National Rivers Authority

Awdurdod Afonydd Cenedlaethol

WELSH REGION

Rhanbarth Cymru

EURWG

Catchment Management Plan

Phase I

Statment Of Catchment Uses And Problem Identification

Guardians of the Water Environment

Diogelwyr Amgylchedd Dwr

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1. CATCHMENT MANAGEMENT PLANS : INTRODUCTION TO CONCEPT

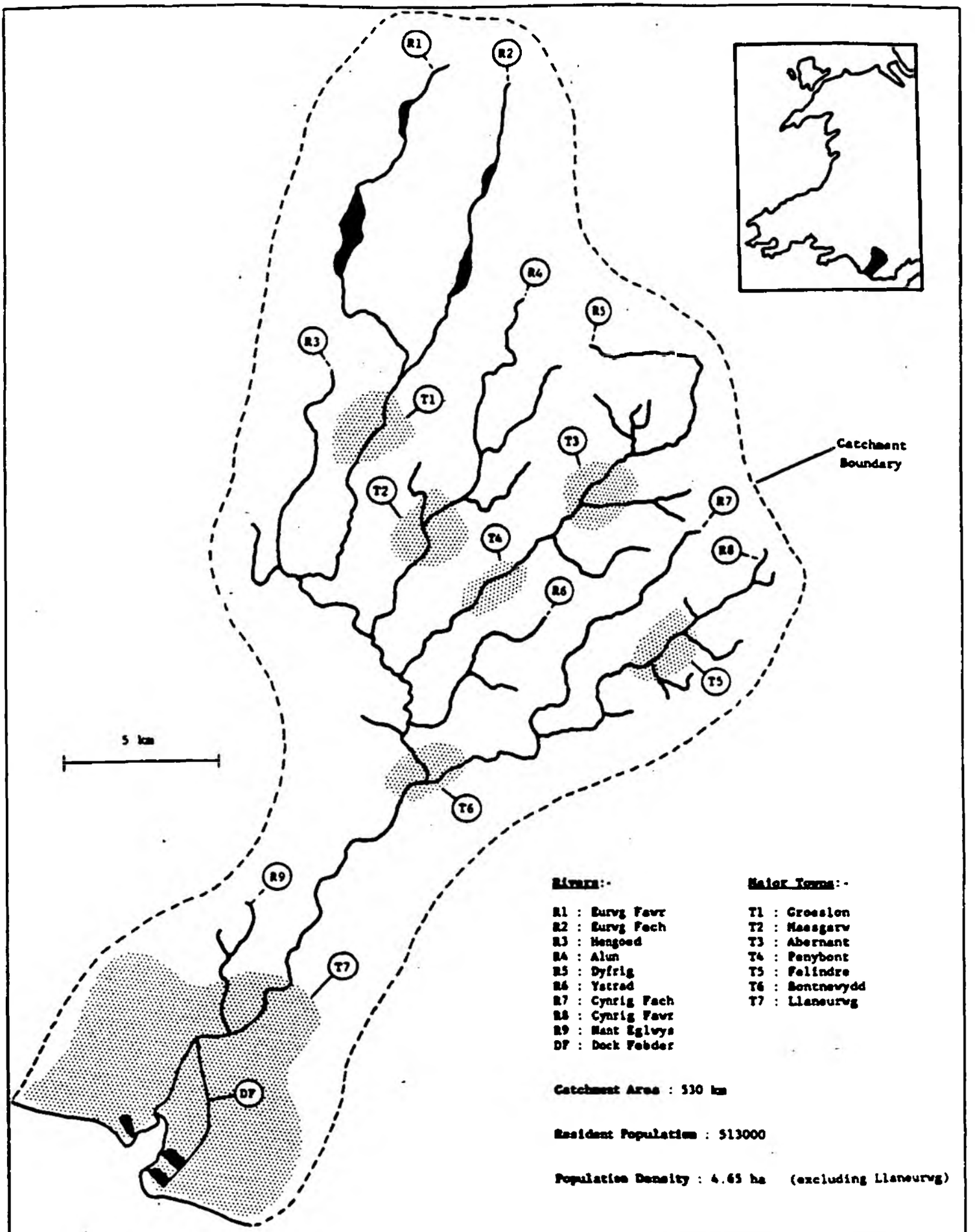
1.1 With the utilisation of river systems for a variety of uses it has long been recognised that there is a need to examine interactions and to reconcile any conflicts which may arise. The National Rivers Authority has taken the decision to formalise this requirement with the production of Management Plans for individual river catchments. These Catchment Management Plans are drawn up in consultation with interested parties and represent an agreed strategy for realising the environmental potential of the catchment concerned, within prevailing economic and political constraints.

