construction, mining or other excavations can interrupt this flow, with potential impacts upon abstractions or the environment. The NRA can influence development proposals through its role as a planning consultee and, where appropriate, through the NRA's licences and consents. This target has been included in the NRA's PPPG.

5.3 PHYSICAL FEATURES TARGETS

General

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

Fisheries

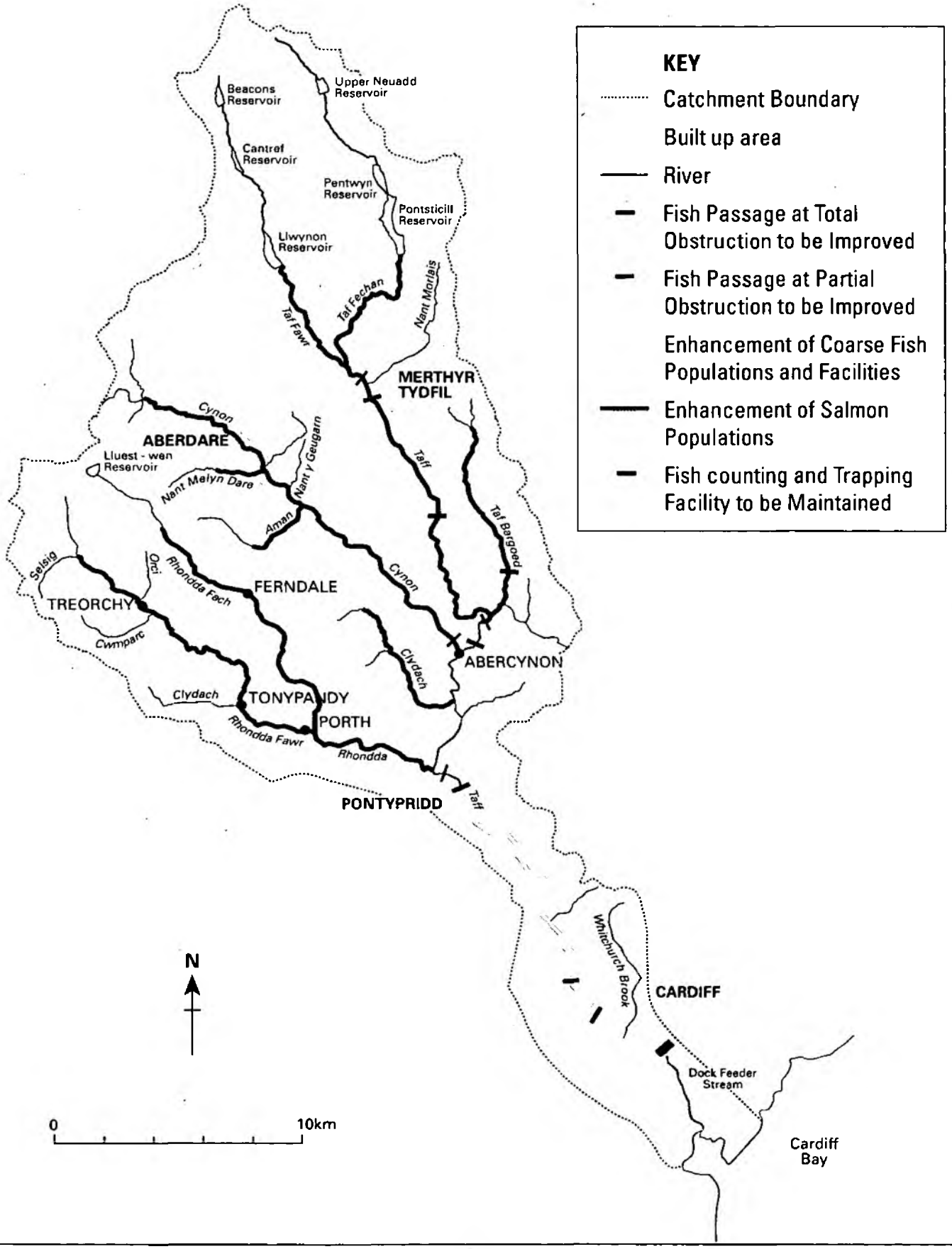
Through its operational, regulatory and advisory activities, and particularly in its role as a statutory consultee to the Local Planning Authorities, the NRA will endeavour to ensure that there is:

