NRA - Wales 28

ELY
CATCHMENT MANAGEMENT PLAN
CONSULTATION REPORT

NRA

National Rivers Authority
Welsh Region

River Ely
Catchment Management Plan
Consultation Report
March, 1994

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THE NRA'S VISION FOR THE ELY CATCHMENT

The Ely catchment is extensively used for industry and urban development particularly in its upper and lower reaches. Consequently the river is highly used for sewage effluent disposal.

Angling is the only significant recreational activity. There is also limited canoeing. The middle parts of the river are attractive for walking.

The river's ecology has in the past been significantly affected by man's activities but improvement is now taking place and fish populations are improving. Threats however still remain, particularly from the growing population and industrial development.

The challenge of managing and improving the River Ely is one to which the NRA readily responds, recognising that there is much to be done if we are to move into the next century with a catchment of quality that we would all desire.

NRA's vision for the Ely during the lifetime of the Plan is to achieve improvements in the fisheries by making the river more accessible to migratory fish and improving the water quality in general. The ammonia levels in the Ely will be substantially reduced. We will continue to maintain the flood defences to the required standard and river flows will be safeguarded by the careful consideration of abstraction licences. The impact of the planned Cardiff Bay Barrage will be closely scrutinised in order to safeguard the water environment. The NRA will take positive steps wherever possible to improve conditions for wildlife.

It is our intention to work with all other agencies and representative organisations in the catchment to promote and achieve an integrated approach to management. In particular, the NRA anticipates that the plan will influence the planning processes of local authorities.

The realisation of the NRA's vision will be achieved through a balanced management approach to all activities so that the required improvements in the catchment can, as far as practicable, be obtained and sustained in active collaboration with all users of the catchment.

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SECTION 1: THE PURPOSE OF CATCHMENT MANAGEMENT PLANS

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 NRA is the major manager of the water enviroment in England and Wales and aims to reconcile conflicts between water users as well as its general duties that include:-

- Maintenance and improvement of water quality by control of pollution in surface and groundwater.
- Flood defence for people and property.
- Flood warning.
- Management of water resources
- Management of 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 enviroments.

We believe that it is important that the interests of all water users are considered in the development and protection of the water enviroment and 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

Catchment Plans have the following common objectives:-

- We want the Plans to provide a focus for the formation of agreements between water users about the future development of the catchment.

- We will use the Plans to provide a consistent and appropriate response to external pressures, including development in the catchment, and strengthen links with the Planning Authorities.

- The Plans will enable us to be more effective and will help in the allocation of our resources.

- The Plans will provide a targeted Action Plan that will detail the measures required of the NRA, and others, to solve problems identified in the catchment.

- We will use the Plans to provide a framework within which we can implement the new system of Water Quality Objectives (WQOs) under development at the Department of the Environment. These objectives will be use-related and may be given a statutory status following public consultation and agreement by the Secretaries of State.

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

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

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

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

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

1. <u>Uses of the Catchment</u>:

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

2. Catchment targets:

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

3. Catchment status:

   Areas where the catchment is unable to support identified users are detected by analysis.

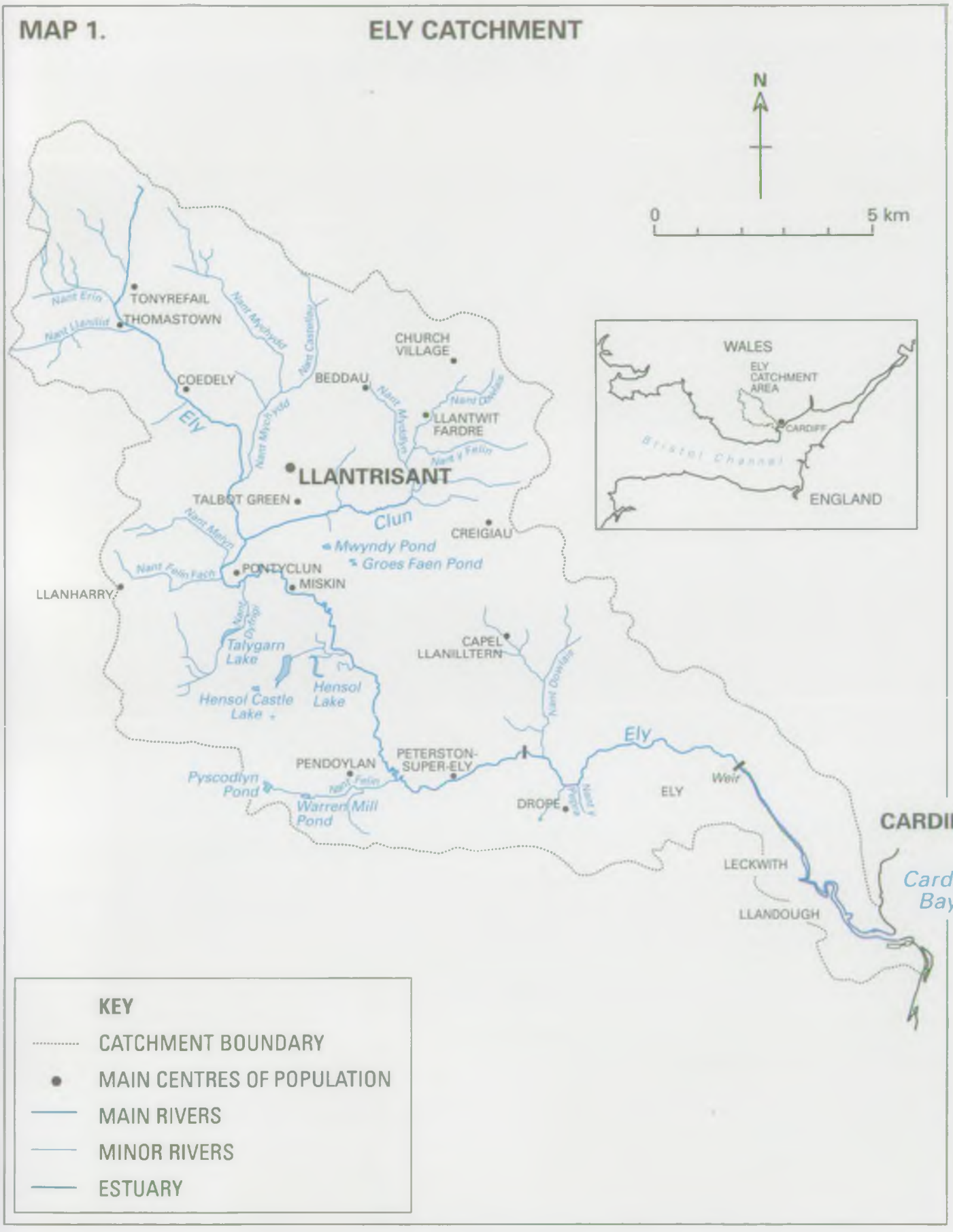
4. Issues and Options:

   We outline the issues relating to the identified problems and examine the options available to us. We identify people who are responsible for carrying out the remedial measures and then consult the public and other interested parties about our proposals.

5. Revision:

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

SECTION 2: AN OVERVIEW OF THE ELY CATCHMENT


MAP 1.
ELY CATCHMENT
N
0
5 km
WALES
ELY CATCHMENT AREA
CARDIFF
Bristol Channel
ENGLAND
TONYREFAIL
THOMASTOWN
Nant Erin
Nant Llanilist
Nant Afanfyda
Nant Castellau
CHURCH VILLAGE
COEDELY
BEDDAU
Nant Dindda
LLANTWIT FARDRE
Ely
Nant Mynyddyn
Nant Mychyndd
Nant y Felin
LLANTRISANT
TALBOT GREEN
Nant Muarlyn
Clun
CREIGIAU
Mwyndy Pond
Groes Faen Pond
Nant Felin Fach
PONTYCLUN
MISKIN
LLANHARRY
Nant Dyfrgi
Talygarn Lake
CAPEL LLANILLTERN
Hensol Castle Lake
Hensol Lake
Nant Dowlais
Ely
PENDOYLAN
PETERSTON-SUPER-ELY
Pyscodlyn Pond
Nant Felin
Warren Mill Pond
DROPE
Nant Ely
ELY
Weir
CARDIFF
LECKWITH
Cardiff Bay
LLANDOUGH
KEY
CATCHMENT BOUNDARY
MAIN CENTRES OF POPULATION
MAIN RIVERS
MINOR RIVERS
ESTUARY

2.1 CATCHMENT DESCRIPTION

General

This plan considers the catchment of the River Ely. Much of the catchment is rural, though there are extensive developments lower down the valley. The character of the middle Ely has changed in the last few decades with the demise of traditional industries like mining and the development of the M4 motorway cutting across the river valley near Llantrisant. Consequently much of the future development is planned for this particular area.

Industry is concentrated at Tonyrefail, Llantrisant and Cardiff. The predominant agricultural activities are dairy farming in the middle and lower reaches and sheep farming in the upper reaches of the catchment.

Topography

The total catchment area is 169 km^2. The river flows in a south easterly direction for 42km to its confluence with the Taff estuary in Cardiff Bay. The northern half of the catchment is characterised by uplands of up to 42m, cut by deep, narrow valleys. Further south, the Ely valley opens out, and catchment relief is much more subdued. The lower Ely is a meandering lowland river with an average daily flow of 4.3 cumecs at St. Fagans. The only major tributary is the Afon Clun which contributes 1 cumec to the Ely under average conditions.

The Q95 flow at St. Fagans is approximately 0.56 cumec, at Lanelay is 0.16 cumec and is 0.08 cumec at the mouth of the Clun.

Rainfall

The average annual rainfall increases from 1000 mm/yr in the south to around 1800 mm/yr on the highest ground. Approximately 500mm of this is lost through evapotranspiration. This compares with an average annual rainfall from Wales of 1385mm and for England and Wales together of 912mm.

Floods in the upper Ely can be caused by short intense storms on the hills. Longer storms covering the entire catchment are more likely to affect the lower Ely.

Geology

The high ground of the upper catchment is underlain by hard Pennant Sandstone of the Upper Coal Measures series. South of this are east-west running outcrops of Middle Coal measures and Carboniferous Limestone. The southern part of the catchment is formed from softer conglomerates, sandstones and marls of the Triassic and Jurassic Periods.

Overlying the solid geology are extensive deposits of glacial till in the north and sands gravels in the south.

Quite large quantities of the groundwater are available within the Ely catchment, notably in the Carboniferous Limestone. Springs are formed where the water reaches the surface. These are important local wetland features and the water from these springs represents the baseflow of streams and rivers, maintaining their flow

at times of low rainfall. During long dry periods, however, groundwater levels themselves will fall and springs may dry up.

2.2 MONITORING

Water Levels and Flows

The NRA operates two gauging stations at Lanelay and St. Fagans measuring river levels and flows in the Ely catchment. The information is used by the NRA to manage the Water Resources of the catchment and control and regulate abstraction. The gauging stations are connected to the Authority's telemetry system and are both used for flood warning purposes. River and stream flows are also routinely monitored at a number of sites in the catchment by the use of one-off spot gauging. Groundwater levels are measured continuously only at Llanharry Iron Ore Mine. No other groundwater level monitoring occurs in the catchment.

Rainfall

Rainfall is measured continuously by the NRA at Dyffryn Isaf. A further two gauges are read by private observers, who send data to the NRA. The information from the gauges is collated by the Authority and sent to the Meteorological Office at Bracknell.

Water Quality

Water quality samples are taken regularly at 22 sites covering most of the rivers and streams in the catchment. They are analysed for many substances. All the significant discharges are sampled and analysed routinely to ensure that they meet the standards set for them by the NRA.

Historically, groundwater quality has not been routinely monitored.

Regular inspections are carried out at high risk sites including farms, trade premises, industrial sites and sewage installations as part of the NRA pollution prevention programme and details are kept on a computer database to assist in the catchment management.

Biological Monitoring

Routine biological monitoring is undertaken at 18 of the water quality sampling points. Each site is normally sampled twice a year. An assessment of the biological quality is made by analysing the species of insects and other small aquatic life that are present. Other surveys are carried out to discover the impact of sewage treatment works' discharges on the river.

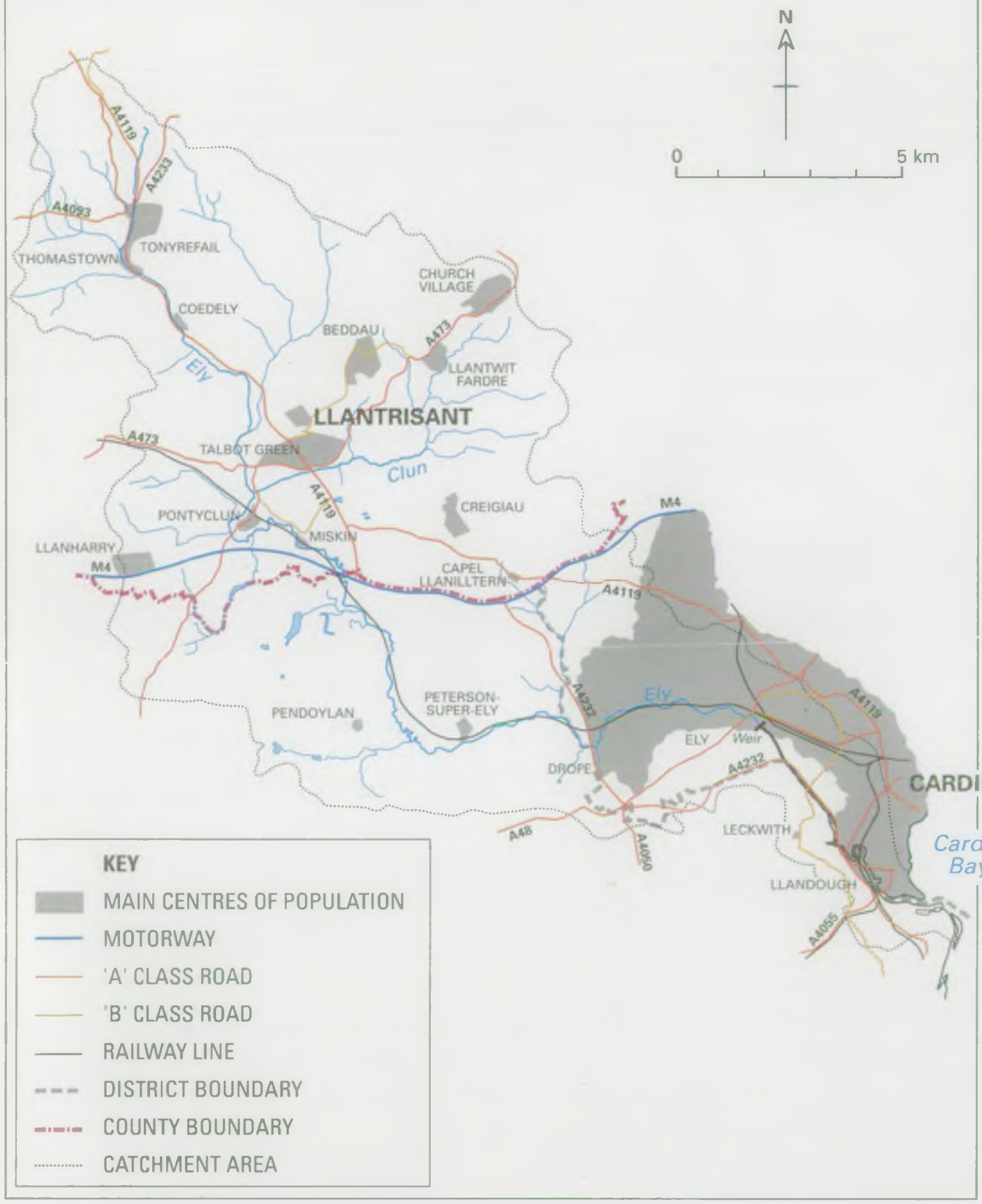
Habitat Surveys

A River Corridor Survey is planned for the Ely in 1996 to record the different habitats that exist along the river corridor. This is part of a strategic national survey programme.

Fish Stocks

In 1990 an electrofishing survey was carried out on the Ely to determine the state of the fish stocks. Data were collected from 37 separate sites. Assessment of the fish stocks is made every three years at ten sites in the catchment.

MAP 2. INFRASTRUCTURE



2.3 KEY DETAILS

Catchment Area: 169km^2

Highest Point: 416m AOD at Mynydd Pen-y-graig

Population:

Year	Population
1981	140,118
1991	146,900
2021	160,000

Administrative Details

County Councils: (% of plan area)	South Glamorgan	42%
	Mid Glamorgan	58%
City Council:	Cardiff	15%
Borough Councils:	Vale of Glamorgan	27%
	Taff-Ely	58%
National Rivers Authority:	Welsh Region South East Area Rivers House St. Mellons Business Park St. Mellons Cardiff CF3 0LT	
Water Companies:	Dŵr Cymru/Welsh Water plc.	

SECTION 3: ISSUES AND OPTIONS

This section of the Plan presents the key Issues that the NRA has identified from its analysis of the Ely catchment. One or more suggestions are made for solving each issue and you are invited to comment on these. The following 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.

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 assesses its ability to support them.

You should note that these Issues and Options are not NRA policy but have been considered within the NRA's policy framework.

3.1 ISSUES IDENTIFIED

3.1.1 WATER QUALITY ISSUES

Cwm Coke Works - Ammonia standard failure in Nant Myddlyn and rivers Clun and Ely (Issue 1)

Ammonia standard failure in the Ely Estuary (Issue 2).

Intermittent pollution from Combined Sewer Overflows (Issue 3).

Coslech Sewage Treatment Works (Issue 4).

Pollution and Siltation of Talygarn lake (Issue 5).

Impact of Maendy Tip Leachate on Nant Tyr'Arlwydd (Issue 6).

Foam on the main River Ely (Issue 7).

The impact of the Cardiff Bay Barrage on the Ely (Issue 8).

Impact of Sludge Disposal to land on water quality (Issue 9).

Lack of Groundwater Quality and Level information (Issue 10).

3.1.2 WATER QUANTITY ISSUES

Specification of **environmental requirements** of river and its plant, **animal and fish life**: setting of **hands-off flow** conditions **(Issue 20).**

Water Resouces implications of **improvements in water quality** of the river below **Cwm Coke Works (Issue 1).**

3.1.3 PHYSICAL FEATURES ISSUES

Flood Defence

Potential impact of Cardiff Bay Barrage - which may include deposition of gravels in the tidal channel (Issue 8).