1.2 These Plans are all produced using the same general procedure:-

- o Uses of the catchment are identified.
- o Environmental requirements are identified for each use, in relation to Water Quality, Water Resources and River Topography.
- o The environmental requirements for all the uses are integrated to give overall targets for the catchment in relation to Water Quality, Water Resources and River Topography.
- o The state of the catchment is assessed against these targets, and problems and conflicts are identified.

The results of studies to this stage are released for public consultation as the "Phase 1 Plan", and this is such a document for the Eurwg Catchment.

2.3 The problems identified by the Phase 1 Plan are discussed with relevant organisations and the agreed solutions are presented in a formal "Phase 2 Plan", which represents the plan of action for the catchment. It is envisaged that a Phase 2 Plan for the Eurwg will be produced within eighteen months of the release of this Phase 1 Plan.



Rivers:-

R1 : Eurvg Fawr
R2 : Eurvg Fach
R3 : Hengoed
R4 : Alun
R5 : Dyfrig
R6 : Ystrad
R7 : Cynrig Fach
R8 : Cynrig Fawr
R9 : Nant Eglwys
DF : Dock Feeder

Major Towns:-

T1 : Groesion
T2 : Maesgarw
T3 : Abernant
T4 : Penybont
T5 : Felindre
T6 : Bontnewydd
T7 : Llaneurwg

Catchment Area : 530 km

Resident Population : 513000

Population Density : 4.65 ha (excluding Llaneurwg)