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

- the NRA has declared its intention, in its recently published Fisheries Strategy, to set specific targets relating to fish stocks and spawning success. The following are identified for the Taff:

Target annual salmon run size	1000
Equivalent annual target declared salmon rod catch	200
Target annual sea trout run size	1500
Equivalent annual target declared sea trout catch	300
Target coarse fish open winning match weight	40lb

MAP 27. PHYSICAL FEATURES TARGETS



- provision and maintenance of a diversity of natural river features to ensure variety of habitat to maximise production of fish populations. This target can be progressed by taking one or more of the following actions:

* Removal of migration barriers where appropriate (Map 27)

* Maintenance of fish passes.

* Maintenance of adequate facilities for stock counting and broodstock collection.

* Implementation of appropriate recommendations of the NRA report "Resident Brown Trout - A Management Strategy" (1992) to protect and enhance brown-trout populations.

* Accelerate restoration of salmon and sea trout populations by restocking.

* Enhancement of coarse fishing facilities and populations where appropriate.

* Enhancement of river habitat to increase carrying capacity of fish populations where appropriate.

* Introduction of legislation (byelaws) to control over- exploitation of fish stocks.

* Implementation of appropriate enforcement strategies to implement legislation designed to protect fish stocks from over exploitation.

* Maintenance of access and associated facilities for commercial fisheries.