Surface drainage problems associated with high tide levels in developed areas on low-lying land in Cardiff (Issue 13).

Flooding of isolated properties at Peterston-Super-Ely - there are no plans to protect these **(Issue 14).**

3.1.3 PHYSICAL FEATURES ISSUES - Continued

The Comprehensive School at Pontyclun - which is situated on the flood plain of the River Clun and has been subject to flooding since its construction against the advice of the NRA's predecessor, the Glamorgan River Authority **(Issues 12 and 14)**.

Development in the upper reaches of the catchment - has led to drainage and capacity problems. eg. Nant Erin and Pontlydan **(Issue 12)**.

Responsibility for flood defence maintenance of watercourse, associated structures (including floodbanks) passing into multiple ownership as a result of development - on Ynysddu Housing development the flood bank maintenance is the responsibility of the residents who own the land adjacent to the stream. A culvert at Tylcha-Ganol was constructed by householders and led to upstream flooding **(Issue 15)**.

Fisheries

The impact of the proposed Cardiff Bay Barrage - on the passage of fish. The effects on the salmon and sea trout rod fisheries and on the coarse fish population of the **Ely (Issue 8).**

The Ely Paper Mill Weir - impact of improved fish passage at the Ely Paper Mill Weir on coarse fish populations and fishing immediately upstream, and the present inaccessibility of the river Ely to salmon and sea trout **(Issue 19)**.

Talygarn Lake - the trout and/or coarse fishery at Talygarn Lake could be improved if an extensive desilting operation were to be undertaken **(Issue 5)**.

Conservation

Floodplain and riverside development (Issue 14).

Lack of riparian habitat diversity and structure (Issue 16).

Widespread distribution of alien plants ie Japanese knotweed and Himalyan Balsam (Issue 17).

The impact of the proposed Cardiff Bay Barrage (Issue 8).

No standards of service agreed with CCW for NRA operations affecting SSSIs (Issue 18).

3.2 A DESCRIPTION OF ISSUES FACING THE ELY CATCHMENT

ISSUE 1: CWM COKE WORKS - AMMONIA STANDARD FAILURE IN NANT MYDDLYN, RIVERS CLUN AND ELY.

During coke production, various gases are given off. To avoid air pollution these gases are cleaned, producing a liquid effluent. Some of this effluent is re-used in the plant, which can still cause localised air pollution. The remainder is discharged to the Nant Myddlyn. This is a small stream whose flow can be further reduced by abstraction at the works and there is consequently too little dilution of the effluent to achieve the fisheries ecosystem class 5 target. The effluent needs to be further treated before being released to the environment. The pollution inhibits wildlife and makes the watercourses unsuitable for sustaining even a cyprinid fishery.

There is conflict between the need to reduce pollution and maintain the present low level of abstraction. The abstraction licence was granted as a licence of right and allows a large volume of water to be abstracted. The re-use of effluent reduces the water demand well below the licence quantity, but causes air pollution. Similarly discharging effluent to the watercourse maintains flow but causes pollution.

There are several options that could be taken to improve the quality of the water:

Treatment of Effluent to Standard suitable for River Discharge or Effluent Reuse

This would achieve the water and air quality standards whilst maintaining a low level of abstraction. Treatment to a very high standard would be needed to achieve the water quality target class 5 and the best available technology would have to be used. Even then, accidental spillage and leakage from contaminated ground on the site would inevitably result in some failures of discharge consent conditions. A cyprinid fishery could not be maintained in the immediate vicinity of the discharge because of the size of the river.

Treatment of Effluent to a lesser Standard for Disposal to Public Sewer

This will achieve the air and water quality improvements required. However, water demand would be increased and it would not be returned to the Nant Myddlyn. It is unlikely that the full licensed volume would be abstracted but over-abstraction from the Nant Myddlyn or its tributaries would still be possible. Nearly half the abstractable volume at the site is from groundwater, so further investigation may reveal that the borehole has little impact upon the surface streams. This would reduce the level of potential over-abstraction, but it may still

prove necessary to develop other sources of water to supply the plant.

Improved water management at Cwm Coke Works

This may reduce some of the water demand or improve the efficiency of supply. It is unlikely to prevent intermittent failures of water quality standards so would be additional to Options 1&2. It is also unlikely that the present low level of abstraction could be maintained without effluent re-use.

ISSUE 2: ELY ESTUARY - AMMONIA STANDARD FAILURE

The Ely estuary has suffered from serious pollution for many years. Effluent from the paper mill and crude sewage from Cogan outfall combined to make the estuary water quality one of the worst in Wales. The paper mill company installed an effluent treatment plant in 1989 and this resulted in a significant improvement. The sewage outfall has still to be removed and this will be done as part of the Penarth/Lavernock sewerage improvement scheme in 1995. The sewage will be pumped to Cog Moors where it will initially receive preliminary treatment and subsequently full secondary treatment (in 1997) prior to discharge at a new long sea outfall at Lavernock. A combined sewer overflow from the new pumping station will replace the crude discharge at the Cogan outfall and will be screened to modern standards.

ISSUE 3: IMPROVEMENTS IN COMBINED SEWER OVERFLOWS IN THE CATCHMENT

Combined Sewer Overflow discharges (CSO) mostly affect the system upstream of Miskin but their intermittent operation is not necessarily detected in the routine chemical monitoring. Biological monitoring and visual inspection nevertheless indicate that several overflows require improvement. 10 of the 45 CSOs in the catchment appear on the NRA Regional CSO Strategy list as unsatisfactory. This list is prepared by the NRA and fed directly into the negotiations on Dŵr Cymru's investment programmed for sewage effluent disposal for the period 1995-2015.

ISSUE 4: COSLECH SEWAGE TREATMENT WORKS

Coslech STW is now nearing its full capacity for treating sewage. Unless additional treatment capacity is provided, further development in much of the Ely catchment will be restricted. The water quality in the River Ely below Coslech STW is not meeting the target of Fisheries Class 3. It is presently in Class 4 due to the large proportion of sewage effluent in the water and cannot be allowed to deteriorate any further. Future improvement is also dependent on reducing the ammonia levels upstream of the discharge.

ISSUE 5: POLLUTION AND SILTATION OF TALYGARN LAKE

Talygarn Lake supports a trout and coarse fishery and as such is used extensively for angling. The surrounding woodlands and wetlands also provide a pleasant area for walks and are of local conservation interest. The lake water is a source of fire fighting water for the adjacent Talygarn Miners Rehabilitation Centre.

On occasions the discharge from Forest Wood Quarry together with runoff from surrounding land has caused an increased cloudiness of the water and small oil patches on the lake surface. Excessive weed growth in the lake also restricts the use to which the lake is put.

Improved water management at the quarry is being actively pursued. Desilting would be beneficial to the ecology of the lake but would be costly if done sensitively without the lowering of the lake.

ISSUE 6: IMPACT OF MAENDY TIP LEACHATE ON THE NANT TYR'ARLWYDD

This industrial waste landfill site was closed in 1973 but leachate still causes localised pollution of the Nant Tyr'Arlwydd, a headwater tributary of the River Clun. Negotiations with the owners are continuing regarding remedial measures. The leachate discharges are both consented by the NRA but the company is required by a condition of these consents to produce an improvement plan for the site by 1994. This will evaluate a number of options (including the removal of waste) and a cost-benefit analysis will determine the one to be implemented.

ISSUE 7: FOAM ON THE RIVER ELY

The main River Ely suffers occasionally from the presence of detergent foam. This has given rise to a number of complaints in recent years. Several potential sewage and industrial sources are suspected but work is ongoing to identify the type of detergent responsible before remedial action can be taken.

ISSUE 8: IMPACT OF CARDIFF BAY BARRAGE ON THE ELY

The proposal is to create a barrage across 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 river and its estuary.

To achieve the desired water quality standards within the impoundment direct discharges of crude sewage will have to be diverted, major combined sewage overflows will require substantial modifications, and nutrient stripping of upstream effluents may prove necessary. Once the lagoon has been created the Cardiff Bay Development Corporation (CBDC) will be responsible for maintaining the correct water quality standards for uses to which it is put. This includes enhancing the dissolved oxygen levels by the provisions of oxygenation equipments.

Rising groundwater levels may mobilise pollutants from contaminated land in the Grangetown area and CBDC will be responsible for preventative measures if this occurs. However, with impoundment, hydraulic gradients are reduced and this situation is not expected to arise.

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 paper mill weir serves the same purpose for the land immediately above it now.

The barrage will increase siltation in the Ely 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.

There is provision to include a fish pass in the Cardiff Bay Barrage, and as it is unlikely to be 100% effective, passage of migratory fish such as salmon, sea trout, eels, shad and estuarine species such as flounder and mullet could be hindered.

Regeneration of natural salmon and sea trout populations in the Ely are likely to take longer, and eel 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. Recreational water based activities are likely to develop in the freshwater lake. This may require reduction of bacterial loads by ultra violet treatment of discharges.

ISSUE 9: THE IMPACT OF SLUDGE DISPOSAL TO LAND ON WATER QUALITY

The Ely catchment is predominantly agricultural and increasing use is being made of farmland to dispose of sewage sludge and industrial organic waste. Although regulation of this activity does not come directly within the jurisdiction of the NRA it has the potential to cause significant water pollution problems. One serious incident has already occurred in the catchment.

ISSUE 10: LACK OF GROUNDWATER LEVEL AND QUALITY DATA

The NRA has little data on the groundwater regime of the Ely catchment. Local groundwater problems are known to exist in certain areas. The NRA is proposing to develop a network of monitoring boreholes for the better management of groundwater levels and quality.

ISSUE 11: THE THREAT TO THE WATER ENVIRONMENT FROM NEW INDUSTRIAL DEVELOPMENTS

This is an increasing threat to the water environment and has given rise to a significant number of pollution incidents in recent years.

Industrial development in the form of new industrial estates is occurring, principally centred around Ynysmaerdy. Similar development, but to a lesser degree, is underway at Mwyndy and Tonyrefail.

The surface water from these estates drains to local streams. Many industrial premises store fuel oils and raw materials for their processes. Not all companies provide properly bunded areas for the storage of such materials with the result that spillage can, and often does, enter the surface drainage system. Increasing industrialisation of greenfield sites along the River Ely inevitably results in an increased risk of pollution.

At the present time the NRA cannot **require** industry to provide anti-pollution measures and reliance is placed on recommendations made through the planning system for such measures to be implemented.

ISSUE 12: DEVELOPMENT IN UPPER CATCHMENT - INCREASED FLOOD RISK

The increase in the rate of run-off which occurs when new sites are developed results in high and/or more frequent peak flows in the receiving watercourse. This, in turn, increases the risk of flooding downstream. In the Ely catchment, there are a number of trouble spots where flooding occurs, but improvement works cannot, at present, be justified in terms of cost-benefit. Amongst those are:

I) A bridge (Pontlydan) at Llantwit Fardre on the Nant Dowlais which causes road flooding

II) Tyn-y-Bryn bridge on the Nant Erin at Tonyrefail

III) Pant Comprehensive School, Pontyclun

In the absence of viable means of resolving such problems, the NRA can only seek to maintain the status quo by advising the Local Planning Authorities to make any developments conditional upon measures being incorporated to restrict run-off. Generally this involves storage (oversized pipes, tanks or attenuation ponds) with controlled discharge, but source control techniques (permeable pavements, soakaway) can also be used. All of these measures have a cost implication as well as a need for maintenance in capacity of the river downstream. This could involve the replacement of bridges.

ISSUE 13: SURFACE DRAINAGE PROBLEMS IN LOW-LYING AREAS OF CARDIFF ASSOCIATED WITH HIGH TIDES

At times of very high tide, surface drainage systems within low lying land become tide-locked and ineffective. However, the resultant flooding problems can be overcome if:

a) sufficient storage exists in the system to cover the period when it is tide-locked,
b) the discharge can be pumped over the level of the tide,
c) the high tide can be excluded.

ISSUE 14 : FLOODPLAIN AND RIVERSIDE DEVELOPMENT eg Pant School, Pontyclun

The floodplain is frequently seen as an attractive area to develop. However, it forms a natural "safety valve" in the drainage system. The river corridors and wet pastures are also valuable for wildlife and should be maintained and, if possible, enhanced. Floodplain and riverside developments often affect wetland and riparian and channel habitats.

For these reasons the NRA is opposed to most floodplain development, eg Pant School was constructed on flood plain against the advice of the then Glamorgan Rivers Board. Some properties in Peterston and St. Fagans also flood due to their proximity to the flood plain.

ISSUE 15: RESPONSIBILITY FOR FLOOD DEFENCE MAINTENANCE OF WATERCOURSES AND ASSOCIATED STRUCTURES PASSING INTO MULTIPLE OWNERSHIP AS A RESULT OF DEVELOPMENT

The recently constructed housing development in Ynysddu has been established with the gardens of some of the properties extending to the flood bank which protects the development. Is important that individual owners of these properties do not carry out any works which would compromise the integrity of the flood defences. A similar situation has occurred at Coedely involving the construction of an inadequate culvert by residents which caused some flooding. It would be preferable for maintenance of watercourses and flood defences to be excluded from individual householders by exercising greater control when planning approval is granted.

ISSUE 16: LACK OF RIPARIAN HABITAT DIVERSITY AND STRUCTURE

Although a detailed river corridor survey has not yet been undertaken, it is evident that in many reaches the riparian habitat lacks diversity and structure. Natural regeneration of trees and shrubs is limited for a variety of reasons, resulting in a very even-age structure and vegetation of limited interest.

ISSUE 17: WIDESPREAD DISTRIBUTION OF ALIEN PLANTS

Japanese Knotweed and Himalayan Balsam are widespread on riverbanks in the catchment and pose problems for the inspection and maintenance of flood banks and for the native flora and fauna. Regular trashing and herbicide spraying of Japanese Knotweed currently takes place on flood banks but not on other reaches of the river. A regional policy setting out the circumstances in which alien plants should be controlled by the NRA is being drafted in order to combat the problem successfully and efficiently.

ISSUE 18: NO STANDARDS OF SERVICE AGREED WITH CCW FOR NRA OPERATIONS AFFECTING SSSI

Many NRA operations can directly or indirectly affect wetland SSSI, eg flood defence maintenance works, issuing of abstraction licences. There is therefore a need to identify sites which are sensitive to such operations and agree standards to be applied when dealing with such sites, eg working only at certain times of the year, maintaining a certain groundwater level.

ISSUE 19: THE ELY PAPER MILL WEIR

The Paper Mill Weir is an obstruction to salmon and sea trout, except at Easter, August and Christmas Bank Holidays when the site closes down and the weir is raised completely for several days. Of these, the August raising is of greatest benefit as this is when most fish are migrating. Few fish are present in the spring and by Christmas the spawning season is virtually over.

The NRA objective is to allow the regeneration of a self sustaining population of salmon and sea trout in the Ely. This requires free passage of the weir.

In the autumns of 1992 and particularly in 1993 the site owners, Arjo Wiggins, have been very co-operative in liaising closely with the NRA to raise the weir more frequently. However, the timing and duration can be very restrictive depending on river flow, the tidal cycle and water demand.

There are several options to improve fish passage facilities:

Install a Fish Pass

This would be very expensive - an estimated £75,000. Expenditure of this sort could not be justified until the effects of the Cardiff Bay Barrage on migratory fish are known. In addition, fish passes take considerable time to design and construct, and they are rarely as effective as having free passage through a river channel. However, a pass would leave the Paper Mill Site operations totally unaffected, coarse fish populations in the deep water upstream would also be unaffected and the mud banks would not be exposed.

Regular Weir Raising

There is little or no capital cost with this option and when the weir is raised fully, fish passage is probably more successful than via a fish pass. This is therefore the most suitable option in the short term, though it has its limitations. A careful and regular check on river levels and site water requirements is required to decide the extent of weir raising. Realistically, unless river flow is significantly above average, the weir cannot be raised high enough for long enough to be of sufficient benefit. In addition, when the weir is raised, the deep water, extending for several hundred yards upstream, drops rapidly. Mud banks (which may be regarded as unsightly by the public) are then exposed and coarse fish can be washed downstream below the weir - with little opportunity for them to return.

Removal of Weir

The removal or permanent raising of the weir would be the preferred option in the long term, as a natural flow regime would allow all species of fish to pass as they require. The tidal range would extend above the site of the weir and vegetation would recolonise above the high tide limit. There would be no revenue cost, but there is likely to be some expense if the Paper Mill's river water requirements were to be secured in an alternative way.

The weir also currently has the function of protecting low lying urban areas upstream from tidal flooding. This function will not be required after construction of the Cardiff Bay Barrage.

ISSUE 20: SETTING OF HANDS-OFF FLOWS: SPECIFICATION OF ENVIRONMENTAL REQUIREMENTS OF RIVER PLANT AND ANIMAL LIFE

When determining an abstraction licence, regard has to be given to the fish life as well as other conservation uses. This is usually accomplished by putting a condition on a licence which requires abstraction to stop when the flow at some point on the river falls below a certain level. This is known as a 'hands-off flow' or HOF. However, the NRA is duty-bound to issue a licence unless it can demonstrate that existing rights or the river environment will adversely affected.

Ever since licences were first issued in 1965, it has been extremely difficult to assess how much water can be abstracted without adversely affecting the river environment. A number of pragmatic solutions have been used, but none has been based on scientific studies.

The NRA has now commissioned a number of fundamental research projects to try to quantify the flow requirements of the river flora and fauna. It may be several years before results are applicable.

In the meantime, a licensing policy that can be applied consistently across the NRA and balance the requirements of both the environment and abstractor is being developed.

3.3 A SUMMARY OF THE ISSUES, AND OPTIONS FOR THEIR RESOLUTION.

The issues and options facing the Ely described in the previous section are shown in summary tables in the following pages. These are intended to provide quick reference to the issues and options that have to be addressed as well as the means of resolving these problems.

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 faciilitate improvements to the water environment for the benefit of all users. Their implementation will entail many bodies and individuals co-operating. Cost, both capital and revenue, could be regarded as a disadvantage to most of the issues. Any costs that have been included are broad estimates. The final action plan will provide more detailed budget and timetable implications.

These should not be taken as a definitive list, nor should the proposed solutions be taken to be the only ones available. We hope that interested parties will debate these issues and pass their comments to the NRA for consideration when preparing the final version of the plan.