Eurwg Catchment Main Towns and Rivers

2. EURWG CATCHMENT : OVERVIEW

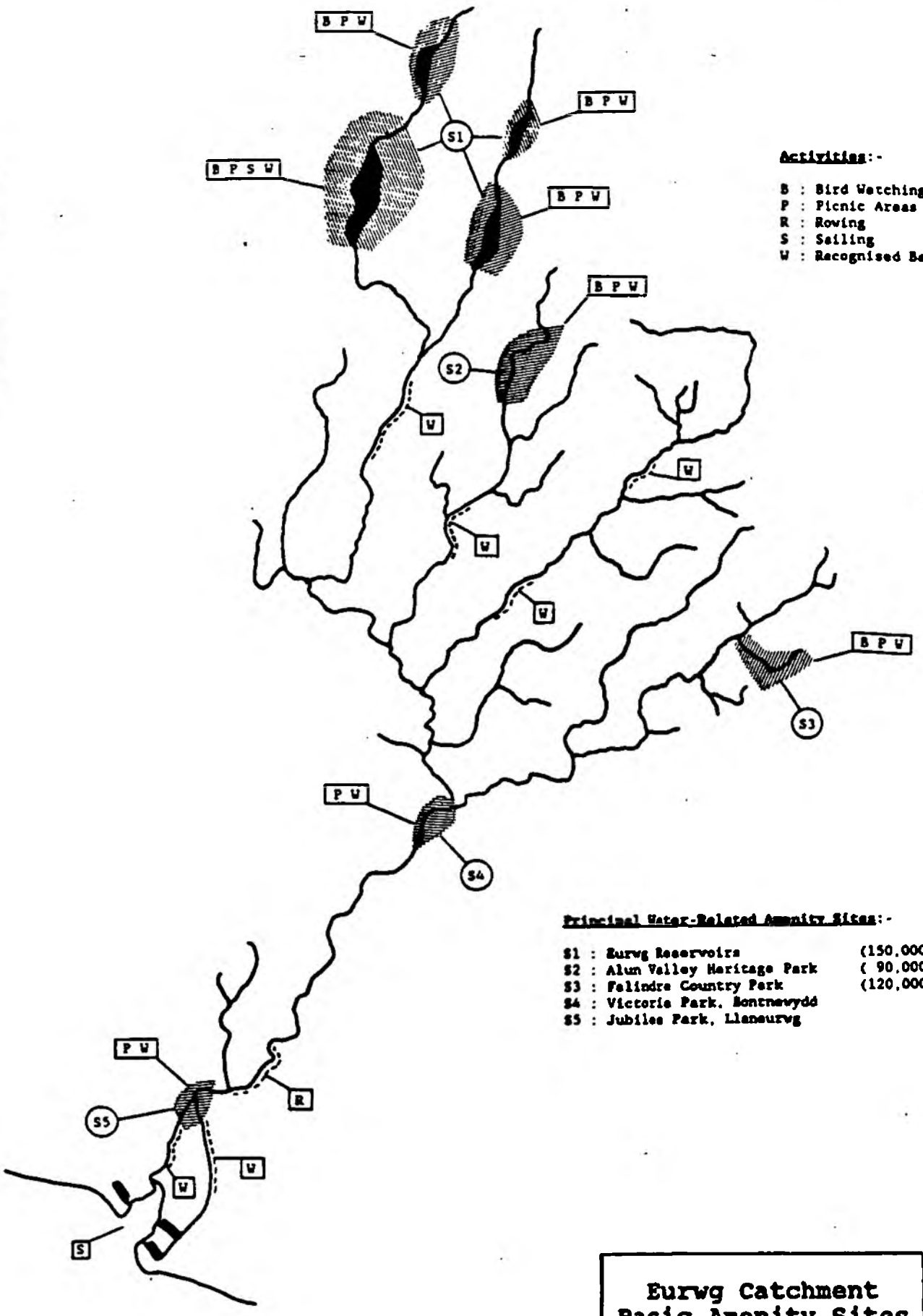
2.1 The catchment of the R.Eurwg is the most densely-populated in Wales, with 300000 in the city of Llaneurwg alone. Falling 900 metres from its source in the Brecon Beacons to the sea 65 km away, the catchment is heavily industrialised, with agriculture largely confined to sheep-farming and some conifer plantations in the rough upland areas. Elsewhere, the problems faced and the opportunities presented are typical of those in the wider South Wales Coalfield. Over the last ten years, the recession in the coal industry, and the diversion of the steel industry to coastal areas, has lead to an improvement in water quality and a virtual elimination of the grossly-polluted conditions which were taken for granted for so long. At the same time, however, the deficiencies in the sewerage system and in the effluent treatment systems from the remaining industries have been very much brought to the fore.

2.2 While heavy industry has contracted, this has not been accompanied by any large-scale depopulation of the valley areas. There has been a substantial increase in the numbers of people commuting from the valleys to service jobs in Llaneurwg and an encouraging trend in the attraction of relatively "high-technology" industry to the valley towns themselves. Despite the financial assistance that is now available, these new industries are unwilling to set up in areas which are environmentally unattractive and there has been wide-scale reclamation of spoiltips and other industrial land. Understandably, these aspirations towards improved environmental quality are increasingly shared by the resident population and the National Rivers Authority will be expected to promote improvements in the Water Environment to match those achieved by other organisations in other spheres.

2.3 Neither are people prepared to tolerate the risk of flooding that affected both Llaneurwg and the Valleys in the past. Major flood prevention schemes have been carried out over the last ten years, but this problem continues to afflict certain areas, exacerbated by the rapid rises in river levels that are a typical feature of steep, highly-urbanised catchments.