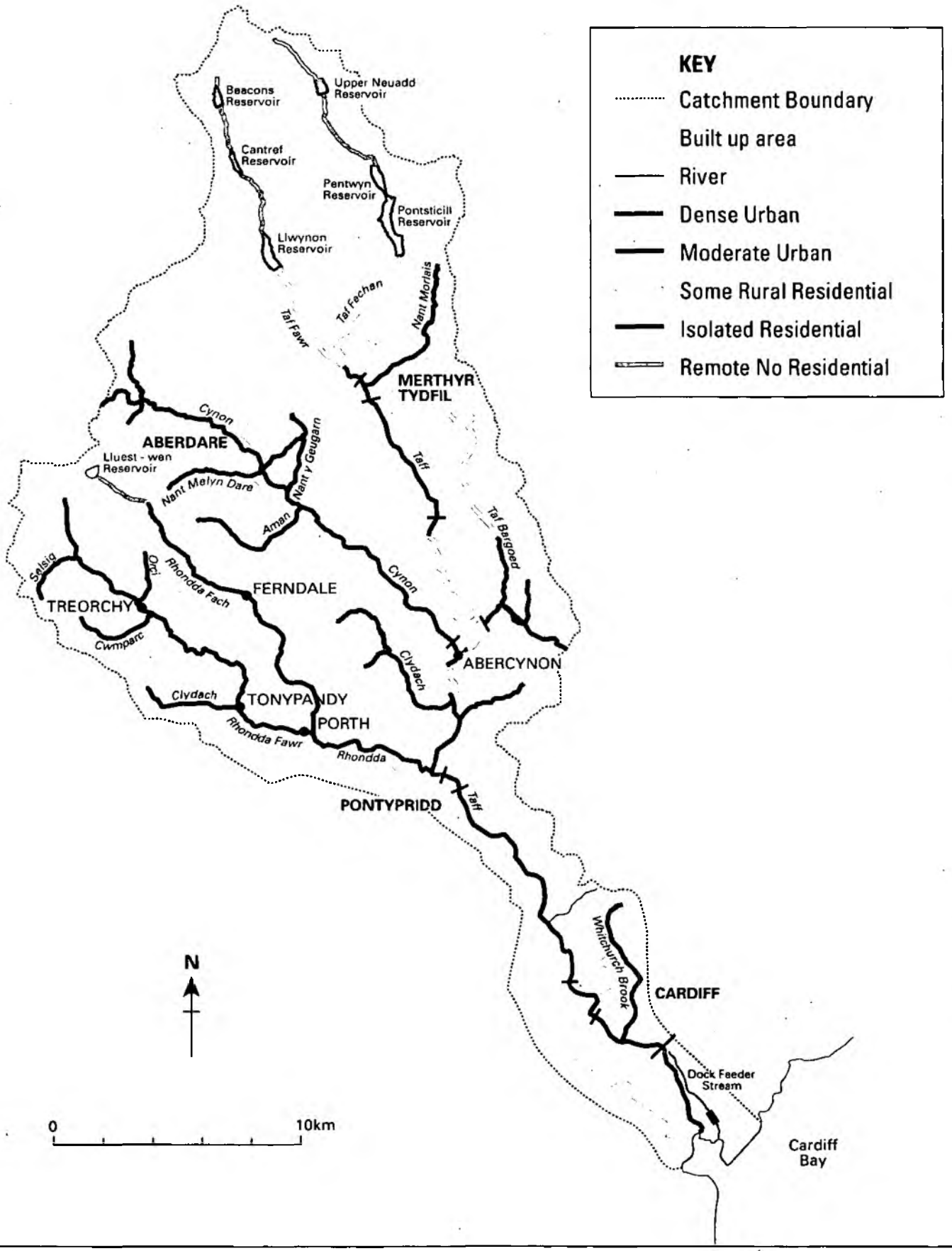
Conservation

The NRA is currently developing a national river habitat classification system, which will assist in identifying reaches which are degraded and would hence benefit from restoration.

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

- the current diversity of natural features such as bankside features, wetlands, emergent vegetation, meanders, pools and riffles are maintained in order to conserve river corridors and safeguard landscape quality; improvements are effected and degraded features reinstated where possible. In order to achieve this, water fringe buffer zones should be set up wherever possible to protect waterside habitats from damage.

MAP 28. FLOOD DEFENCE TARGETS



- 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, is agreed with CCW.

- areas of degraded wetland and riverine habitat are identified and, where possible, restored to a level at which they support a range of species typical of similar habitats elsewhere in the catchment.

- habitats for key species associated with the river corridor are enhanced where possible.

- the physical structure of archaeological sites and their settings is maintained and, where possible, enhanced, recognising the interdependence of many of the sites and monuments. Where unavoidable change occurs, the original detail of the site should be carefully recorded.

- the survival and, where necessary, reinstatement of threatened fish populations is promoted. This will include not only rare species (e.g. shad), but also specific local strains of more common native species.

- control of the spread of Japanese Knotweed and other alien weeds is undertaken as required under the Wildlife & Countryside Act 1981.

Recreation, Boating & Navigation

The NRA, through its operational, regulatory and advisory activities and in its role as statutory consultee to the Local Planning Authorities, will endeavour to ensure that:

* protection is given to existing recreational sites, and that the development of new sites is promoted at suitable locations, as opportunities arise.

* access and associated facilities for boating are maintained.

* promotion of controlled access and use by contact/recreational users (principally canoeists). This target can be progressed by the following actions:

- liaison with fishery, riparian owners and canoeing organisations to encourage production of informal access agreements;

- liaison with canoeing and angling organisations to educate canoeists in practising their pastime with minimal conflict with other river users.

- in liaison with other river users and riparian owners, identification and development of a single location to act as a focus for canoeing activity on the river.

* an appropriate network of riverside paths and access points is maintained and safe access to and from waterside angling facilities is maintained and promoted for the disabled.

* maintain the existing rowing course in Cardiff free from obstruction.

* no obstruction to the passage of vessels within the Taff Estuary.

Flood Defence

Maintenance and Improvement

Where economically, technically and environmentally justifiable, the NRA aims to maintain or improve the designated "Main Rivers" to standards of service which accord with the Land Use Bands described in Appendix 3 for the given area (Map 28).

Regulation and Enforcement

Ensure that there is suitable access for maintenance of river/channel, sea/tidal flood defences and the construction of new defences by limiting development within 7 metres of the top of the river bank.

Ensure that obstructions to flow do not result in an increased flood risk.

Ensure that development in flood risk areas is identified and encourage planning authorities to use the planning process to guide development away from these areas (Section 105 (2) survey and Welsh Office Circular 68/92).

Ensure that there is no increase in flood risk to existing properties as a result of further development either remote from or adjacent to existing development.

Flood Warning

Where flood warning systems are in operation the NRA target is to ensure that the warning is received at least 2 hours before the flood event occurs. The NRA flood warning system aims to provide:

* a 24 hour monitoring service which receives forecasts of adverse weather and heavy rainfall, and warning of high river levels in order to detect and forecast possible main river flooding.