ISSUES AND OPTIONS

ISSUE No: 1	**CWM COKE WORKS - AMMONIA STANDARD FAILURE IN NANT MYDDLYN & RIVERS CLUN AND ELY**		
OPTIONS/ACTIONS	Responsibility	Advantages	Disadvantages
1. Treat Cwm Coke effluent to a standard suitable for river discharge or reuse in the plant.	NRA/HMIP/Coal Products	Reduce water and air pollution. Reduce effect of abstraction on river flows in the upper part of the Myddlyn catchment and the River Clun.	Will require Best Available Techonology to be applied. Cost £millions.
2. Treat Cwm Coke effluent to a standard suitable for discharge to public foul sewer.	Coal Products/Dŵr Cymru	Reduced risk of failing discharge consent conditions. Lower cost than 1. Will achieve water quality target of Class 4 in River Clun.	Net loss of water from catchment. Over abstraction possible and could require development of new sources of water supply or a groundwater investigation to determine the impact of borehole abstraction on surface sources. Approx cost £100,000.
3. Require improved water management at Cwm Coke works.	NRA/HMIP/Coal Products.		Only partial solution and failure of consent still likely.

ISSUE No: 2	**ELY ESTUARY - AMMONIA STANDARD FAILURE**		
OPTIONS/ACTIONS	Responsibility	Advantages	Disadvantages
1. Divert effluent to Cog Moors STW	Dŵr Cymru	1. Land available. 2. Cost effective. 3. Already has planning permission.	Approx cost £400,000

ISSUE No: 3	**INTERMITTENT POLLUTION FROM COMBINED SEWER OVERFLOWS**		
OPTIONS/ACTIONS	Responsibility	Advantages	Disadvantages
1. Prioritise remedial work required	NRA/Dŵr Cymru	Permits planning of Dŵr Cymru capital expenditure programme.	1. Competes with other priority CSOs in the region.
2. Improve/relocate CSOs	Dŵr Cymru	Removes intermittent pollution sources.	1. Will take many years to complete.

ISSUE No: 4	**COSLECH SEWAGE TREATMENT WORKS**		
OPTIONS/ACTIONS	Responsibility	Advantages	Disadvantages
1. Enlarge Coslech STW	Dŵr Cymru	Large Greenfield site available for development.	1. Trunk sewer restricts inflow to STW. 2. Does not utilise self-purification in river. 3. Cost £2/3 million.
2. Rebuild Rhiwsaeson STW	Dŵr Cymru	1. Relieves load on trunk sewer. 2. Allows more capacity at Coslech.	1. Confined site. 2. Low dilution. 3. Cost 5 million.

ISSUE No: 5	**POLLUTION AND SILTATION OF TALYGARN LAKE**		
OPTIONS/ACTIONS	Responsibility	Advantages	Disadvantages
1. Review Forest Wood Quarry discharge consent.	NRA	Improved discharge quality and on-site water management.	
2. Desilt the lake.	Mid Glam Health Authority Llantrisant & Pontyclun Anglers.	1. Improved conditions for trout & coarse fish populations. 2. Improved conditions for angling.	1. Reversal of natural succession with associated fauna and flora. 2. Spoil disposal.

ISSUE No: 6	**IMPACT OF MAENDY TIP LEACHATE ON THE NANT TYR'ARLWYDD**		
OPTIONS/ACTIONS	Responsibility	Advantages	Disadvantages
1. Produce and implement improvement plan for site. Consider various options.	Cleanaway	Removes pollution	

ISSUE No: 7	**FOAM ON MAIN RIVER ELY**		
OPTIONS/ACTIONS	Responsibility	Advantages	Disadvantages
1. Review discharge consents as appropriate.	NRA/Dischargers	1. Reduces source. 2. Removes problem.	

ISSUE No: 8	**IMPACT OF CARDIFF BAY BARRAGE ON THE ELY**		
OPTIONS/ACTIONS	Responsibility	Advantages	Disadvantages
1. Installation of fish pass.	Cardiff Bay Development Corporation	Allow passage of salmon, sea trout and eels	Despite best intentions fish passage is likely to be hindered.
2. Modify CSOs	CBDC/Dŵr Cymru	Improve aesthetic quality of water	
3. Remove gravels from impoundment	CBDC	Prevent silt building up in lagoon	
4. Protect contaminated land from groundwater	CBDC	Prevent mobilisation pf pollutants	
5. Nutrient Stripping	CBDC/Dŵr Cymru	Prevents algal blooms	
6. Remove crude sewer outfall	CBDC/Dŵr Cymru	Improve water quality	

ISSUE No: 9	**THE IMPACT OF SLUDGE DISPOSAL TO LAND ON WATER QUALITY**		
OPTIONS/ACTIONS	Responsibility	Advantages	Disadvantages
1. Indentify Groundwater Protection Zones and implement Aquifer Protection Policy.	NRA	Protect potable sources, groundwater aquifers and surface water.	Resource implication
2. Better regulation by authorities involved.	HMIP/Wastes Regulatory Authorities/ CONTRACTORS	Reduce risk to water environment.	

ISSUE No: 10	**LACK OF GROUNDWATER QUALITY AND LEVEL DATA**		
OPTIONS/ACTIONS	Responsibility	Advantages	Disadvantages
1. Implement routine groundwater monitoring programme	NRA	1. Identifies problem. 2. Permits better groundwater management.	

ISSUE No: 11	**THE THREAT TO THE WATER ENVIRONMENT FROM NEW INDUSTRIAL DEVELOPMENTS**		
OPTIONS/ACTIONS	Responsibility	Advantages	Disadvantages
1. Persuade developers to include pollution control measures.	NRA/Local Planning Autority	Reduce risk of pollution.	No statutory powers.
2. Regular inspection of premises.	NRA	Prevent establishment of risk activities.	No statutory powers.

ISSUE No: 12	**DEVELOPMENT IN UPPER CATCHMENT - INCREASED FLOOD RISK**		
OPTIONS/ACTIONS	Responsibility	Advantages	Disadvantages
1. Restrict run-off from development.	NRA/Land Planning Authorities/ Developer	1. Flood risk downstream not increased.	Maintenance of storage/control structures in perpetuity.
2. Carry out hydraulic improvements to bridges.	Highways Authority	1. Reduced development cost. 2. No maintenance of storage/control structures.	1. Involves complicated engineering to replace bridges/raise highway level. 2. Listed structures.

ISSUE No: 13	**SURFACE DRAINAGE PROBLEMS IN LOW-LYING AREAS OF CARDIFF ASSOCIATED WITH HIGH TIDES**		
OPTIONS/ACTIONS	Responsibility	Advantages	Disadvantages
1. Restrict development of low-lying sites.	Cardiff City Council	Avoid Flooding problems.	1. Restricts planning. 2. More pressure to develop elsewhere. 3. Does not resolve existing problem.
2. Provide tide-locked storage/pumping.	Dŵr Cymru/Cardiff CC	Excludes tide and prevent flooding.	
3. Exclude high tides.	CBDC/NRA	No extra cost.	Stringent controls on barrage operation required.

ISSUE No: 14	FLOODPLAIN AND RIVERSIDE DEVELOPMENT EG. PANT SCHOOL, PONTYCLUN		
OPTIONS/ACTIONS	Responsibility	Advantages	Disadvantages
1. Raise land	Developer/LPAs	1. Reduced flood risk to that development.	1. Increase flood risk downstream. 2. Need to restrict run-off from development upstream. 3. Loss of habitat.
2. Restrict development on floodplain and riverside via Structure Plans and the planning procedure.	NRA/LPAs	1. Less flood risk to the development and areas downstream. 2. Protect the remaining conservation interests. 3. Less need to restrict run-off from upstream developments.	1. Does not improve conservation interests already affected.

ISSUE No: 15	RESPONSIBILITY FOR FLOOD DEFENCE MAINTENANCE OF WATERCOURSES AND ASSOCIATED STRUCTURES PASSING INTO MULTIPLE OWNERSHIP		
OPTIONS/ACTIONS	Responsibility	Advantages	Disadvantages
1. Ensure responsibility passes to single body capable of maintaining watercourse or structure.	NRA/LAs/ Developers	Ensure upkeep of watercourse without need for serving of notices on individuals.	Possible reduction in development area.

ISSUE No: 16	**LACK OF RIPARIAN HABITAT DIVERSITY AND STRUCTURE IN THE ELY**		
OPTIONS/ACTIONS	Responsibility	Advantages	Disadvantages
1. Undertake river corridor survey.	NRA	Identifies scale of problem and priority areas.	Approx cost £3000
2. Undertake habitat improvements during flood defence maintenance work.	NRA	Can be incorporated into routine work over a period of time.	1. Requires agreement of landowner. 2. Flood Defence Works not always in priority areas. 3. Flood damage to works.
3. Promote enhancement measures via consenting procedures and planning comments.	NRA/Landowners		1. Work not always in priority areas. 2. Future maintenance.
4. Undertake catchment -wide capital projects in collaboration with other organisations and landowners.	NRA/Conservation Organisations.	Can address priorities. Costs can be shared.	Requires agreement of landowners.

ISSUE No: 17	**WIDESPREAD DISTRIBUTION OF ALIEN PLANTS**		
OPTIONS/ACTIONS	Responsibility	Advantages	Disadvantages
1. Prepare Regional Policy to determine circumstance in which alien plants should be controlled by NRA.	NRA	1. Coherent approach to problem. 2. More effective and efficient control.	

ISSUE No: 18	**NO STANDARDS OF SERVICE AGREED WITH CCW FOR NRA OPERATIONS AFFECTING SSSI**		
OPTIONS/ACTIONS	Responsibility	Advantages	Disadvantages
1. Agree Standards of Service.	CCW/NRA	1. Protect SSSI. 2. Ensures consistent approach.	

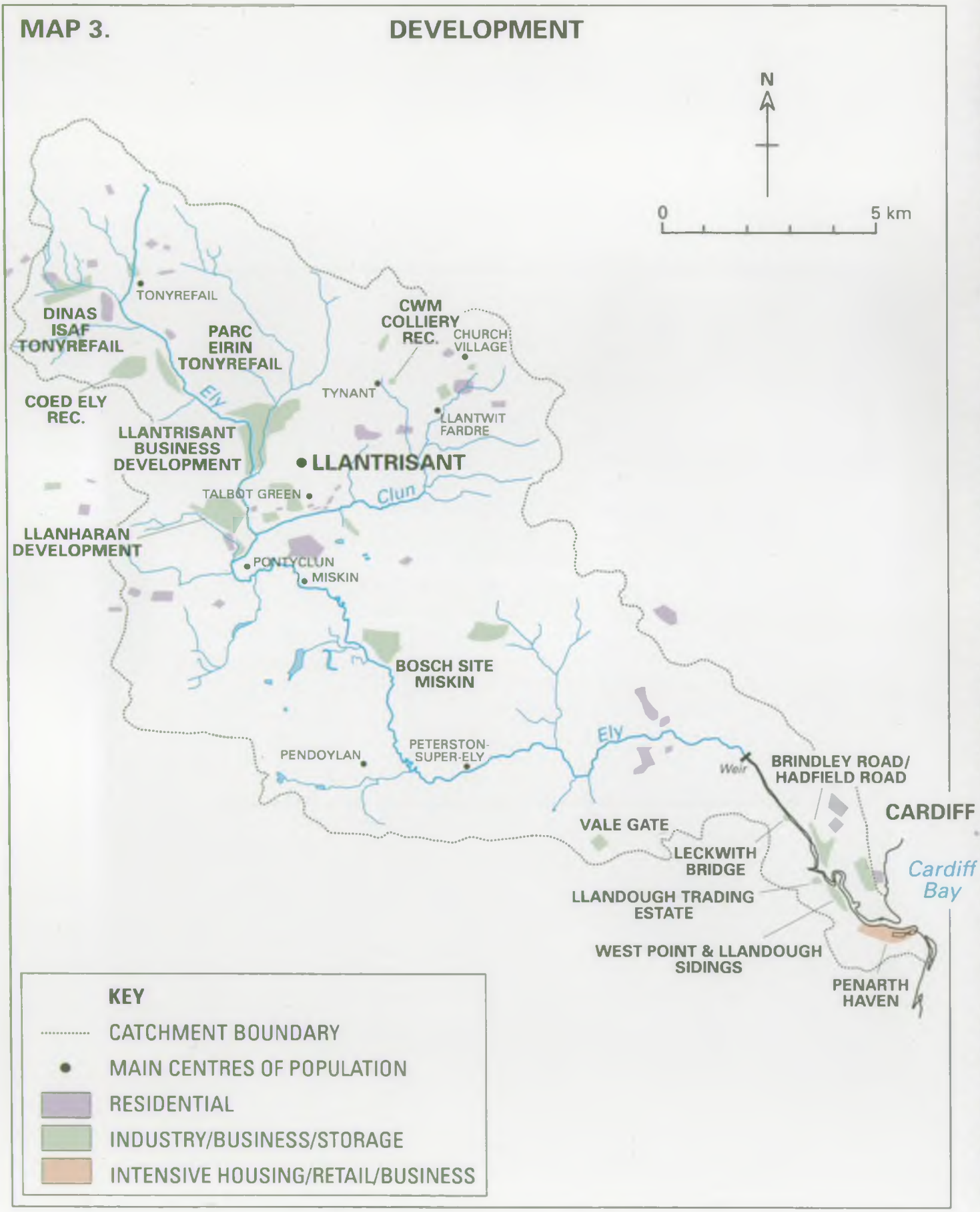
ISSUE No: 19	**ELY PAPER MILL WEIR**		
OPTIONS/ACTIONS	Responsibility	Advantages	Disadvantages
1. Install fish pass.	Arjo Wiggins NRA Other sponsors	1. Paper mill operations unaffected. 2. Coarse fish populations unaffected.	1. Time to plan and construct. 2. May not be 100% effective. 3. Cost - £75,000.
2. Raise weir on a regular basis.	Arjo Wiggins NRA	1. Little capital cost. 2. Fish passage more successful than with fish pass.	1. Coarse fish washed down, loss from river above. 2. Limitations to operational flexibility.
3. Remove weir (or raise it permanently)	Arjo Wiggins	1. Salmonid fish passage. 2. Coarse fish passage unhindered. 3. Mud banks will recolonise. 4. River above weir to become natural.	1. Site owner to secure alternative abstraction arrangements. Could cost > £10,000. 2. Tidal flood risks to riverside area of Ely, Cardiff. 3. Erosion risks to all land and structures on river up to railway bridge near Glan-Ely Hospital.

ISSUE No: 20	**SETTING OF HANDS-OFF FLOWS: SPECIFICATION OF ENVIROMENTAL REQUIREMENTS OF RIVER PLANT & ANIMAL LIFE**		
OPTIONS/ACTIONS	Responsibility	Advantages	Disadvantages
1. Undertake research into flow requirements of river flora and fauna.	NRA	Already in hand in NRA R&D	Unlikely to produce practically applicable results quickly.
2. Develop and implement licensing policy based on 'Yorkshire' methodology to determine licensable resource and compare with existing use.	NRA and others as consultees	Tried and tested. Widely accepted principle. Can provide policy within 2 years.	

PART II SUPPORTING INFORMATION

SECTION 4: THE USES OF THE ELY CATCHMENT

The following sections catalogue the legitimate Uses of the Ely 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 objectives and targets. These are designed to protect both the environment and the requirements of other Uses. In Section 5 these 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 3.
DEVELOPMENT
N
0
5 km
TONYREFAIL
DINAS ISAF TONYREFAIL
PARC EIRIN TONYREFAIL
CWM COLLIERY REC.
CHURCH VILLAGE
TYNANT
LLANTWIT FARDRE
COED ELY REC.
Ely
LLANTRISANT BUSINESS DEVELOPMENT
LLANTRISANT
TALBOT GREEN
Clun
LLANHARAN DEVELOPMENT
PONTYCLUN
MISKIN
BOSCH SITE MISKIN
PENDOYLAN
PETERSTON-SUPER-ELY
Ely
Weir
BRINDLEY ROAD/ HADFIELD ROAD
CARDIFF
VALE GATE
LECKWITH BRIDGE
Cardiff Bay
LLANDOUGH TRADING ESTATE
WEST POINT & LLANDOUGH SIDINGS
PENARTH HAVEN
KEY
CATCHMENT BOUNDARY
MAIN CENTRES OF POPULATION
RESIDENTIAL
INDUSTRY/BUSINESS/STORAGE
INTENSIVE HOUSING/RETAIL/BUSINESS

4.1 DEVELOPMENT

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 Ely catchment is covered in part by the administrative boundaries of Glamorgan County Councils, the Borough Councils of Vale of Glamorgan and Taff-Ely, plus that of Cardiff City Council as shown on the infrastructure plan (Map 2).

The present status of Local Plans covering the Ely catchment is as follows:

Council	Plan Type	Coverage	Status
South Glam CC	Replacement	1991-2011	Draft due to be issued early 1994.
Mid Glam CC	Replacement	1991-2006	Draft due to be issued early 1994.
Vale of Glam BC	Local	1993-2001	Draft has been circulated.
Cardiff City	Local	1993-2001	Deposit Plan has been to a local public inquiry.
Taff-Ely BC	Local	1992-2006	Draft due to be issued late December 1993.

Over the last few decades, the pattern of development in the Ely Catchment has changed with the demise of the mining industry in the upper catchment and improvements to the road network (in particular the construction of the M4 Motorway).

Recent road improvements linking the M4 form Talbot Green to Tonyrefail (connecting to the Rhondda Valleys) and from Capel Llanilltern to the Cardiff Bay area will no doubt continue to attract development.

Future highway improvements include a by-pass of Church Village from which a new road will connect to the M4 at Capel Llanilltern.

It is estimated that an additional 7000 houses will be built in the catchment by the year 2006 of which about 70% will lie in the Taff-Ely Borough Council area.

Industrial development is planned within or near the river corridor in the Leckwith/Grangetown area of Cardiff and north and south of Llantrisant with their direct links to the M4.

Two major impacts on developments during the next decade will be the construction of the Cardiff Barrage and consequent regeneration of the docklands area by Cardiff Bay Development Corporation.

Objectives

To ensure that development does not adversely impact, and wherever possible, to ensure that it proceeds in a way that benefits the water environment.

To ensure, wherever possible, that development proceeds in a way that benefits the water environment and its users.

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.