2.4 Nowhere are the increased aspirations of the Public brought to a sharper focus, than in relation to a major infrastructure development that has been mooted for the bottom end of the catchment: the Llaneurwg Docklands Redevelopment Scheme. Under these proposals, a barrage would be constructed across the mouth of the estuary, to create a large freshwater impoundment. This, claim the scheme's sponsors, would be the centrepiece of a large-scale commercial, residential and recreational revitalisation of the city's extensive and substantially derelict waterfront. Opposition to the development revolves around two factors: the rise in groundwater level and increased likelihood of flooding in low-lying areas of Llaneurwg, and the loss of estuarine mudflats that support nationally important numbers of migratory waders and waterfowl.

2.5 While the NRA's position in relation to these proposals is laid out in a separate document, this Catchment Management Plan will flag the major implications of the scheme for the wider catchment. The debate surrounding these proposals epitomises the widely-varying demands and aspirations of different individuals and organisations towards the catchment, and illustrates very clearly the path of critical examination and reasonable compromise that must be followed in order to achieve our target: a strategic plan which solves the problems of today, and addresses the challenges of tomorrow, with widespread public support.



Activities:-

B : Bird Watching
P : Picnic Areas
R : Rowing
S : Sailing
W : Recognised Bankside Walk

Principal Water-Related Amenity Sites:-

S1	: Eurwg Reservoirs	(150,000 visitors/yr)
S2	: Alun Valley Heritage Park	(90,000 ")
S3	: Felindre Country Park	(120,000 ")
S4	: Victoria Park, Bontnewydd	
S5	: Jubilee Park, Llaneurwg	

Eurwg Catchment Basic Amenity Sites

3. BASIC AMENITY

3.1 **General** : This use relates to those activities which attract people to the river corridor, and which may therefore bring them into close proximity with the water, but without intimate contact. Examples include walking, bird watching, boating, sailing and rowing. As such, the principal areas of concern are general aesthetic acceptability and access to the watercourse.

3.2 **Local Perspective** : While the reservoirs at the top of the catchment are a focus for outdoor activities, it is the middle and lower reaches which present the greatest opportunities in relation to this use, offering the potential for "linear parks" in otherwise heavily built-up areas. There are several recognised bankside walks, and a proposal has been floated for a virtually continuous footpath from Llaneurwg to Groeslon, that would make considerable use of the river corridor. As well as the established municipal parks in Bontnewydd and Llaneurwg, there is an increasing trend towards the setting up of "Heritage Parks" and even "Country Parks" on reclaimed industrial land, which variously emphasise the industrial achievements and environmental potential of the area. Such schemes offer great scope for collaboration with other bodies in generating amenity sites which are of great value to the resident population as well as being a magnet for tourists.

3.3 **Environmental Objectives:-**

- o To maintain water quality so as to prevent public nuisance arising from visual and smell problems.
- o To provide safe and easy access to the river corridor, in a way which does not impinge unreasonably upon other uses.