* warnings to the police, for dissemination to local authorities, emergency services, other bodies and the general public. The current accepted practice for the dissemination of flood warnings is for the NRA to issue warnings to the police who in turn alert local authorities and people at risk.

APPENDICES

APPENDIX 1a

THE GROUNDWATER PROTECTION POLICY

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

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

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

The Policy recognises three groundwater source protection zones:

Zone I (Inner Source Protection)

Immediately adjacent to the source area defined by a 50-day travel time from any point below the water table to the source (based on biological contaminant decay).

Zone II (Outer Source Protection)

Area defined by 400-day travel time (based on the delay and attenuation of slowly degrading pollutants).

Zone III (Source Catchment)

The complete catchment area of a groundwater source. The controls to be exerted on a given activity will be more stringent the more vulnerable the resource and the nearer the source.

APPENDIX 1b

The Requirement for an Abstraction Licence

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

APPENDIX 2 CLASSIFICATION SCHEMES

THE NATIONAL BIOLOGICAL CLASSIFICATION SCHEME (PROPOSED)

A National biological classification scheme is currently being prepared as part of the General Quality Assessment (GQA) scheme (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 Taff Catchment

Data from biological surveys carried out during 1990, 1991 and 1992 were classified using a 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 of invertebrates. A class (a-f) was calculated for each site where biological information existed. This was then compared with the chemical classification for the respective site using the Regional application of an earlier version of the chemical component of the GQA scheme. Descriptions of the biological and water quality classifications used are 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 EQI (BAPC) (indicative - to be finalised)	Aesthetic Classification Basic Amenity Score (indicative - to be finalised)	Nutrient Status Classification - to be developed
	DO % sat 10%ile	BOD mg/l 90%ile	Ammonia mg N/l 90%ile			
A	80	2.5	0.25	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		

RIVER ECOSYSTEM SCHEME CLASSES

Class RE1: Water of very good quality (suitable for all fish species)

Class RE2: Water of good quality (suitable for all fish species)

Class RE3: Water of fair quality (suitable for high class coarse fish populations)

Class RE4: Water of fair quality (suitable for coarse fish populations)

Class RE5: Water of poor quality (which is likely to limit coarse fish populations)

APPENDIX 3

LAND USE BAND SYSTEM

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

Land Use Band	Typical Description of Reach	Target Standard of Protection (return period)	
A	Contains residential and non-residential properties distributed over a significant proportion of its length. Amenity uses may be prominent.	Fluvial	Tidal
		1:5 - 1:100	1:100-1:200
B	Reaches containing residential and non-residential property over some or all of the reach length but at lower density than Band A. Intensive agriculture may be present.	1:20 - 1:50	1:40 - 1:100
C	Isolated rural communities at risk with limited number of residential properties. Agricultural interests will be more apparent than in band A and B.	1:10 - 1:50	1:20 - 1:100
D	Isolated properties at risk. Agricultural use will probably be the main use with arable farming a feature.	1:1 - 1:5	1:4 - 1:10
E	Very few properties at risk. Agricultural use will be predominant with extensive grass land the main feature.	3:1 - 1:1	<1.5
X	No recorded areas at risk of flooding.		

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

APPENDIX 4

GLOSSARY OF TERMS, UNITS AND ABBREVIATIONS

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'.

ACUTE

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

ADIT

An horizontal passage or entrance/exit in a mine.

AFFORESTATION

The process of creating a forest where none existed before.

ALGAE

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

ALLUVIAL DEPOSITS

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

AMELIORATE

To cause something to get better.

AMMONIA

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

AOD (ABOVE ORDNANCE DATUM)

Land levels are measured relative to the average sea level at Newlyn in Cornwall. This average level is referred to as 'Ordnance Datum'. Contours on Ordnance Survey maps of the UK show heights above Ordnance Datum.

AQUATIC ENVIRONMENT

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

AQUIFER

Layers of rock (usually sub-surface) that are able to hold or allow water to travel through them.

ARTESIAN

Water which rises by natural pressure.

BASE - FLOW

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

BIOACCUMULATION

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

BOD

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

BUFFER ZONE

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

CATCHMENT

The area of land draining to a defined point.

CHRONIC

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

CLASSIFICATION/CLASSES

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

COARSE FISH

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

COMPENSATION FLOW

Water released from reservoirs to maintain adequate flow in the river downstream.