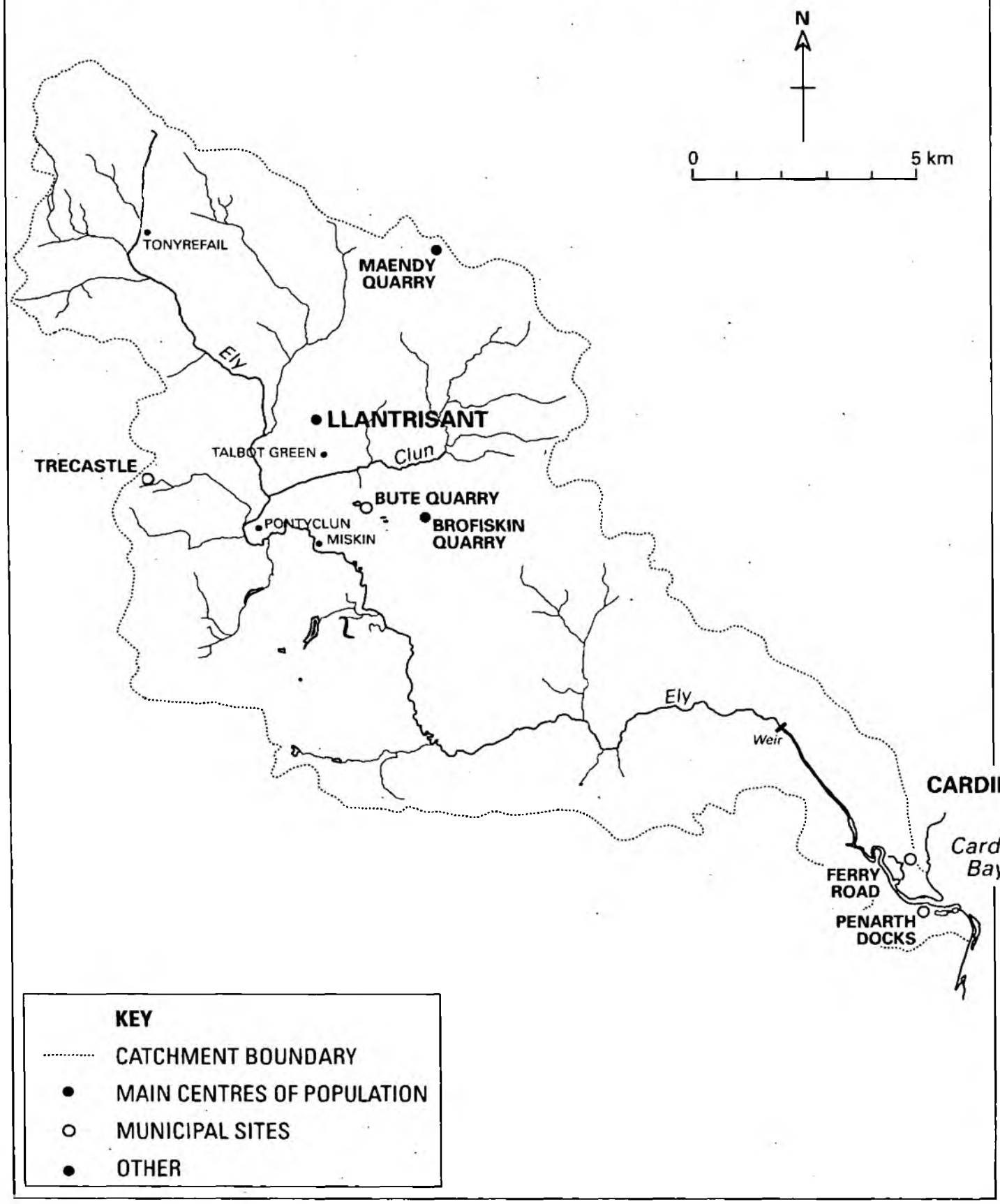
Water Quantity

- To protect surface and groundwaters from the adverse effects of development, including mineral extraction, landfill, afforestation, road construction and other changes in land use.

Physical Features

- Development should not be at risk from flooding and should not put other areas at risk of flooding which could endanger life and damage property.
- To ensure 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.
- Wildlife associated with the water environment should not suffer any detriment due to development, and wherever possible, development should enhance wildlife.

MAP 4. **SOLID WASTE DISPOSAL SITES**



4.2 SOLID WASTE DISPOSAL

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 Control of Pollution Act 1974 (eventually under the Environmental Protection Act 1993). The NRA is a statutory consultee on applications for landfill waste disposal licences.

Local Perspective

There is only one active site receiving domestic, commercial and industrial waste in the catchment at Ferry Road in Cardiff. There are also four closed sites at Penarth Docks, Bute Quarry, Brofiscin and Trecastle. The other closed site at Maendy produces leachate which has a localised impact upon the receiving watercourses. There are 17 sites licensed for inert waste of which 10 are active. All major sites are inspected periodically by the NRA to ensure there is no deterioration in water quality as a result of the presence of the landfill.

Objectives

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

Environmental Requirements

Water Quality

- Waste disposal sites must be designed and managed to prevent liquid effluent from adversely affecting the quality of surface 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 off tipping, all aftercare provisions stated on the planning consent must be carried out by those responsible.

4.3 FLOOD WATER STORAGE AND FLOOD DEFENCES

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 flood plain or washlands take the additional flow or naturally store water when the channel capacity is exceeded. Development on these areas over time has resulted in the need for protection works.

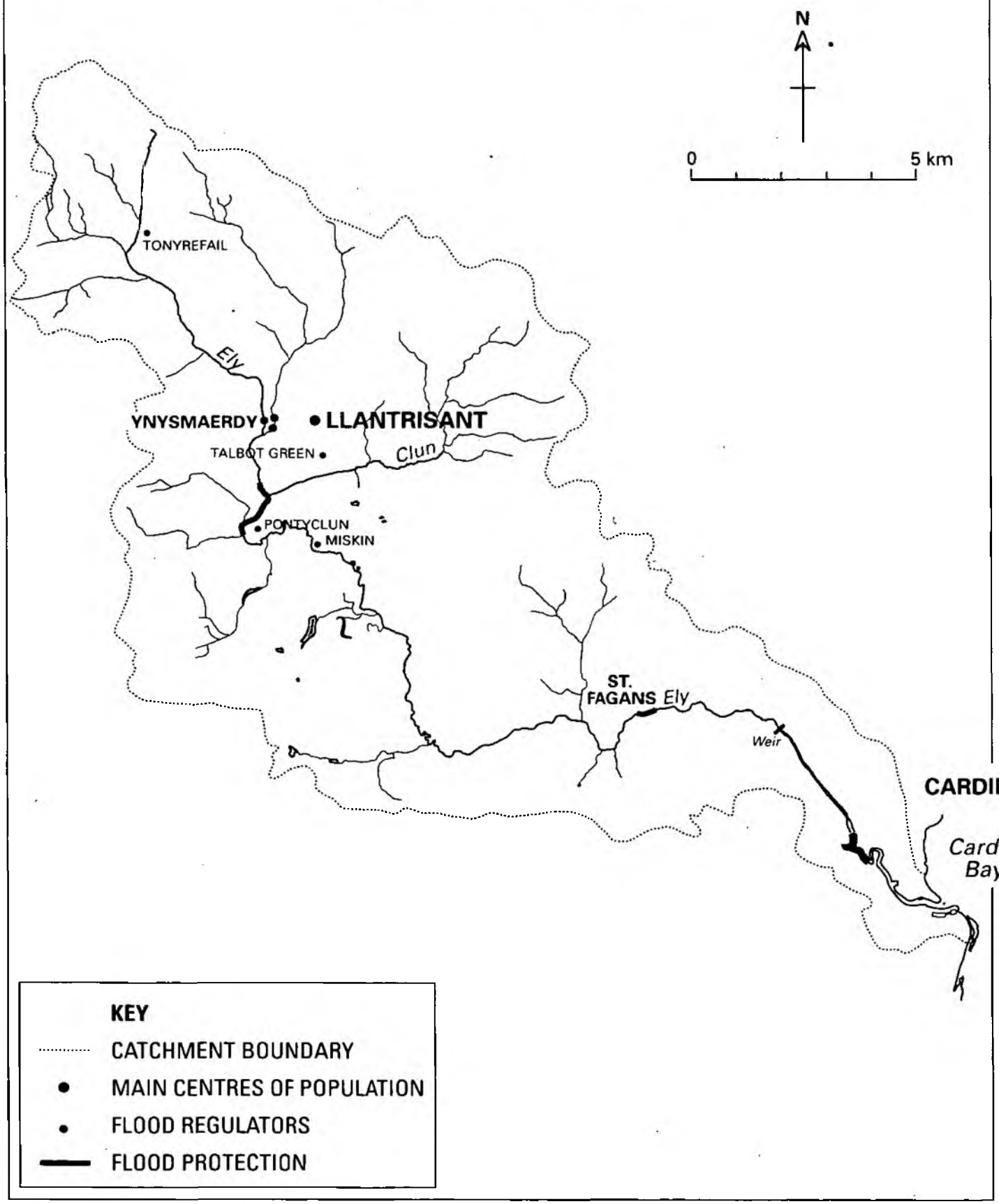
Protection against flooding is provided, where necessary and cost-effective, by the construction and maintenance of flood defences. The effectiveness of these flood defences is often measured in terms of the most severe flood against which protection is provided. The level of protection required depends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

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

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

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

MAP 5. **FLOOD DEFENCE SCHEMES**



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

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

Local Perspective

Flood defence schemes have been constructed at Pontyclun, St. Fagans and on lower reaches of the river in Cardiff (see Map 5).

At Ynysmaerdy a commercial development has taken place on flood plain with flow regulators and associated storage areas provided on the River Ely and its tributary, the Nant Mychydd, to protect against flooding. Maintenance of these structures in the future by the NRA is the subject of current negotiations with the developers.

The main area of flood plain is agricultural land between Pontyclun and St. Fagans.

Flood Warnings are issued by the NRA to South Wales Police for the flood-prone areas of Ynysmaerdy, Talbot Green, Pontyclun and the area between Miskin and St. Fagans, including the lowlying inhabited areas of Peterston-Super-Ely and St. Fagans, and the Ely area of Cardiff.

The flood defences which have been constructed by the NRA and its predecessors at Pontyclun and St. Fagans are maintained on an annual basis to ensure their effectiveness.

Blockages, particularly fallen trees and abandoned vehicles which may be swept downstream and create major obstructions at bridges, are removed from the main river network on an 'as needs' basis. This work is regularly carried out on the Nant Melyn at Pontyclun, the Nant Erin at Tonyrefail and at Ely Bridge in Cardiff. The Authority's general policy for new river crossings is to require that they are built without central supports. This ensures that they are less likely to trap flood water debris on them and to make them more hydraulically efficient.

Preventative maintenance by the regular lopping of trees takes place in the rural areas between Pontyclun and St. Fagans. This makes the trees less likely to fall during floods and thus add to problems at Peterson-Super-Ely and St. Fagans.

The upkeep of the flood defences at Trelai Park in Cardiff is the responsibility of Cardiff City Council.

Objectives

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

To improve the standard of flood defence where appropriate by promoting and constructing new flood defences and maintaining them in perpetuity to provide an adequate level of service.

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 water course should provide effective drainage.
- The river banks should contain flows up to a defined maximum, expressed as the calculated probability of occurrence.
- No development should be permitted which would impair the effectiveness of any flood defence scheme or prevent access for maintenance of flood defence works.
- To provide adequate arrangements for flood warning.

MAP 6. FISH DISTRIBUTION

4.4 FISHERIES ECOSYSTEM

General

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

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

In setting the first WQOs based on Fisheries Ecosystem Classifications, the DoE will select, a small number of pilot catchments to test the procedures for implementing the scheme. Although the Ely catchment is not among those catchments being considered for inclusion in the first batch, it is appropriate to consider the proposed water quality standards of the WQO scheme when planning the maintenance and improvements of the fisheries and general ecosystem of the river.

Local Perspective

Salmon

Salmon are rare in the Ely. Water Quality in the upper tributaries is capable of sustaining juvenile populations. Salmon are known to have spawned in one major tributary, the Nant Mychydd, in recent years.

Trout

The trout population has recovered in recent years, due mainly to improvements in water quality and stocking by angling clubs, and a reasonable trout fishery exists throughout the catchment, apart from in the lower Clun and Nant Myddlyn. Brown trout are stocked by angling clubs in several locations, notably Hensol Castle Lake and, until recently, Talygarn Lake. Sea trout are present in the Ely in small numbers. Their rejuvenation is constrained by several factors that will be discussed later in the State of the Catchment Section.

Coarse Fish

Coarse fish are present in the Ely, with roach being the predominant species. Populations have increased over the past 10 years due to improved water quality and stocking by angling clubs. Roach, chub, dace and gudgeon are present from the paper mill weir in Cardiff to above Talbot Green on the Ely, and to below Llantrisant on the Clun.

The major stillwaters in the catchment with coarse fish are Groesfaen Pond, Hensol Castle Lake, Hensol Lake, Mwyndy Pond, Pyscodlyn Mawr Pond, Talygarn Lake and Warren Mill Pond.

Other Migratory Fish *Eels are quite common in the Ely catchment. Elvers enter the river during the Spring and adult eels migrate to the sea during the Autumn.*

Fish Distribution *The distribution of salmon, trout and coarse fish is shown on Map 6 and has been assessed from several sources of information: electrofishing surveys, anglers catches and assessments of fish mortalities arising from sporadic pollution incidents.*

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

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

Environmental Requirements

Water Quality

Rivers. - Waters should comply with the formal and informal standards set for the Fishery Ecosystem Use for CMPs.

Stillwaters: - Until specific stillwater Water Quality Objectives are set, these waters should conform with the same standards used for the Fisheries Ecosystem Use, applied to rivers in CMPs.

Estuaries: - Coastal and estuarial waters should conform with the informal standards for the Protection of Aquatic Life.

Water Quantity: - The Authority will develop and implement a Regional abstraction licensing policy that will enable the effective management of water resources within the catchment. This will achieve the right balance between the needs of the environment, abstractors and other river users.

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

- Appropriate levels of riparian and instream vegetation should be maintained to provide adequate cover for fish and habitats for other wildlife associated with the river and its corridor.

- Artificial barriers should not obstruct passage of migratory fish.

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

- River maintenance and other works should be carried out in a way that causes the least detrimental impact on the fishery or general ecosystem, and where possible should lead to enhanced diversity.

MAP 7. SPECIAL ECOSYSTEMS

4.5 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 Scheduled Ancient Monuments (SAMs).

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

There are 6 designated SSSIs (see Map 7) which are in some way associated with watercourses or wetlands. The middle and lower reaches of the River Ely itself are a SSSI and the best area in Wales for the rare flower, monkshood (Aconitum anglicus).

None of the Scheduled Ancient Monuments are directly associated with the aquatic environment.

The Taff-Ely estuary is designated a SSSI due to its importance as a feeding ground for birds. This area will be eliminated when the proposed Cardiff Bay Barrage is built.

Objectives

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

Environmental Requirements

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

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

4.6 CONSERVATION - ECOLOGY, LANDSCAPE AND HERITAGE

General

The protection of the aquatic ecosystem and designated sites for nature conservation are covered in the Fisheries Ecosystem and Special Ecosystems sections respectively. This section deals with the broader aspects of the conservation of wildlife, landscape and heritage features that extend beyond 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 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 or as 'listed buildings' but can be any feature of interest.

Local Perspective

Upstream of Talbot Green, the Ely catchment is similar to most of the South Wales valleys with a steep topography and considerable urban and industrial development. Downstream the catchment is more rural with development generally limited to small villages. This distinction is reflected in the types of habitats available. The upstream part of the catchment is dominated by acid or neutral grasslands, either rough pasture or improved. Many tributaries have narrow corridors of broad-leaved woodlands and small areas of marsh and mire. The ecology of the main river is less natural with areas of artificial bank and infestation with Japanese Knotweed and Himalayan Balsam.

Downstream there have been more agricultural improvements. There are numerous open-water habitats and fairly extensive areas of wet grassland, mostly associated with the main flood-plain and its high water table. These habitats are of considerable value to plants and birds, and bankside vegetation is often restricted to a single line of alders, although larger woodlands appear in the lowest part of the catchment. Japanese Knotweed and Himalayan Balsam are widespread.

Otters are known to frequent the main river and are also likely to be making use of some tributaries and ponds in the catchment. This distribution is confirmed in the Otter Survey of Wales 1991 (Vincent Wildlife Trust).

The Ely valley between Miskin and Peterston-Super-Ely is designated as an Area of Special Landscape Value in the Vale of Glamorgan Draft Local Plan.

Objectives

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

Environmental Requirements

Water Quality

- It is unlikely that there could 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 Fisheries Ecosystem class, while estuarial and coastal waters should conform with standards for the Protection of Sensitive Aquatic Life.