3.4 **Environmental Requirements:-**

Water Quality:-

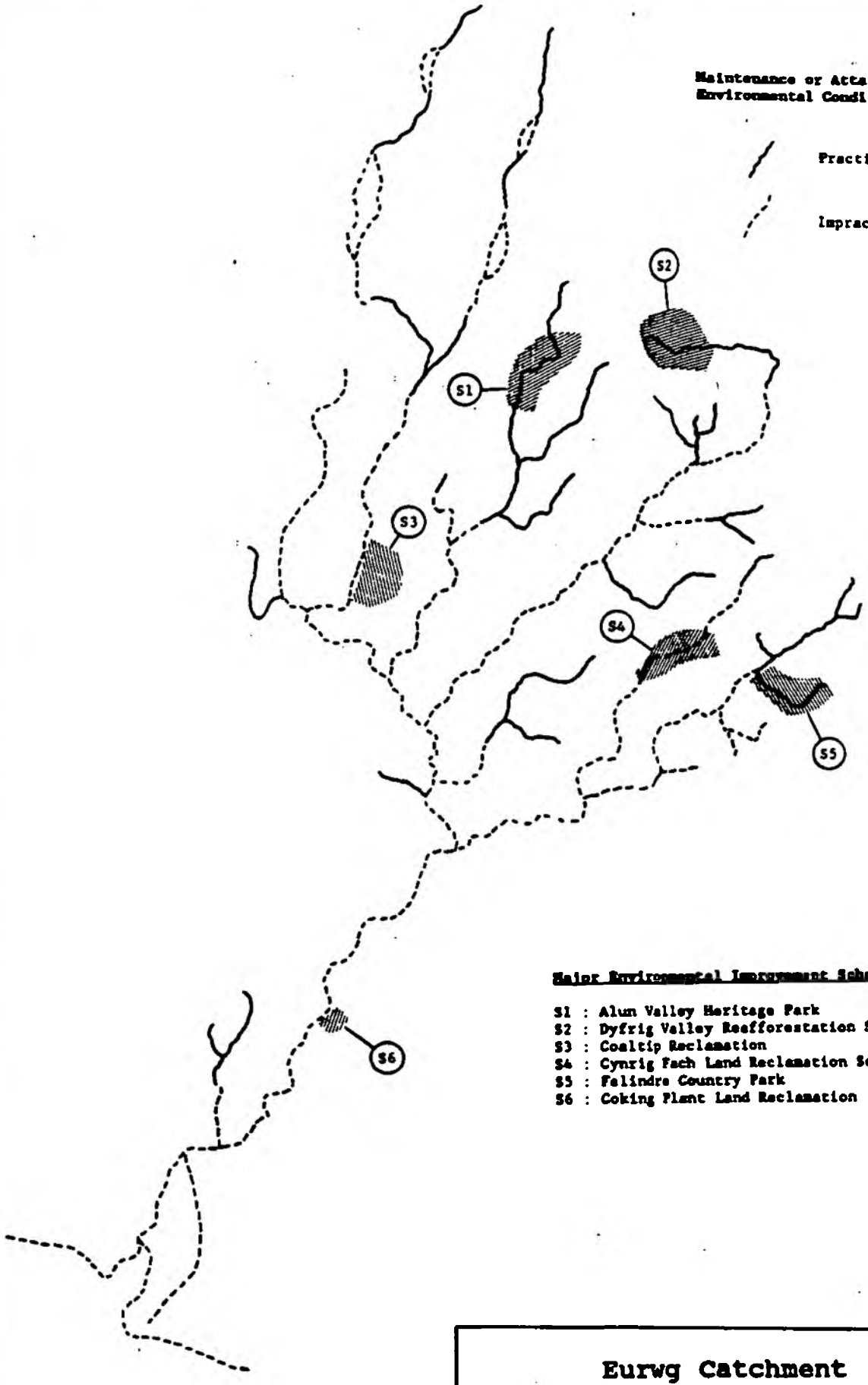
- o Water Quality Suite 1 : Aesthetic Criteria (See Appendix).
- o Dissolved Oxygen : >10% sat.
- o Plastic objects to be absent.

Water Resources:-

- o Abstraction must not reduce the river flow below Q95.

River Topography:-

- o All-weather footpath for recognised bankside walks.
- o Clearly-marked and maintained launching points in recognised boating areas.
- o Clear indication, on the ground, of recognised bird-watching areas together with observation hides at prime sites.



Eurwg Catchment
General Ecosystem Conservation

4. GENERAL ECOSYSTEM CONSERVATION

4.1 **General** : This use relates to the protection of all aquatic flora and fauna, along with dependent organisms in the wider river corridor, but excluding fish which are protected under the terms of specific uses. Dependent organisms include species such as the otter, dipper and sandpiper, which are closely associated with water, as well as birds such as willow warblers and flycatchers which are not inextricably linked with rivers, but which nevertheless exploit the uncultivated vegetation often associated with the wider river corridor. The use, which applies throughout the catchment, is implemented in one of two ways, depending upon the practicability or not of attaining the "pristine" conditions that would largely be expected of the river in its wild state.