CONFLUENCE

The point where two or more streams or rivers meet.

CONSENT

Two types of consent are issued by the NRA:

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

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

CONTROLLED WATERS

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

CULVERT

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

DANGEROUS SUBSTANCES

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

DIFFUSE

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

DISSOLVED OXYGEN

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

ECOSYSTEMS

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

EC DIRECTIVE (Control)

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

ENVIRONMENTALLY SENSITIVE AREA (ESA)

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

EUTROPHIC/EUTROPHICATION

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

FAUNA

Animal life.

FLORA

Plant life.

FLUVIAL

Associated with river processes such as flow and erosion.

FRESHET

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

FRY

Fish which are less than 1 year old.

GAUGING STATION

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

HABITAT

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

INDICATIVE FORESTRY STRATEGY

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

IMPROVED GRASSLAND

Meadows and pastures which have been affected by heavy grazing, drainage or the application of inorganic fertilisers, slurry or high doses of manure. They have a limited range of grass species.

LEACHATE

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

LIST I AND LIST II SUBSTANCES

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

- List I substances are considered to be the most harmful. Pollution caused by these must be eliminated.

- List II substances are less harmful and pollution caused by these must be reduced.

m^3/d

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

MACROINVERTEBRATE FAUNA

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

STATUTORY MAIN RIVER

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

Ml/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 unit is often used to measure river flows.

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

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

PARAMETER

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

PARCOM

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

PARR

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

PERMEABILITY

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

PERMISSIVE POWER

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

POOL

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

POROSITY

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

POTABLE

Water suitable for drinking.

REACH

A length of a river.

RED LIST SUBSTANCE

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

REDD

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

RIFFLE

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

RIPARIAN

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

RIVER CORRIDOR

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

RIVERINE

Something that is associated with the river environment.

RIVER QUALITY OBJECTIVE (RQO)

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

SALMONID FISH

Game fish, e.g. trout and salmon.

SETASIDE

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

SMOLT

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

SPATE (flash flood)

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

SPRING RUN

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

SSSI

Abbreviation for 'Site of Special Scientific Interest'.

SURFACE WATERS

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

TELEMETRY

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

CLASSIFIED REACHES

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

WASHLANDS

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

WETLAND

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

95-PERCENTILE FLOW (Q95)

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

APPENDIX 5 NRA RESEARCH PROJECTS RELEVANT TO TAFF CMP

R&D Project 5 - "Environmental impact of fish farming".

R&D Project 10- produced 3 Project Board Reports entitled " Environmental Quality Standards to protect identified uses of controlled waters". Vol.1 looked at general and special ecosystems, Vol 2 looked at fisheries and Vol. 3 dealt with other uses.

R&D Project 114- "Forestry impact on upland water quality" produced R&D Note 77 of same title.

R&D Project 230- "Measures for protecting upland water quality" reported in R&D Note 239 of same title on the effects of buffer strips alongside streams in forest areas.

R&D Project 238 - produced Project Record 238/2/T "Sensitivity of sea defence structures to rise in sea level".

R&D Project 294- produced R&D Note 233 " Control of invasive riparian and aquatic weeds".

R&D Project 339 - produced R&D Note 243 "Treatment processes for ferruginous discharges from disused coal workings".

R&D Project 360- produced R&D Notes 102 and 103 "Constructed wetlands to ameliorate metal-rich minewater: review of literature: study of natural wetlands".

R&D Project 368- "Impact of erosion of forest roads on water quality". Due to report late 1995.

R&D Proj.415&321- produced R&D Note 174 "Sources, pathways and sinks of litter in riverine and marine environments".

R&D Project 422- "Review of water quality implications of conifer harvesting" produced R&D Notes 156 and 159.

R&D Project 465- "Impact of fine particulate outputs associated with timber harvesting". Report due in 1996.

R&D Project 473- produced " Control of pollution from highway drainage discharges for new road systems". Available as a CIRIA report No. 142.

R&D Project 502- "Impact of conifer harvesting and replanting on upland water quality". Final report due 1997.

R&D Project 537- "Use of industrial by-products in road pavement foundations". Report due 1995.

The reports which have been completed can be purchased from: Foundation for water research, Allen House, The Listons, Liston Road, Marlow, Bucks. SL7 1FD. Tel: 01628-891589.