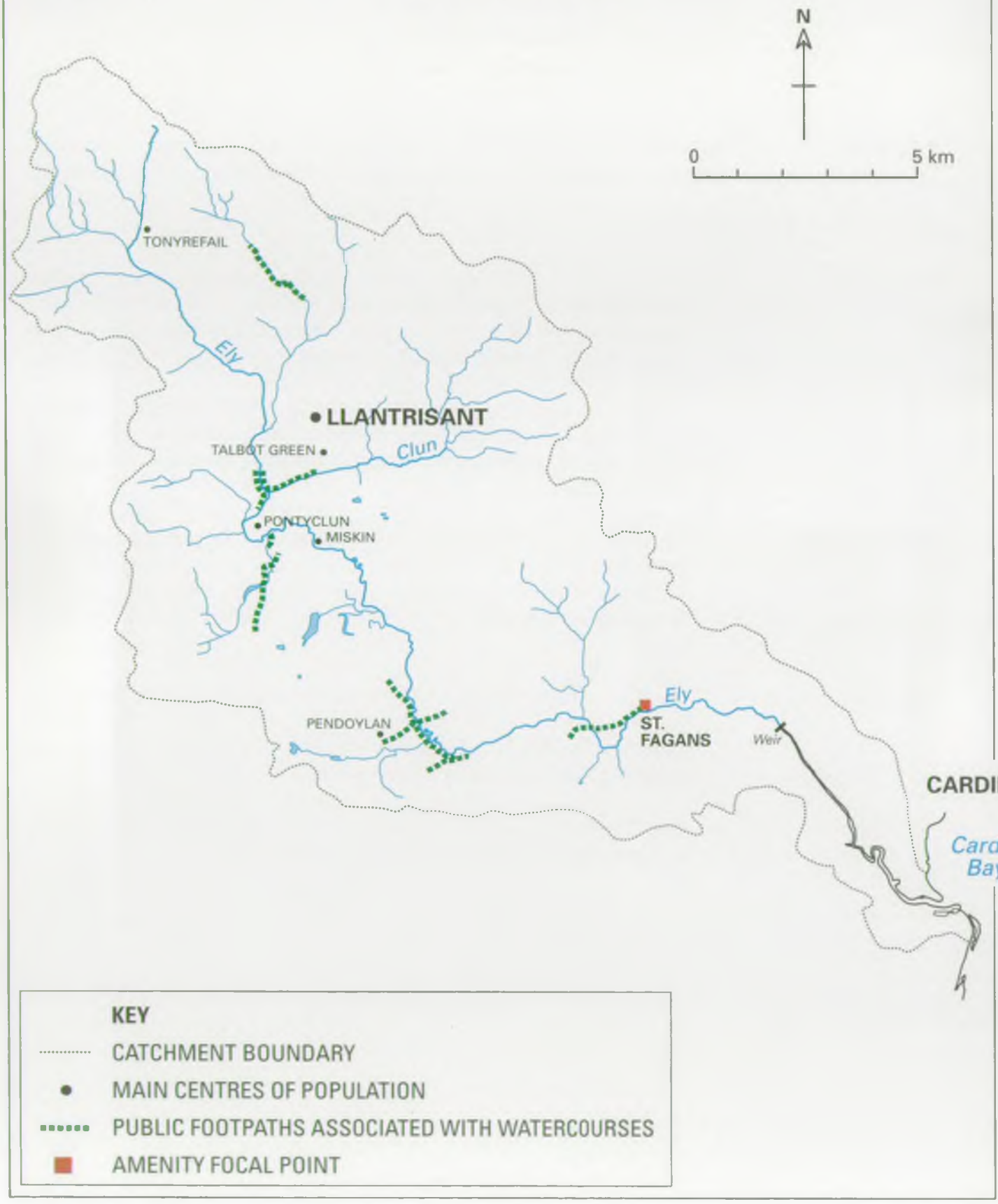
Water Quantity

- The Authority will develop and implement a Regional abstraction licensing policy that will enable the effective management of water resources within the catchment. This will achieve the right balance between the needs of the environment, abstractors and other river users.

Physical Features

- Physical features that give rise to natural beauty should be protected.
- Sites and buildings of interest should, where cost-effective, be protected from damage by flooding and/or drought.
- The diversity of natural in-stream features and river corridor plants and animals should be maintained and enhanced.

MAP 8. BASIC AMENITY



4.7 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 major focal point is the Welsh Folk Museum at St. Fagans (see Map 8). There are relatively few public rights-of-way adjacent to rivers and wetland though the low-lying land in the middle reaches provides access to an attractive area with opportunities for bird-watching.

Objectives

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

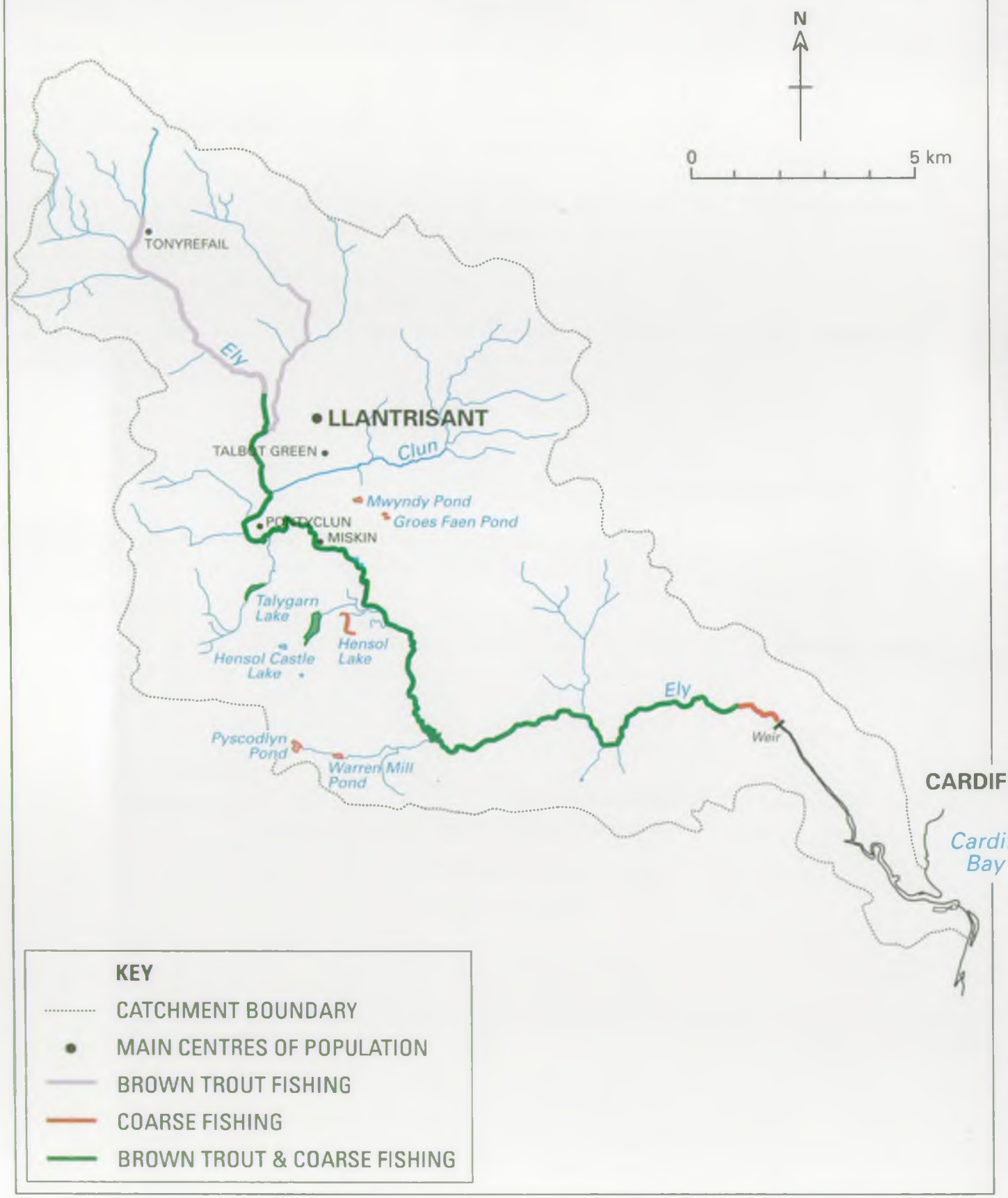
- The Authority will develop and implement a Regional abstraction licensing policy that will enable the effective management of water resources within the catchment. This will achieve the right balance between the needs of the environment, abstractors and other river users.

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 9. ANGLING



4.8 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 Ecosystem section.

In many ways the requirements for angling are very similar to those for the basic amenity use. However the NRA has formal responsibility towards angling, and issues rod licences that are 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

The River Ely from Cardiff to Tonyrefail provides an amenity for angling. Most fishing rights on the Ely and its tributaries are in private ownership with other stretches, particularly in urban areas, owned by the Local Authority. Fishing rights are often leased and occasionally owned by angling clubs.

Trout fishing takes place between Cardiff and Tonyrefail on the Ely and on the lower half of the Nant Mychydd. Trout stocks are supplemented in some areas through re-stocking by angling clubs. Trout are also fished at Talygarn Lake and Hensol Castle Lake.

Coarse fishing on the Ely occurs between the Cowbridge Road bridge in Cardiff to just above Talbot Green. Roach is the predominant species with fishing best in the middle reaches around Peterston-Super-Ely. Dace, chub and gudgeon are present in fewer numbers. The still waters of Groesfaen Pond, Hensol Castle Lake, Hensol Lake, Mwyndy Pond, Pyscodlyn Mawr Pond, Talygarn Lake and Warren Mill Pond are also important coarse fishing lakes.

Due to the current low numbers of salmon and sea trout there is, at present, no fishing for these species.

There is no commercial fishing on the Ely.

Objectives 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. - The Authority will develop and implement a Regional abstraction licensing policy that will enable the effective management of water resources within the catchment. This will achieve the right balance between the needs of the environment, abstractors and other river users.

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

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

4.9 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), waters must have met several criteria that include: high numbers of bathers, first aid facilities, life guards and toilets. Identified waters are required to achieve the mandatory bacteriological standards of the EC Directive and are sampled according to the DoE/WO guidelines during the bathing season (May to September inclusive). In Wales, these are exclusively saline waters.

Water Contact/Recreational 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

Canoeing takes place on the Ely in Cardiff as part of the North Ely Community Resource programme (supported by Cardiff City Council).

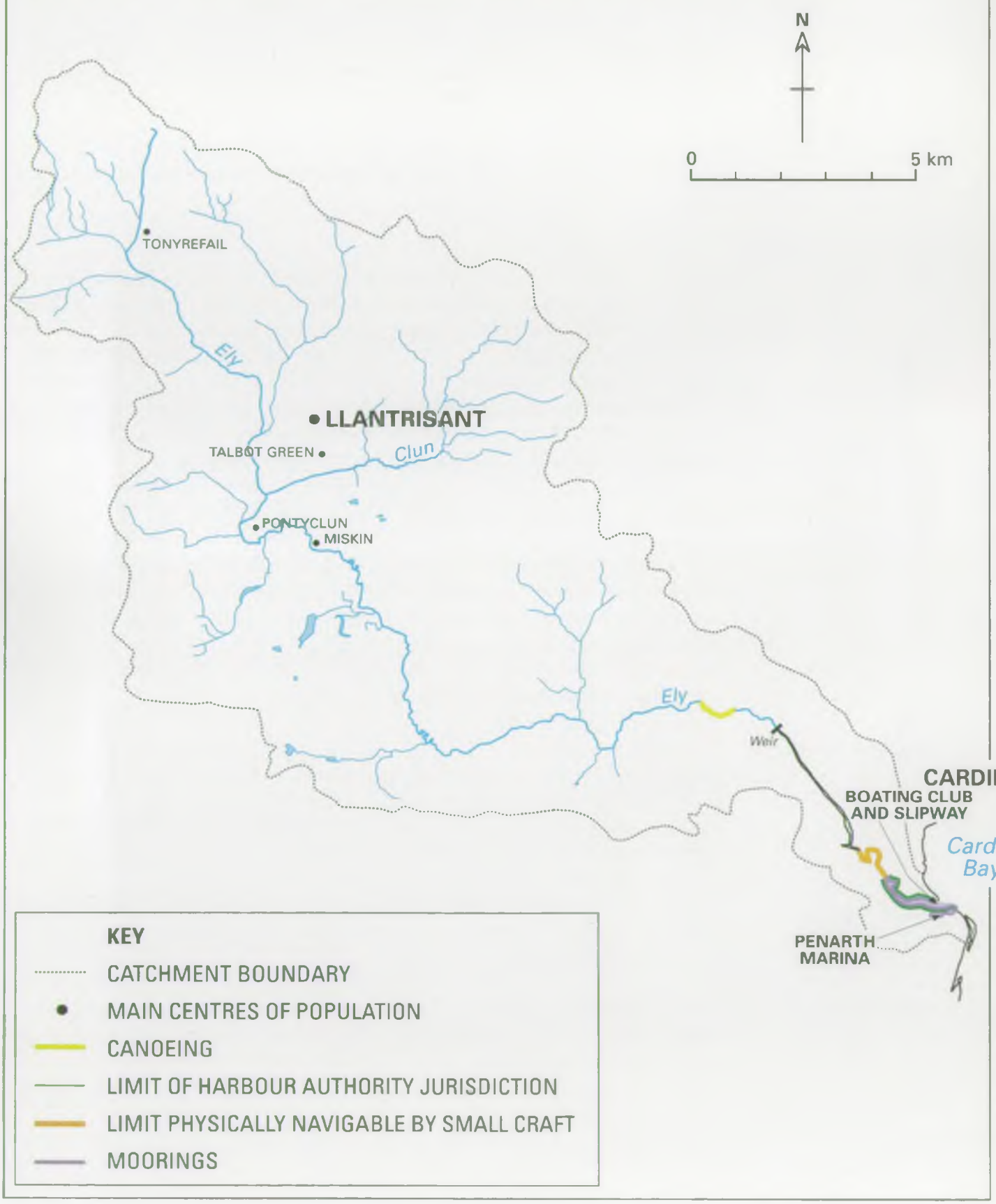
There is a private marina based in the former Penarth Dock where approximately 350 boats are moored.

Within the river channel about 200 moorings are occupied by the Penarth Motor Boat and Sailing Club, leased from the Harbour Authority - Associated British Ports.

Objectives

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

MAP 10. BOATING, NAVIGATION & WATERSPORT ACTIVITY



Environmental Requirements

Bathing in Identified Waters:

Water Quality At Identified Bathing Waters (EC Directive), water quality should conform with the mandatory standards contained within the EC Bathing Waters Directive.

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

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.

4.10 NAVIGATION

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.

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

Local Perspective

The NRA has no responsibility for the provision of navigation aids in the Ely estuary.

Responsibility for navigation is administered by Associated British Ports (ABP) from the north of Cardiff Bay to upstream of the first road bridge (Cogan viaduct).

The estuary is navigable as far as Leckwith bridge for small craft.

When the Cardiff Bay Barrage is complete, ABP will cease to be the navigation authority with responsibility passing to the Cardiff Bay Development Corporation. They will have byelaw powers up to Penarth railway bridge. The NRA will be consulted on any byelaws that affect discharges into water, fishing, watersports or other recreational activities.

Objectives

To maintain or help in the maintenance, as appropriate, of navigation to standards specified in the navigation orders.

Environmental Requirements

Water Quality.

- Compliance with the standards for Aesthetic Criteria should be achieved.

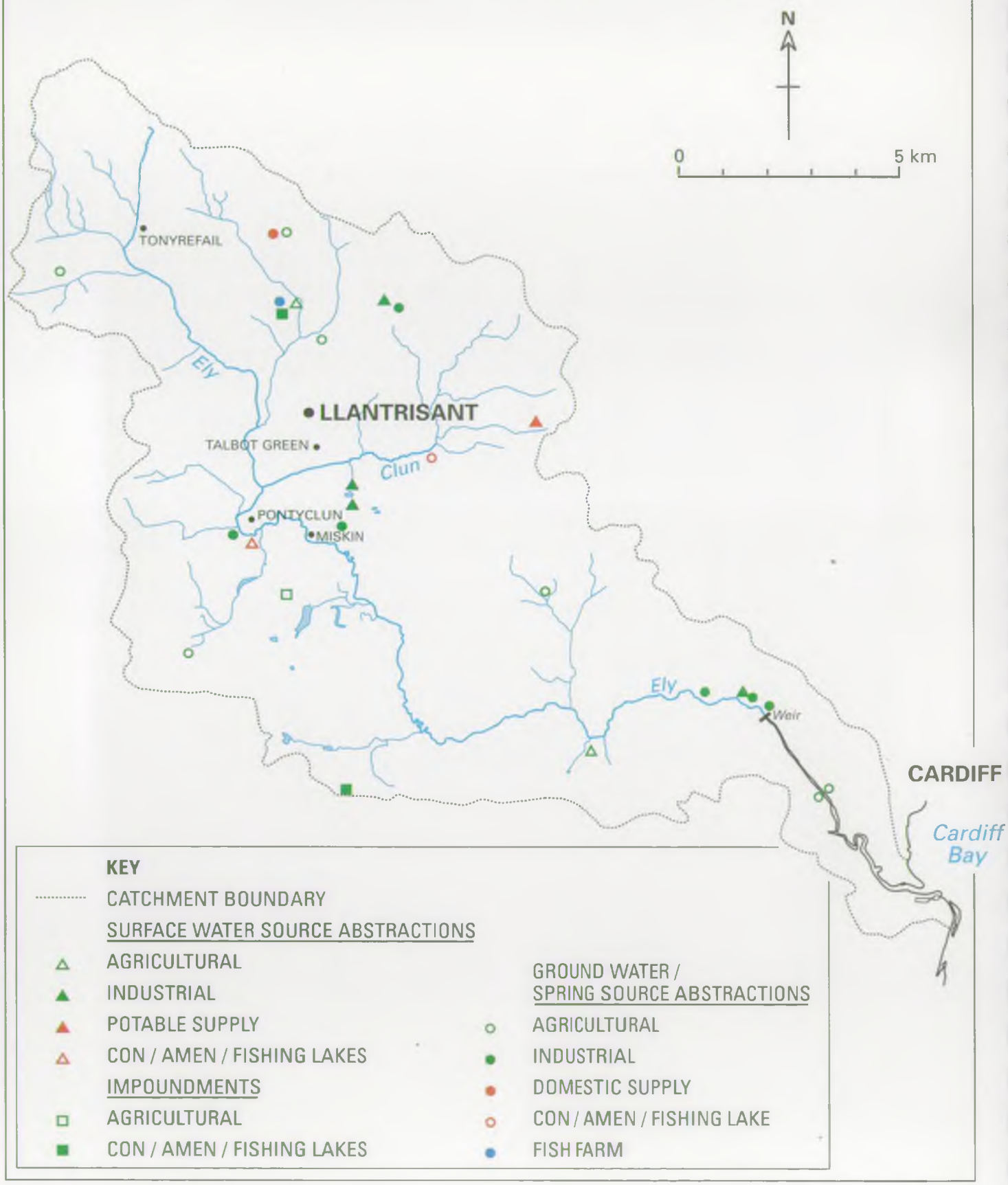
Water Quantity.

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

Physical Features.

- Where waters under the control of the NRA are used for navigation there shall be no obstruction to the passage of vessels.
- Any maintenance of navigation channels or aids to navigation should take into account other uses of the water.

MAP 11. ABSTRACTIONS AND IMPOUNDMENTS



KEY

CATCHMENT BOUNDARY

SURFACE WATER SOURCE ABSTRACTIONS

- AGRICULTURAL
- INDUSTRIAL
- POTABLE SUPPLY
- CON / AMEN / FISHING LAKES

IMPOUNDMENTS

- AGRICULTURAL
- CON / AMEN / FISHING LAKES

GROUND WATER / SPRING SOURCE ABSTRACTIONS

- AGRICULTURAL
- INDUSTRIAL
- DOMESTIC SUPPLY
- CON / AMEN / FISHING LAKE
- FISH FARM

4.11 ABSTRACTION FOR DRINKING WATER (POTABLE) SUPPLY

General

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

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

The NRA does not guarantee the quality of the raw water. However, it does have a duty to protect water quality generally and will specify protection zones around groundwater sources that seek to control certain potentially polluting activities. The Groundwater Protection Policy forms the basis for the NRA's activities in this area.