4.2 **Local Perspective:** The application of this use in the Eurwg catchment closely parallels the situation regarding basic amenity. While certain of the areas at the top of the catchment are in a "wild" natural state, the critical value of the river through much of its length is in maintaining a "green corridor" through an otherwise urbanised catchment. Such a corridor maintains a reservoir of wildlife in the catchment and has immense value as a route for colonising suitable habitats as they arise. The Heritage and Country Parks already mentioned, together with the large areas of general reclaimed industrial land offer great scope for creating habitats, which although not truly "wild", nevertheless provide a basis for a diverse wildlife community.

4.3 **Environmental Objectives:-**

- **For rivers of, or near to pristine conditions,** to maintain water quality, water resources and river topography so as to protect all aquatic life and dependent non-aquatic organisms, such that the river corridor ecosystem is typical of a river in such a geographical situation.

- **For rivers where the achievement of pristine conditions is impracticable,** to maintain or improve water quality, water resources and river topography to such a condition that it can provide a fauna and flora capable of supporting relevant fish populations (salmonid or cyprinid, as stipulated), and can also support a river corridor community of a specified nature.

4.4 **Environmental Requirements:-**

Water Quality:-

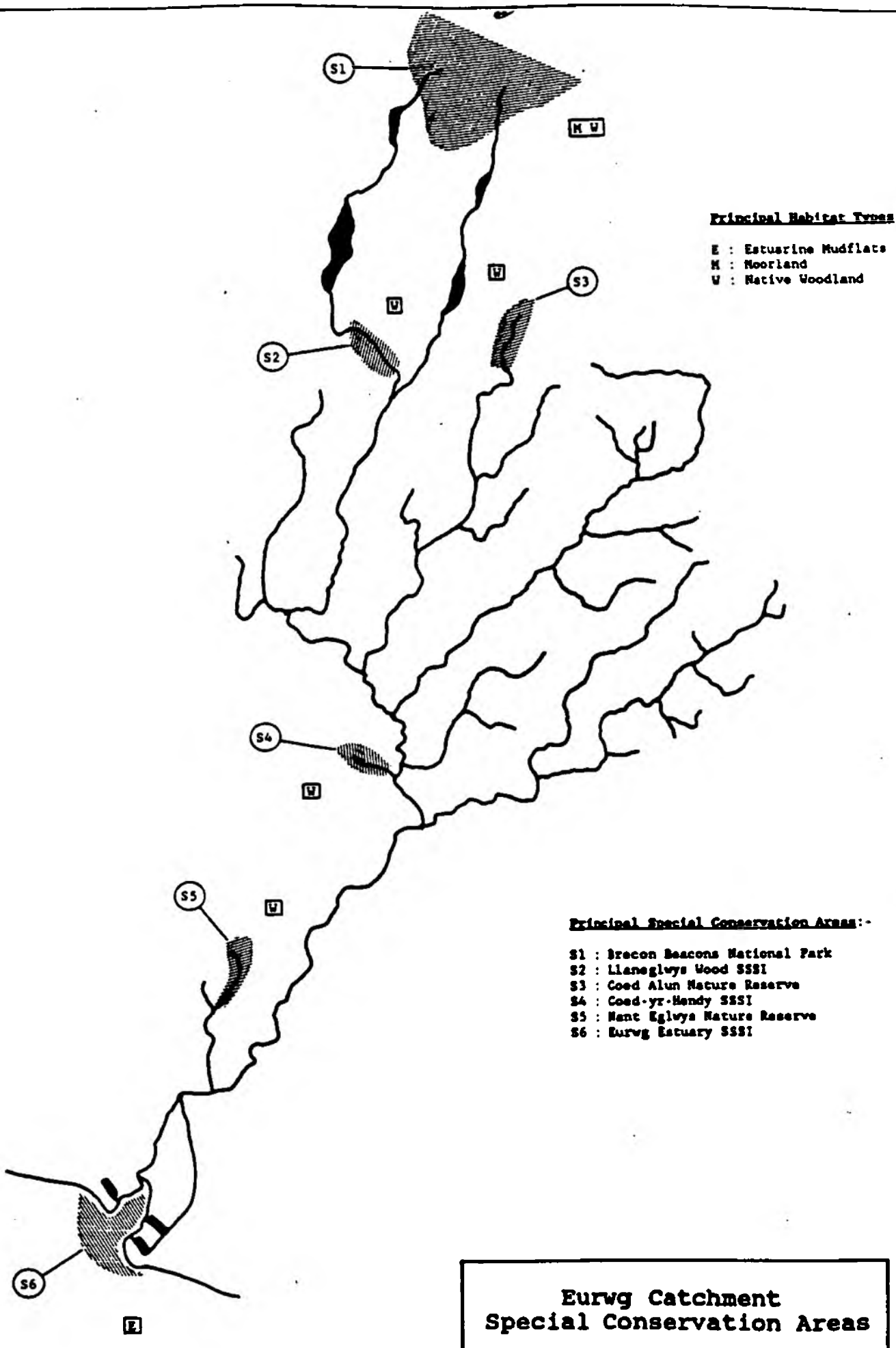
- Water Quality Suite 1 : Aesthetic Criteria (See Appendix).
- Water Quality Suite 2 : List I Substances
- Water Quality Suite 3 : List II Substances (Cyprinids)
- Ammonia (unionised) : 15ugN/l (AA); 21ugN/l (95P)
- Ammonia (total) : 780ugN/l (95P)