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

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

Local Perspective

Abstractions in the Ely catchment provide only a small proportion of the potable water used. Most drinking water originates from outside the catchment. Consequently, there are only two licensed abstractions for drinking water. Both of these are in the upper catchment (see Map 11) and represent only 1.25% of the volume licensed for abstraction.

Virtually all the water for this use in the catchment (0.37Ml/d) is from a surface water abstraction by Dŵr Cymru at Pentyrch Reservoir.

The second abstraction is a small volume (0.007 Ml/d) taken from a spring to supply domestic needs.

There are also some small abstractions for domestic drinking water which do not require a licence.

The demand for drinking water in the catchment, to supply business as well as private houses, could rise by as much as 13% over the next 30 years. All of the increase is likely to be met from supplies obtained outside the catchment.

Objectives

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

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

Environmental Requirements

Water Quality - The quality of water at licensed potable surface and groundwater abstractions should meet the standards set out in EC Surface Waters Directive (75/440/EEC) and 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 - Abstraction and associated activities must not lead to an unacceptable reduction in or alteration to the physical habitats required by other uses.

4.12 ABSTRACTION FOR AGRICULTURAL SUPPLY

General

All abstractions for agricultural purposes, apart from some small (less than 20 cubic metres per day) general agricultural Uses from surface waters, require an abstraction licence. This Use deals with abstraction from groundwaters and surface waters for agricultural use. This includes general stock watering, use around the farm and crop spraying, as well as for spray irrigation and fish farming purposes.

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

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

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

Local Perspective

There are nine abstractions used for stock watering and general agricultural use (see Map 11). Seven of these are from groundwater or spring sources, with two surface water abstractions from the headwaters of tributary streams.

Though agricultural abstractions constitute 38% of all licences in the catchment, the average size of the abstraction is small, 0.01 Ml/d (10m^3/d). Water use by agriculture is only 0.03% of the total licensed water use in the catchment, and of this about 60% is returned to the river or groundwater after use.

In addition to these abstractions, there is an impoundment of water near Miskin. This creates a lake for stock watering, from which no abstraction of water is authorised. There is virtually no loss of water from the catchment caused by the impoundment.

Fish Farms

There is one additional abstraction from the Nant Mychydd which is used for commercial fish farming. This is small (0.56Ml/d) and all the water is returned to the river system.

The increase in demand for water for agriculture is less than 1% per year.

Objectives

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

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

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

Environmental Requirements

Water Quality - The quality of water at licensed surface and groundwater abstractions should meet the standards set out in EC Surface Waters Directive (75/440/EEC) and 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 - Abstraction and associated activities must not lead to an unacceptable reduction in or alteration to the physical habitats required by other uses.

4.13 ABSTRACTION FOR INDUSTRIAL SUPPLY

General

All abstractions used for industrial or commercial purposes must be authorised by a licence granted under the Water Resources Act 1991.

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

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

Local Perspective

Industry is licensed for a total of 33.53 Ml/d, making this the principal abstractor of water in the catchment. There are ten industrial abstractions which are licensed. Four abstractions are from surface water, whilst six are from groundwater sources or springs (see Map 11). In addition the Royal Mint at Llantrisant abstracts water but is exempt from requiring a licence due to its Crown status.

The ten licensed abstractions constitute 42% of authorised abstractions and over 95% of total licensed water used within the catchment. These abstractions are concentrated into three clusters; at Tynant (for Coal Products Ltd.), and around Pontyclun/Llantrisant and Western Cardiff (for mixed industrial use).

The largest single user of water is Arjo Wiggins paper mill in Cardiff which is licensed to abstract 22.73 Ml/d from the River Ely at its tidal limit in Cardiff. This abstraction accounts for 66% of the authorised daily abstraction from the catchment.

Direct abstraction by industry in the catchment will probably not increase over the next 30 years.

Objectives

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

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

Environmental Requirements

Water Quality - For industrial abstractions the standards for Aesthetic Criteria will be met and there should be no deterioration in water quality compared to when the abstraction licence was granted.

Water Quantity - The Authority will develop and implement a Regional abstraction licensing policy that will enable the effective management of water resources within the catchment. This will achieve the right balance between the needs of the environment, abstractors and other river users.

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

4.14 ABSTRACTION FOR AMENITY PURPOSES

General

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 supplies and will be subject to the normal abstraction licensing procedure. There may also be a requirement for a discharge and/or land drainage consent.

Many amenity ponds are constructed in flood plain areas and consequently pose a problem to any other flood plain development. The NRA will seek to ensure that such developments and associated works do not affect the natural river environment.

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.

Spray irrigation is a high impact use of a water resource and as such is more strictly controlled than other types of abstraction. This is because it takes place when flows are lowest and no water is returned to the river after use. The NRA encourages winter abstraction into storage and would not usually apply restrictions to winter abstracted water. The winter abstraction charges are only one-tenth of those for summer abstraction.

Local Perspective

Fishing Lakes

There are two abstractions and two impoundments used for maintaining levels in fishing lakes. The combined quantity of water abstracted for this purpose is only 0.6 Ml/d, less than 2% of licensed water use. Moreover all the water is returned to the river system after use. The only reduction in river flows is a minor one between the abstraction and discharge points. One of the stock watering lakes on the Nant Mychydd is also used to provide water for a fishing lake.

Spray Irrigation

A Golf Club abstracts water from a spring to water the area during the summer. The abstraction is small (0.08Ml/d) though none of it is returned to the river system.

Water demand for amenity purposes is expected to rise slightly in line with the expected increase in population in the catchment.

Objectives

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

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

Environmental Requirements

Water Quality - While the developer must ensure that the intended source of water is fit for the proposed use(s) all waters should 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 - There should be no alteration of the river channel or flood plain that would reduce its fishery and conservation value or increase flood risk.

4.15 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 authorisation issued is consistent with protecting the Uses of the receiving water and also the broader commitment to the reduction of dangerous materials in the environment. Where pollution prevention measures are stated by HMIP these must also be consistent with NRA pollution prevention policy.

Trade effluent is discharged to sewers with the permission of the sewerage undertaker (Dŵr Cymru in Welsh Region) and is then subject to the sewage effluent treatment and disposal controls outlined in Section 4.17.

Local Perspective

The catchment has a considerable industrial presence including coal processing, cosmetics manufacture, chemical processing and electronic industries principally centred around the Llantrisant area.

There are several consented discharges of industrial effluent to surface or groundwater (see Map 12). The most significant is Coal Products Ltd Cwm Coke Works situated in the Clun catchment. The coke works is a heavy industry site producing metallurgical coke. It produces effluent rich in ammonia and suspended solids. Another coal processing effluent enters the River Clun system from Maxibrite Ltd., which manufactures smokeless fuel briquettes at Mwyndy. Both of these sites are controlled by HMIP.

Arjo Wiggins Paper Mill, is situated at the head of the Ely estuary. This company formerly had a significant impact on estuary quality but now discharges consist only of a small quantity of process water, cooling water and site surface drainage with no impact.

Other industrial effluents with discharges to the river include those from the Royal Mint and Hume Pipe Works. There are also many discharges of surface drainage from industrial premises that drain to the river system.

The majority of industrial effluent enters the public foul sewerage system and is treated at sewage works. Industrial effluent accounts for approximately 20% of the current dry weather flow at Coslech sewage treatment works.

Increasingly land within the catchment is being developed for industrial estates (see Map 3). This poses an increasing risk to surface and groundwater quality from spillages or industrial accidents. Industrial sites are regularly inspected to ensure that appropriate preventative measures are taken to minimise the risk to the water environment.

Objectives

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

Environmental Requirements

Water Quality

- Discharges should comply with all conditions stated within discharge consents. This will be enforced by the NRA.
- There should be no deterioration in water quality above the discharge below that assumed when the discharge consent was calculated.

Water Quantity

- Consent conditions will be derived taking into account the upstream dilution available under average and dry weather flow conditions.
- The Authority will develop and implement a Regional licensing Policy, which will enable the effective management of water resources within the catchment. This will achieve the right balance between the needs of the environment, abstractors and other river users.

Physical Features

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

MAP 12. TRADE AND MINERAL WORKING SITES

4.16 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 runoff and reduce the recharge of groundwaters by rainfall.

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

Gravel extraction may take place from the river channel or 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

Site drainage from Forest Wood and Creigiau quarries discharges into this catchment (see Map 12). These discharges have localised impacts on the receiving waters. Improvement works are planned for Forest Wood and Creigiau quarries to further reduce the impact of these discharges.

Although the coal industry presence within the catchment has all but gone, associated land reclamation schemes at Coedely and Cwm (see Map 12) are planned and will need careful control to prevent river pollution.

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

Environmental Requirements

Water Quality

- All consented discharges must comply with the conditions stated within the consent. This will be enforced by the NRA.
- There should be no deterioration in water quality above a consented discharge, from that assumed when the discharge consent was calculated.
- Measures must be taken to prevent diffuse pollution that may arise from rainfall runoff.

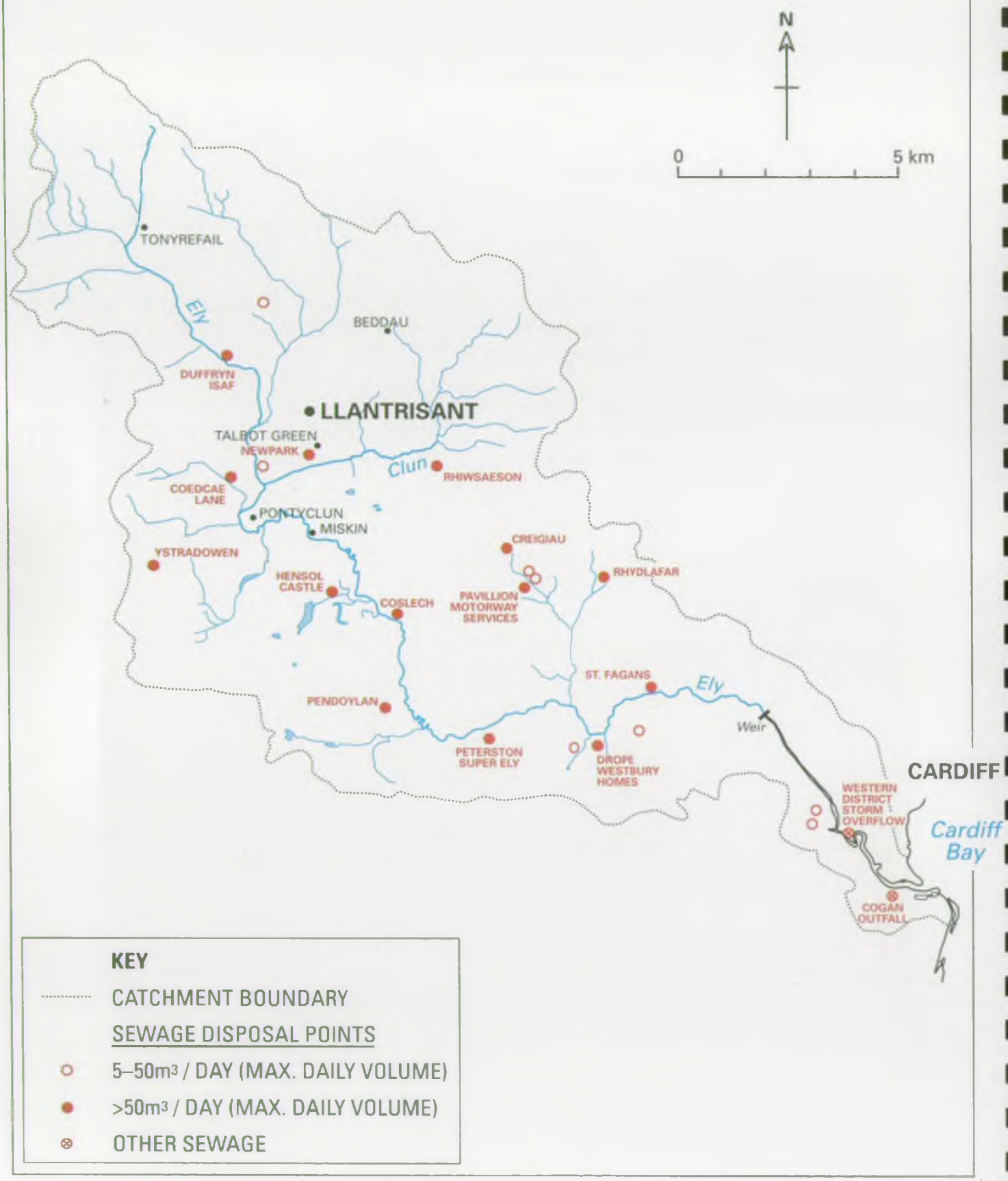
Water Quantity

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

Physical Features

- Mineral working, land reclamation and associated activity should not reduce the quality of the physical habitats available in the water environment.
- The aesthetic quality of restored landscapes should be in keeping with the overall nature of the catchment and reflect the local needs for amenity and recreation.

MAP 13. SEWAGE EFFLUENT DISPOSAL



KEY

CATCHMENT BOUNDARY

SEWAGE DISPOSAL POINTS

- 5–50m³ / DAY (MAX. DAILY VOLUME)
- >50m³ / DAY (MAX. DAILY VOLUME)
- OTHER SEWAGE

4.17 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. They are designed to only operate 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 handles the bulk of sewage effluent discharged to freshwaters, although the greater number of STWs are privately owned.

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

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

Increasing quantities of sewage sludge are being disposed of by surface spreading onto, or injection into, farmland. This is a direct result of implementation of a commitment by the U.K. Government to cease sewage sludge dumping at sea by 1998. A waste disposal licence is not required for land spreading provided the sludge application is beneficial to the land. The contractor is expected to provide details of the sludge application to the Local Authority under provisions in the Sludge (Use in Agriculture) Regulations 1989. It is considered essential that sludge disposal to land is performed by competent operators if surface and groundwater pollution is to be avoided.

Local Perspective

There are 20 sewage works with effluent discharges of more than 5 m^3/d. There are also numerous discharges to ground from septic tanks serving individual properties.

The principal discharges are from Coslech STW serving Ynysmaerdy, Llantrisant, Talbot Green, Miskin, Llanharry and Pontyclun areas and Dyffryn Isaf STW; serving Tonyrefail. Coslech is currently treating sewage passed forward from a third major STW at Rhiwsaeson. The Rhiwsaeson STW has been temporarily "mothballed"' until treatment capacity at Coslech has been fully utilised. Pressure for development in the Coslech catchment is such that this is likely to take place within the next 2 years during which time Rhiwsaeson works will be rebuilt.

The total sewage effluent discharged to surface water in the catchment is approximately 20M1/d (in dry weather conditions). This represents nearly 41% of the dry weather flow of the River Ely at St. Fagans.

There are 45 combined sewer overflows (CSOs) in the catchment. The majority are unscreened and permit the discharge of sewage solids.

The sewage systems serving the three main works have been modernised in recent years and do not now pose a significant threat to water quality. The major exception is the trunk sewer between Beddau and Rhiwsaeson works. Renewal of this length is programmed for completion in 1994 and will result in a substantial improvement in the quality of the River Clun.

The estuary is currently used for the discharge of substantial amounts of crude sewage from Cogan outfall and several combined sewer overflows. The CSO discharge from Cardiff Western Pumping Station is particularly large and can contain oil and listed substances.

Sewage Sludge to Land

Following representation by this Authority the main disposal contractor has agreed to a system of renotification enabling this Authority to comment on sites of particular sensitivity in the last 12-18 months. Filter cake from Coslech STW and digested sludge from Penybont STW (Bridgend) are spread to agricultural land in the middle reaches of the catchment.

Objectives

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

Environmental Requirements.

Water Quality.

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

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

Water Quantity.

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

- The Authority will develop and implement a Regional licensing Policy, which will enable the effective management of water resources within the catchment. This will achieve the right balance between the needs of the environment, abstractors and other river users.

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.

4.18 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

There are many dozens of farms in the catchment, ranging from small mixed sheep and dairy farms in the north, to larger beef and dairy farms in the south. There is very little arable farming. A general trend towards intensification of beef and dairy farms in the catchment has led to an increase in silage production. Adequate silage liquor and slurry storage and disposal facilities are required if water pollution is to be prevented. Several farms have used the Ministry of Agriculture Fisheries and Food

(MAFF) Farm and Conservation Grant Scheme to uprate their systems, whilst others continue with existing facilities, relying on frequent maintenance to avoid river and groundwater pollution.

Agricultural Land Drainage

Predecessors of the NRA (Glamorgan River Board and Glamorgan River Authority) carried out river channel widening and regrading between Pontyclun and St. Georges-Super-Ely during the 1950s and 60s. The purpose of these works was to improve land drainage and thereby increase the productive value of farmland. Extensive work was carried out on the Ystradowen and Pendoylan moors.

With the change in priority for river works away from agricultural land drainage toward flood defence, the NRA only considers requests for maintenance of land drainage schemes where good husbandry of the land is clearly in evidence.

Schemes to restore and improve the drainage of Ystradowen moors for agricultural purposes have been considered on a number of occasions. The most recent of these, eight years ago, involved the removal of silt from Talygarn Lake and lowering of its outlet weir. However, the environmental damage caused by lowering of the water table and deposition of silt near the lake or on redundant farmland upstream was viewed to be unacceptable..

Objective

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

Environmental Requirements

Water Quality

- All consented discharges should comply with the conditions expressed in the consent. This will be enforced by the NRA.
- The codes of practice for the handling and use of Pesticides, Herbicides and Fertilisers should be strictly followed.
- Where applicable, the management practices set out for Nitrate Sensitive Areas should be strictly followed.
- The Code of Good Agricultural Practice for the Protection of water should be complied with as should the Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) Regulations 1991.

Water Quantity

- The Authority will develop and implement a Regional abstraction licensing policy that will enable the effective management of water resources within the catchment. This will achieve the right balance between the needs of the environment, abstractors and other river users.

Physical Features

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

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

4.19 FORESTRY

General

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

- Increased sediment load and runoff rate to rivers that can increase the flood defence maintenance requirement and may also destroy key conservation features.

- Increased water use by the trees can also reduce the baseflow in the streams and rivers in the catchment.

- In sensitive areas water quality can become too acid for fish and other wildlife to survive, as the dense tree canopy increases the effects of acid deposition often referred to as 'Acid Rain'.

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

A survey of the soil types and geology in England and Wales has been undertaken by the Institute of Terrestrial Ecology. This highlighted areas in the Welsh Region, where afforestation may pose a risk to water quality. This 'indicative' information will be used to screen consultations received on future forestry developments. Forestry proposals which relate to any sensitive areas shown on the map opposite will be considered on a case by case basis, by the NRA.

Local Perspective

There are almost 700 hectares of commercially managed forestry in the catchment in the Ynysmaerdy and Hensol areas. This represents about 4% of the total land area of the catchment. None of the catchment is identified as being in a "Sensitive area" as defined in the NRA Forestry policy.

Objective

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

Environmental Requirements

Water Quality - That the provisions of the Forests and Water Guidelines should be complied with in all cases to minimise the impact of forestry on water quality.

Water Quantity - The Authority will develop and implement a Regional abstraction licensing policy that will enable the effective management of water resources within the catchment. This will achieve the right balance between the needs of the environment, abstractors and other river users.

Physical Features - That the provisions of the Forests and Water Guidelines should be complied with in all cases to minimise the impact of forestry on the physical environment

SECTION 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 14. WATER QUALITY TARGETS

5.1 WATER QUALITY TARGETS

General

There are two aspects of water quality assessment; the first relates to the classification of waters according to a graded system, the second to the measurement of achievement of specific targets. The first aspect has, for many years, involved using the former National Water Council (NWC) system where water quality classes range from excellent to very poor. In future this will be superseded by the General Quality Assessment Scheme currently under development within the NRA. The new system will also include biological and fisheries elements and will provide an overall snapshot view of river water quality across the country.

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 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 EC Directive for Bathing Water, Freshwater Fisheries, Dangerous Substances and Urban Wastewater Treatment and are constructed to give a complete coverage of water chemistry. The targets set represent the most stringent water quality requirement and reflect the visionary concept of Catchment Plans.

WQOs

In recognition of the benefits of this use-related approach to water quality management and assessment, the NRA has recommended a system to the Department of the Environment, which in line with the provisions of the Water Resources Act 1991, can give Water Quality Objectives (WQOs) a statutory basis. If the system is approved these Water Quality Objectives will be ultimately introduced to all catchments via the Catchment Planning programme.

Catchment Targets

The Ely catchment targets are based on the two Uses which have the strictest requirements namely:

- *Fisheries Ecosystem*
- *Basic Amenity*

Coarse fish also inhabit most of the catchment and water quality targets for these fish are satisfied by the more stringent requirements of salmon and trout.

The water quality requirements have been summarised in Map 14. Essentially the objective is to attain fisheries ecosystem Class 2 throughout the catchment. This is considered to be the most realistic water quality target commensurate with the heavy demands placed on the river by other uses. Stretches where a lower target has been set are detailed below..

River Clun

The Clun up to and including the Nant Myddlyn at Beddau is affected by discharges from Cwm Coke Works and Rhiwsaeson STW. It is anticipated that there will continue to be an intractable diffuse input from the coke works industrial site together with the low dilution of the sewage effluent which precludes achievement of Class 2 (see map 14 for target classes).

River Ely

The discharge from Coslech sewage treatment works is afforded limited dilution by the river and therefore a fisheries ecosystem Class 3 (high class cyprinid) is considered to be a more realistic target for the river between the STW and Peterson-Super-Ely.

5.2 GROUNDWATER PROTECTION TARGETS

General

The NRA has produced a "Policy and Practice for the Protection of Groundwater" (PPPG) which provides advice on the management and protection of groundwater on a sustainable basis. This new policy deals with the concept of vulnerability and risk to groundwater from a range of human activities. It considers protection both around the point of abstraction and for the area which drains to the abstraction point.

It deals in particular with:

* discharges to underground strata
* waste disposal to land
* disposal of slurries and sludge to land
* physical disturbance of aquifers affecting quality and quantity
* contaminated land
* diffuse pollution and unacceptable activities in high risk areas.

The implementation of the policy relies in part on the construction of a series of maps showing the location of the sources to be protected (protection zone maps).

The Policy recognises three groundwater source protection zones, which are currently being defined. These are:

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.

Zone II (Outer Source Protection)

Area defined by 400-day travel time.

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.

Resource protection maps will also be produced after considering how vulnerable to pollution the groundwater is, based on the nature of the strata and type of soil and drift cover. These maps should be completed by 1996.

Local Perspective

The Welsh Region is implementing this national policy framework for the protection of groundwater which will effectively manage groundwater protection in the area of the Ely catchment.

The particular activities listed in the general introduction above are now considered in more detail.

Discharges to Underground Strata

The NRA has powers under the Water Resources Act 1991 to exert control over discharges of sewage and trade effluents to underground strata. It will seek to prevent any discharge into underground strata, either directly or via sub-surface soakaways, which may lead to pollution of groundwaters.

Waste Disposal

The NRA is a statutory consultee to both the Planning and Waste Regulations Authorities for such proposals, and will exercise the PPPG through these controls.

Disposal of Sludges and Slurries to Land

Disposal of sludges and slurries to land includes wastes from agriculture, industry and sewage treatment. Provided the activities conform to certain criteria, there are no statutory controls governing them, other than EC legislation covering sewage sludge disposal. Nevertheless, the NRA is committed to limiting this activity in Source Protection Areas and this is being achieved by enlisting the co-operation of disposal contractors in their use of land.

Physical Disturbance of Aquifers

Physical disturbance of aquifers will include activities such as mineral extraction and construction projects involving excavation work. The NRA can influence the proposals through its role as a Planning consultee and, where appropriate, through its own licences and consents.

Contaminated land

There are areas of contaminated land in the catchment. These have resulted from historic industrial use around Coed Ely, Beddau, Grangetown and Talbot Green. Contaminated land can cause aquifer pollution at some sites, and redevelopment of the sites would have to be carefully controlled.

Diffuse Pollution

Diffuse pollution is not attributable to any one location and is therefore principally governed by land management. Other than by the creation of 'Water Protection Zones' and 'Nitrate Sensitive Area', opportunities for the NRA to influence this are limited.

5.3 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 abstraction 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 enviroment, or if conditions can be imposed which restrict their impact.

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

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

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

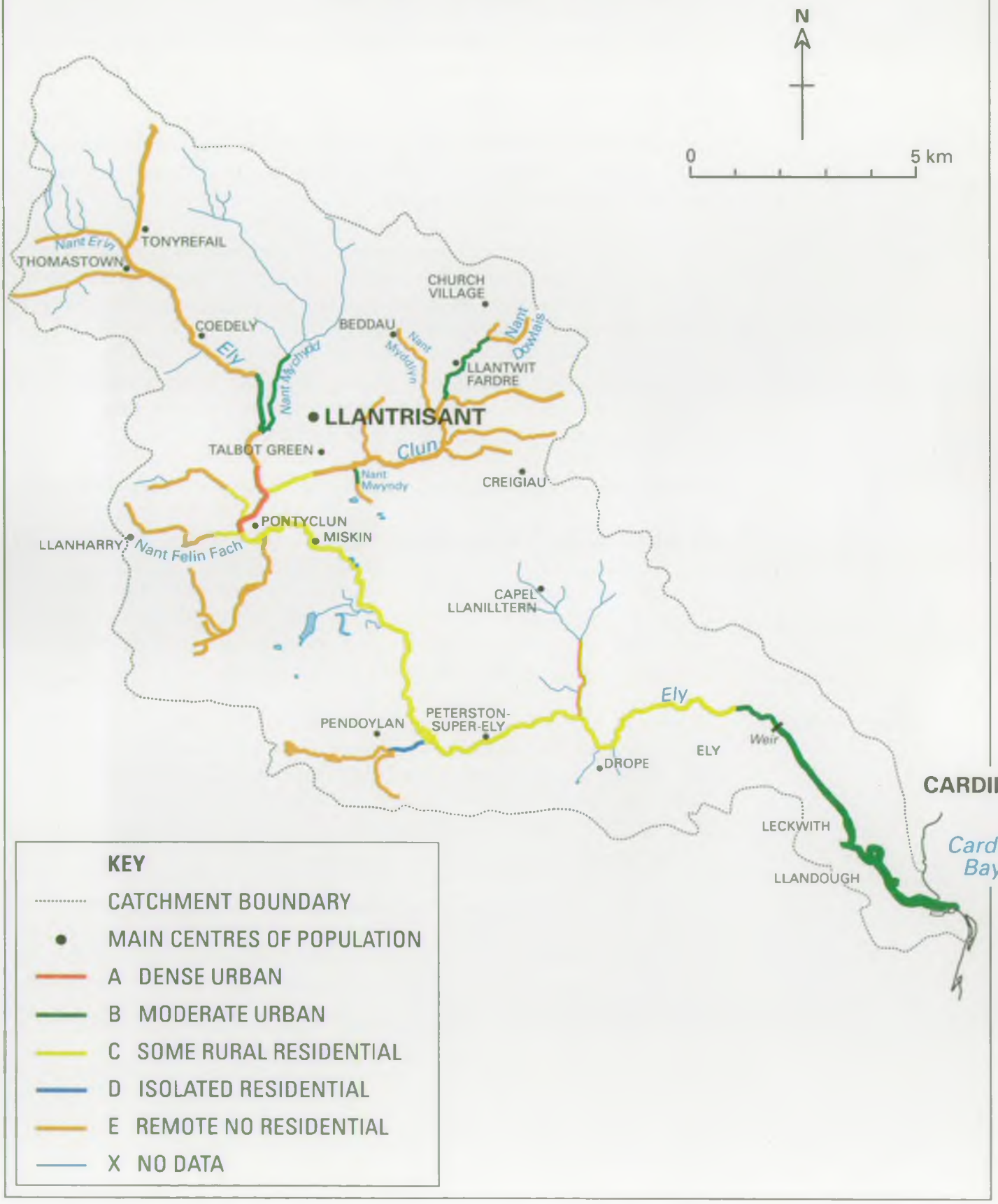
The NRA is analysing information on water use and is preparing a Regional Water Resources Strategy, It will be reviewing forecasts of future demand to try and anticipate needs for water resources developments and consider ways to meeting those future demands.

Local Perspective

At present, it is impossible to make a detailed assessment of the needs of the river. Therefore, until the implementation of the new licensing policy, it is the natural 95-percentile flow (Q95) that the NRA intends to protect. Thus, when determining new licences or enforcing existing ones, the NRA shall seek to prevent abstractions artificially reducing the river flow below the natural Q95.

These target flows apply when considering new abstractions from either surface or groundwater. It is necessary to include groundwater, because although groundwater use is limited within the catchment, over-abstraction from groundwater can, in certain circumstances, be reflected in reductions of surface water flows.

MAP 15. FLOOD DEFENCE TARGETS



5.4 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.

FLOOD DEFENCE TARGETS

A system is under development by the NRA to determine the present standard of service being achieved for Flood Defence maintenance.

The system determines whether present levels of river maintenance have produced a level of protection within, above or below a target standard. The river system is divided into reaches and an assessment is made of the 'Land Use' by considering for each, the agricultural or urban content within the flood plain. For each element (eg road, house, intensive gazing) a score is given. The score is measured by a single unit called a House Equivalent. The reach is place into one of several Land Use Bands according to the total score achieved (see Map 15).

Notwithstanding the newly adopted Land Use Band system, the policy of Welsh Region NRA has historically been to set the following general targets:

The target standard for flood defence schemes is protection of people and property from inundation by floodwaters:

- *for domestic, commercial and industrial property against flood events up to 100 year frequency and*

- *for land, against flood events up to 5 year frequency, depending on the land use.*

(When target standards cannot be justified economically, it may be possible to accept a lower, justifiable standard).

The NRA also aims to ensure the following:

- *Provision of adequate outfalls to existing land drainage systems, to allow them to perform efficiently.*
- *Provision of suitable access for maintenance of the river/channel and sea/tidal/flood defences and for the construction of new defences as required.*
- *Maintenance of unobstructed river flow by the removal of excessive shoals and other major obstructions especially in urban areas.*
- *Continued operation of food defence structures to ensure adequate flood protection of all identified uses.*

Flood Warning *The NRA is currently looking to develop suitable targets for flood warning.*

DEVELOPMENT TARGETS

With regard to development, the following targets are used:

- *No increase in flood risk as a result of development.*
- *No new development in an area where the existing level of flood defence protection is considered below the standard required for the type of development proposed.*
- *Provision of suitable access for maintenance of the river channel and flood defences.*
- *No deterioration of surface or groundwater quality as a result of development.*
- *No development which would lead to derogation of the water resources.*
- *No development which would have a detrimental effect on the wildlife of the water environment. Development to enhance wildlife where possible.*

FISHERIES TARGETS

Fisheries distribution targets are identified on Map 16. These targets are related to those for physical features and water quality and can be described as follows:

Salmon and Sea Trout

It is intended that a self-sustaining population of salmon and sea trout be regenerated in the Ely to support a moderate rod fishery. If this target is attained salmon and sea trout will be available for angling in the lower middle reaches of the Ely below Pontyclun. Fish will spawn in the upper river where there are suitable gravels and it is likely that sea trout will ascend further up the system than salmon.

When fish passage problems have been addressed the regeneration will be assisted by a 5 year programme of stocking juvenile salmon and sea trout.

The eventual aim is unimpeded access for migratory salmonids through the estuary and river to all potential spawning reaches with adequate holding pools throughout the catchment and to obtain suitable habitat for salmonid breeding with adequate distribution of potential redd sites and nursery areas.

Brown Trout

Brown trout are present in the majority of the catchment now. As water quality continues to improve the numbers of trout are expected to increase and repopulate new areas, such as the Clun below Llantrisant.

Coarse Fish

Coarse fish populations will continue to thrive in the Ely catchment and their spread will be restricted only by the physical size and nature of the river channel. Water quality should become adequate for fish in the Clun but there is insufficient depth for sustainable populations above Rhiwsaeson.

Whilst roach populations are thriving in the Ely, introductions of dace and chub are planned to boost the regeneration of these important and popular species.

The overall aim is to improve in-river habitat for coarse fish spawning where required and possible.

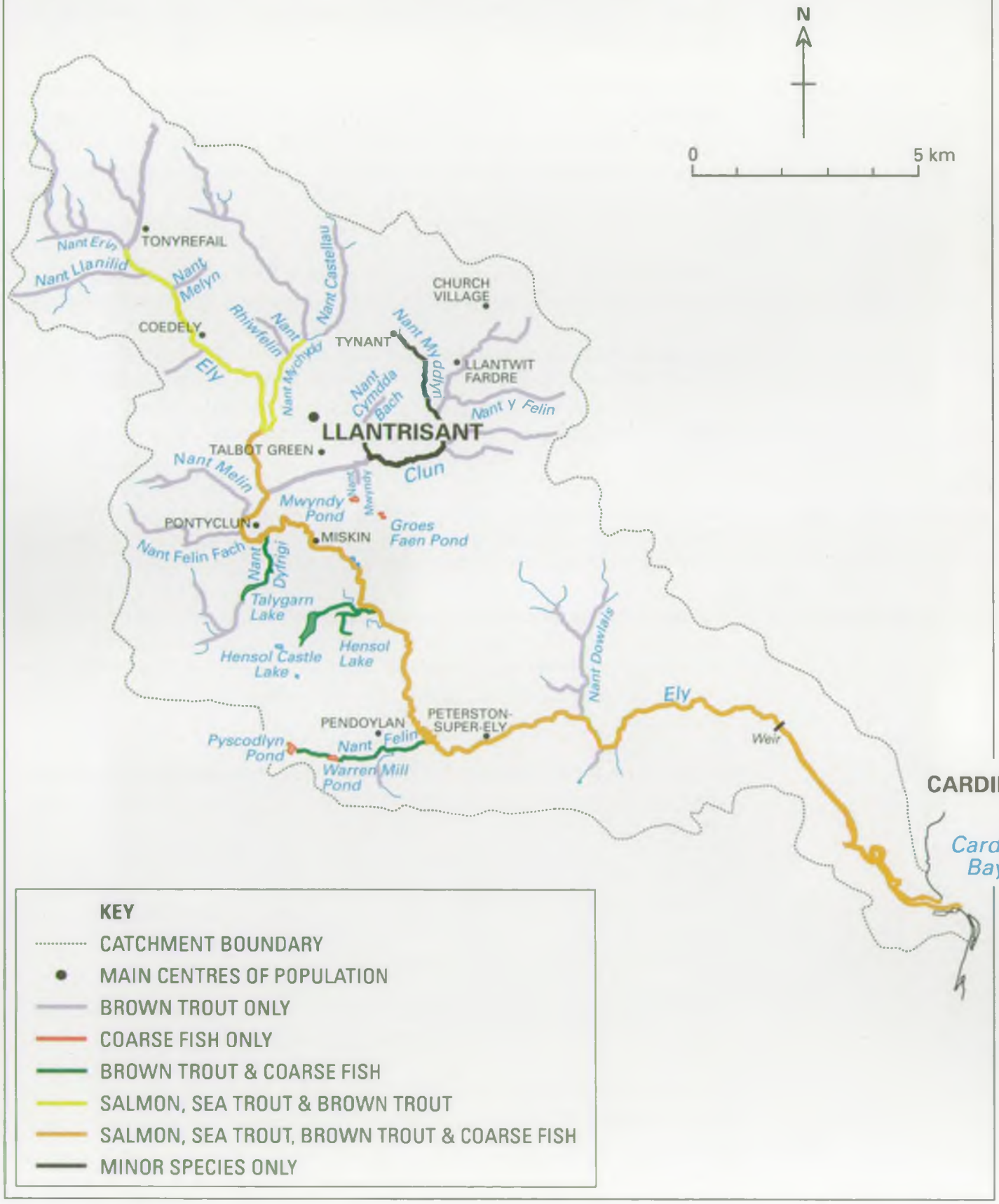
Minor Species

No additional barriers to fish migration.

Effective fish screens on all abstractions and, where necessary, discharges to protect wild fish stocks and prevent escapement from fish farms.

Improve in-river habitat for coarse fish, salmon and trout and for angling where required and possible. Ensure no degradation.

MAP 16. FISHERIES TARGETS



CONSERVATION TARGETS

The NRA is currently developing a national habitat Classification Scheme and an Otter Conservation Strategy. These in addition to the Strategic River Corridor Survey will assist in setting specific targets for conservation. Until more details targets are set the following general targets apply:

- *undertaking river works in a manner that has regard to, and where appropriate increase, the conservation value.*
- *encouraging the creation of a riparian buffer zone.*
- *responding to NRA consent applications and development proposals.*

Protection of historical and archaelogical features and those contributing to local heritage.

Promotion and support of initiatives for the maintenance and enhancement of wetland, wet meadows, bankside and in-stream habitats.

To agree with CCW a standard of service relating to all SSSIs affected by NRA operations.

RECREATION TARGETS

Promotion of suitable access and associated facilities appropriate for identified recreational uses.

Implementation of policies and procedures to minimise the disturbance of river and engineering works to angling conditions.

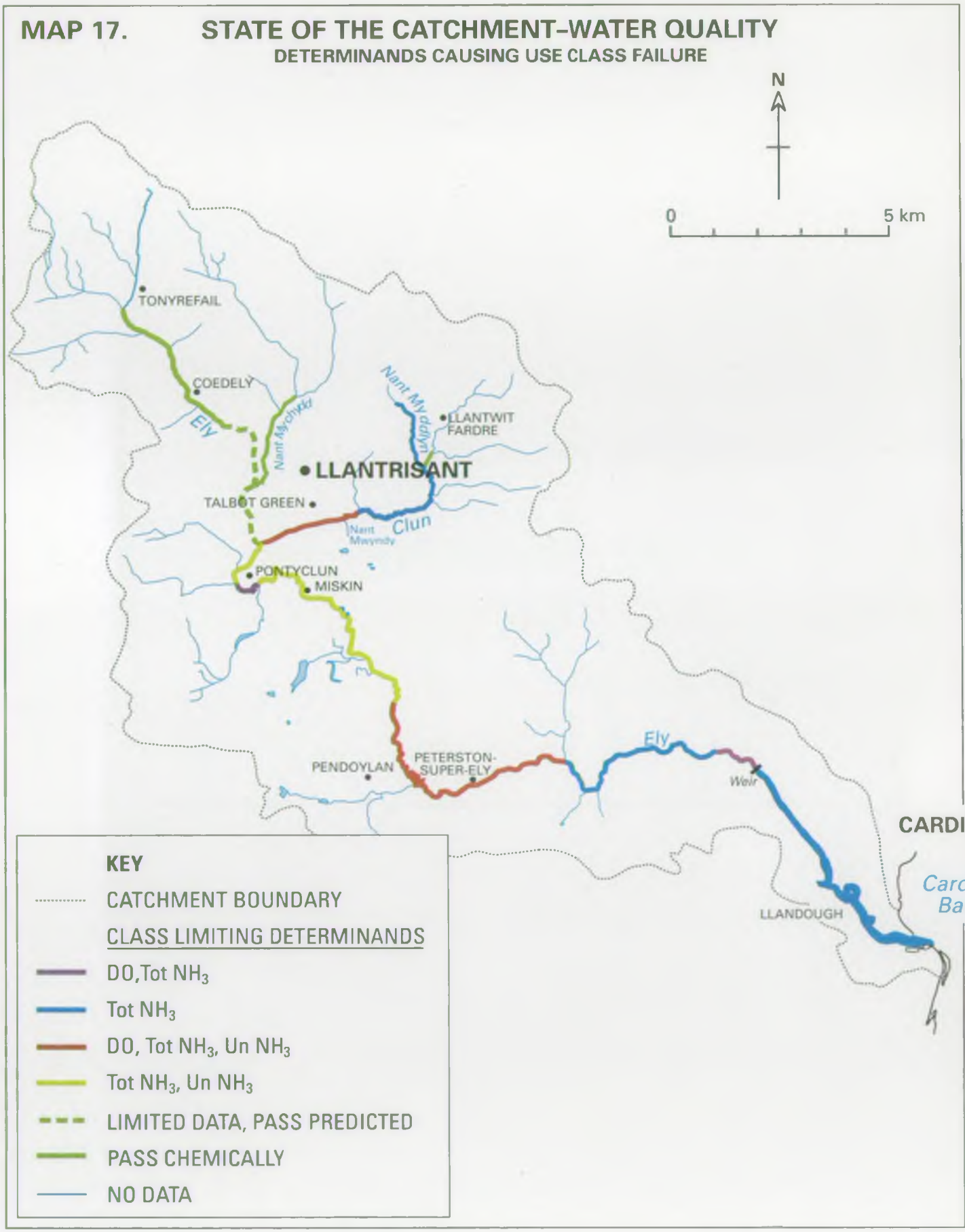
Support the development of water contact/recreational uses in the Cardiff Bay to a level appropriate to the water quality.

SECTION 6.0 THE STATE OF THE CATCHMENT

The following section examines the ability of the catchment to support the Uses identified in Section 4, by assessing compliance with the targets set out in Section 5. In this manner the key Issues in the catchment are identifed. **The Issues and potential solutions are discussed in detail in Section 3 in Part 1 of this Consultation Plan.**

MAP 17. STATE OF THE CATCHMENT–WATER QUALITY

DETERMINANDS CAUSING USE CLASS FAILURE



6.1 WATER QUALITY

General

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

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

The following section illustrates the results of this analysis and it is stressed that all the catchment passes its identified targets, unless it is specifically stated otherwise.

Local Perspective

Map 17 shows that the main river from Cardiff Bay upstream to and including the River Clun fails the target class due to the presence of ammonia. The failures are attributed to the discharge of coke works effluent into the Nant Myddlyn at Beddau, but also to intermittent discharges of sewage effluent and storm sewage. The biological evidence from routine monitoring confirms these target failures.

Above the confluence with the Clun ammonia is not an issue, following construction of a new sewage works below Coed Ely at Dyffryn Isaf. Recent biological evidence has shown that the effluent from this new STW no longer causes any biological impact on the River Ely.

Oxidation of ammonia contributes to reduction in dissolved oxygen concentration which occurs in the middle reaches of the river, principally through Peterston moors, where river flow is slow and considerable weed growth occurs. The biological data gathered from these reaches confirms this chemical quality.

Nitrate and nitrite levels are elevated in the main river Ely at points where it has been measured. This is because they are by-products of the process of oxidation of ammonia.

The biological evidence gathered from the Nant Mychydd in recent years suggests water quality is worse than chemical analyses indicate. This is probably caused by intermittent discharges from an industrial estate.

The estuary fails its target standard due to elevated levels of ammonia. The provision of effluent treatment by the paper mill resulted in significant improvements in the water quality by the discharge of crude sewage from Cogan outfall and the upstream water quality prevent further improvement.

Whilst the map relates to the classified watercourses within the catchment, the NRA also monitors the many unclassified streams and brooks and plans to monitor groundwater. In addition pollution incidents occur throughout the catchment. These are investigated promptly and remedial action taken as appropriate. Several issues also emerge from this work.

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

Local Perspective

In the absence of a licensing policy, it is not possible to make a definitive statement of whether the flow requirements of each use are being met. However, an indication of where the problems may arise is given by comparing the typical natural river flow during a dry summer (the Q95) with the quantity of water abstractable by man. In doing this, an estimate of the net abstraction is made to allow for the return of abstracted water to the rivers.

In making the assessment, all abstractors were assumed to continually take water at the full authorised rate. Furthermore, all groundwater abstractions were taken to have a direct effect upon surface sources. Thus, the results shown on Map 18 present a 'worst case' scenario.

Over-abstraction is generally not a problem in the Ely catchment. In all but two locations, abstractions are a low percentage of the flow typical of even a dry summer (Q95).

The only point on the main River Ely with quite a high level of abstraction is at the paper mill weir in Cardiff. The abstraction is not regarded as a problem, however. Abstraction is not excessive, and much of the water is returned immediately downstream of the weir. There is no significant reduction of flows except over the weir itself, and as this is at the tidal limit of the river, there is no adverse effect upon other licence holders.

The weir structure is regarded as a barrier to fish movement, but the level of abstraction is not regarded as an environmental hazard.

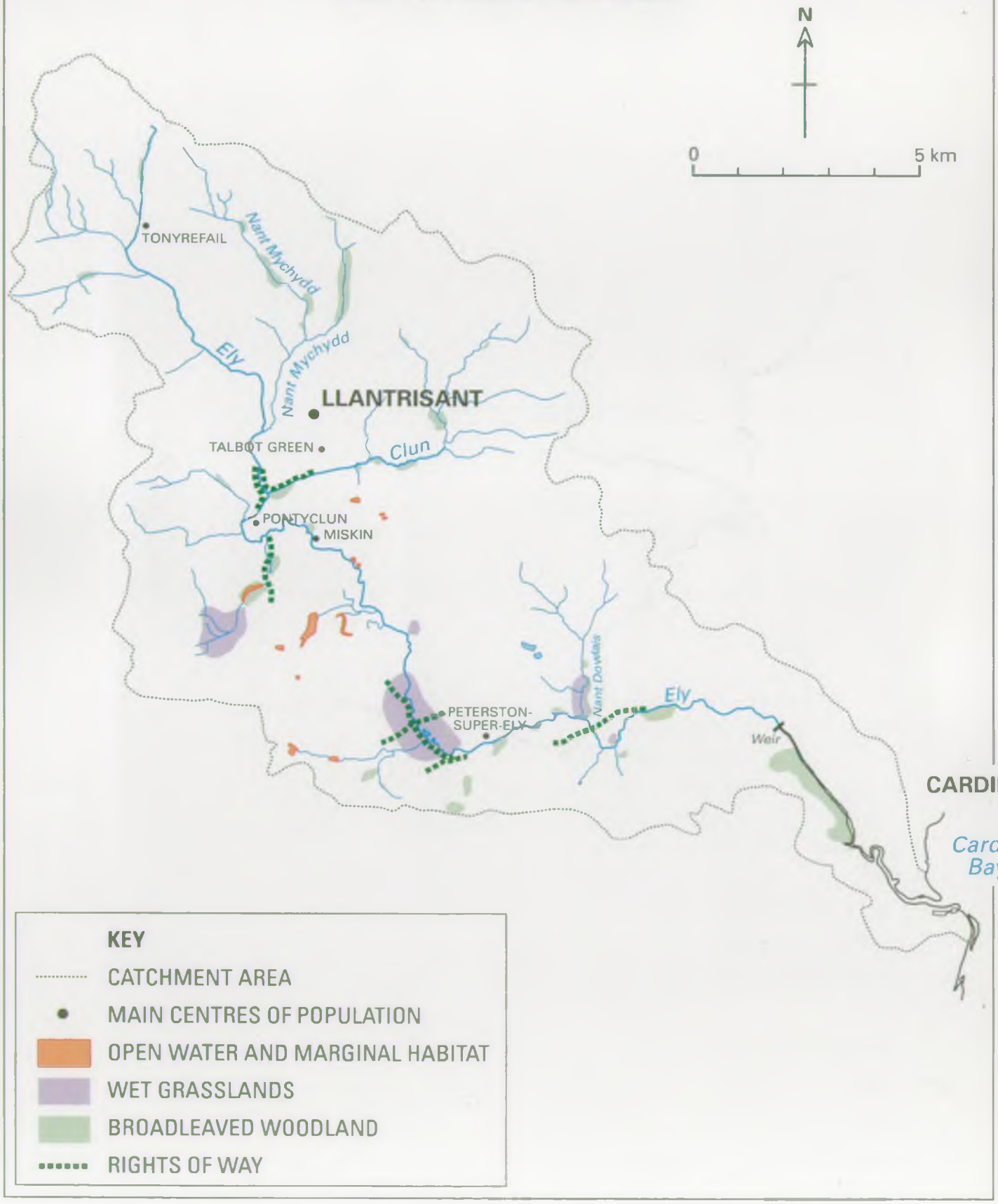
The other site highlighted is the Cwm coking works at Beddau. Here, use of the water varies considerably, but is potentially very large relative to the available resource. The plant has a Licence of Right to abstract from the Nant Myddlyn and its tributaries and from groundwater. The permitted abstraction has in the past allowed tributaries to dry up, but at present, the reuse of trade effluent has reduced abstraction to a very low level. This present level of abstraction is not a problem. It will be necessary to consider the potential high level of abstraction when measures to improve the quality of the air and water emissions from the site are taken.

Only limited groundwater monitoring takes place in the Ely catchment. In order to manage groundwater resources and quality for the protection of exiting abstractors and the environment, there is a need for groundwater monitoring boreholes, particularly within Carboniferous Limestone.

MAP 18. STATE OF THE CATCHMENT–WATER QUANTITY

MAP 19.

STATE OF THE CATCHMENT FOR PHYSICAL FEATURES



6.3 PHYSICAL FEATURES

General

Since Physical Features targets are the most subjective (Section 5.4) it follows that much of the assessment of the state of the catchment must also be subjective. Data from many sources including routine fisheries, biological and habitat surveys and special investigations are used to identify areas that are apparently deficient in certain essential or desirable features such as spawning gravels, riparian tree cover or in-river habitats.

Flood defence has been assessed by studying the flood history over the past 30 years and the known distribution of flooding.

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

FLOOD DEFENCE

The highest river flow on the lower River Ely in the last 18 years of recording was on November 30th 1992. But since their construction, none of the NRA flood defences in the Ely catchment has been seriously threatened.

Of course, it is impracticable to protect all isolated properties in flood-prone areas and this is reflected by the fact there are some properties that can and do flood on occasions.

The highest tide level this century occurred in February 1990 and reached a level of 7.95 metres above ordnance datum (Newlyn) at Cardiff. Previous maximum levels are similar to those of low-lying parts of Cardiff. It is therefore not surprising that the NRA currently recommends that even in areas sheltered from the open sea, future residential and commercial developments are protected to at least 8.6 metres above ordnance datum. This also allows for the predicted effects of global warming.

The planned Cardiff Bay Barrage will have a beneficial effect on tidal flooding. Accumulations of river-borne sediments and their removal will be the responsibility of the Cardiff Bay Development Corporation.

FISHERIES

The trout and coarse fisheries in the Ely are improving in response to improvements in water quality. It is anticipated that this will continue and will be enhanced where appropriate (eg. by introducing coarse fish). The potential exists for the regeneration of salmon and trout populations.

CONSERVATION The River Ely has several areas of conservation interest (Map 19) within its catchment and its middle and lower reaches in particular have a rural aspect.

RECREATION Construction of the Cardiff Bay Barrage will extend the range under which boats can be launched and used within the bay. Access to and from the sea will be delayed as a result of navigating the sea lock. Cardiff Bay Development Corporation will be responsible for recreational development in the bay area.

Angling will improve along with the fisheries improvements.

Canoeing and other water contact sports in the River Ely itself are fairly limited at present. The NRA has reservations about the suitability of the water quality for such activities because of the large amounts of sewage effluent it contains. Public Health implications are a matter for the local environmental health department but the NRA believes it would be unrealistic to seek to bring the microbiological quality up to a standard suitable for contact sports.

NAVIGATION

Construction work associated with the new arrangements over the next 3 years may cause occasional conflict with navigational requirements.

APPENDIX 1: GLOSSARY OF TERMS AND UNITS USED

ABSTRACTION

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

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.

AMMONIA

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

AOD (ABOVE ORDNANCE DATUM)

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

AQUATIC ENVIRONMENT

The rivers, streams, lakes, ponds, springs and features that depend on natural waters such as logs, wetland and so on.

AQUIFER

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

BASE FLOWS

When rain falls onto the catchment, some water is absorbed by the soil instead of flowing directly to the river. The water reaches the river by slowly seeping through cracks and pores in the soil and rock. This is termed the 'base flow' and provides the flow in a river during a long dry spell.

CATCHMENT

The area of land drainage to a defined point.

CLASSIFICATION/CLASSES

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

COARSE FISH

Freshwater fish other than salmon and trout.

CONSENT

A Discharge Consent is a statutory document issued by the NRA to indicate any limits and conditions on the discharge of an effluent to a river, lake, groundwater, estuary or coastal water.

Also a different statutory document issued by the NRA, known as a Land Drainage Consent, this authorises works to the beds or banks of a river which have been approved by the NRA.

CUMECS

Short for cubic metres per second (m^3/sec).

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.

DISSOLVED OXYGEN

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

DRY WEATHER FLOW (DWF)

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

For the river, the Dry Weather Flow is taken to be what is know as the 95-percentile

flow (or Q95) which means the river is higher than Q95 for 95% percent of the time.

ECOSYSTEMS

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

EC DIRECTIVE (Control)

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

EVAPOTRANSPIRATION

Evaporation is the process by which water is turned into vapour. Transpiration refers to the use of soil water by plants and its discharge to the atmosphere as vapour. Both these processes are combined in the term evapotranspiration, which represents the total loss of water from the catchment to the atmosphere.

FAUNA

Animal Life.

FLORA

Plant life.

GAME FISH

Salmonid fish, i.e. trout and salmon.

GAUGING STATION

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

HABITAT

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

LEACHATE

Liquid emanating from solid matter.

LIST 1 AND LIST 2 SUBSTANCES

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

* List 1 substances are considered to be the most harmful. Pollution caused by these must be eliminated.

* List 2 substances are less harmful and pollution caused by these must be reduced.

m^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.

MAIN RIVER

Also known as 'Statutory Main River'. It is a legal definition which defines particular rivers and streams which are defined on special maps. On the 'Main River', the NRA has powers to construct and maintain defences and to control the actions of others through byelaws and the issue of Consent. Any proposal that could interfere with the bed or banks or affect the flow of the river requires formal consent from the NRA.

MARSH

Area of waterlogged mineral soil where the summer water level is close to the soil surface.

MIRE

Area of permanently wet peat caused by a water table very near the surface or high rainfall.

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.

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'.

Q95

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

RAW WATER

This is water in its original state which has not yet undergone any treatment that may be needed for public water standards to be met.

REACH

A length of a river.

REDD

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

RIFFLE

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

RIVER CORRIDOR

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

SALMONID FISH

Game fish, e.g. trout and salmon.

SSSI

Short 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.

TARGET CLASS

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

TELEMETRY

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

TILL

Till is a deposit of clay, sand and boulders which has been left on the land surface by the glaciers of the last ice age.

UNDERGROUND STRATA

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

WETLAND

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

95-PERCENTILE FLOW

See Q95 above.

95-PERCENTILE STANDARD

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