Water Resources:-

- Abstraction must not reduce the river flow below Q95
- Maximum summer abstraction (April-October) : 15 x daily Q95

River Topography:-

- Specific to the target ecosystem.



Principal Habitat Types:-

E : Estuarine Mudflats
M : Moorland
W : Native Woodland

Principal Special Conservation Areas:-

S1 : Brecon Beacons National Park
S2 : Llaneglwys Wood SSSI
S3 : Coed Alun Nature Reserve
S4 : Coed-yr-Hendy SSSI
S5 : Nant Eglwys Nature Reserve
S6 : Eurwg Estuary SSSI

Eurwg Catchment
Special Conservation Areas

5. SPECIAL CONSERVATION AREAS

5.1 **General** : This use relates to the protection of those areas that have been formally designated as being of particularly high conservation value. Such areas include National Parks, National Nature Reserves and all Sites of Special Scientific Interest (SSSI's). However, not all eligible areas will have been formally designated, and the sites identified opposite should not be regarded as the only areas of high conservation value in the catchment.

5.2 **Local Perspective** : While the northern end of the catchment falls within the Brecon Beacons National Park, the urbanised nature of the catchment means that special conservation areas are otherwise largely confined to relatively small areas of native woodland. In addition to a largely unspoilt aquatic habitat, such areas contain a rich terrestrial fauna and flora. The statutory nature of the designated SSSI's means that the NRA is not allowed to undertake river maintenance works without first consulting the Nature Conservancy Council.

Woodlands apart, the remaining important conservation area is the Eurwg Estuary SSSI, which supports nationally important numbers of migratory waders and waterfowl; winter populations of Dunlin, Redshank and Knot are particularly significant. This area would, of course, be adversely affected by the proposed barrage: the mudflats would simply disappear. There are outline proposals to compensate for this loss by artificially creating additional, ostensibly similar feeding areas to the east of Llaneurwg. However, recent evidence indicates that shorebirds will not necessarily transfer away from traditional feeding grounds, and there is thus a possibility that the wintering populations would be lost.

5.3 **Environmental Objectives:-**

- To maintain water quality, water resources and river topography so as to safeguard the special conservation interest for which the river has been designated.

5.4 **Environmental Requirements:-**

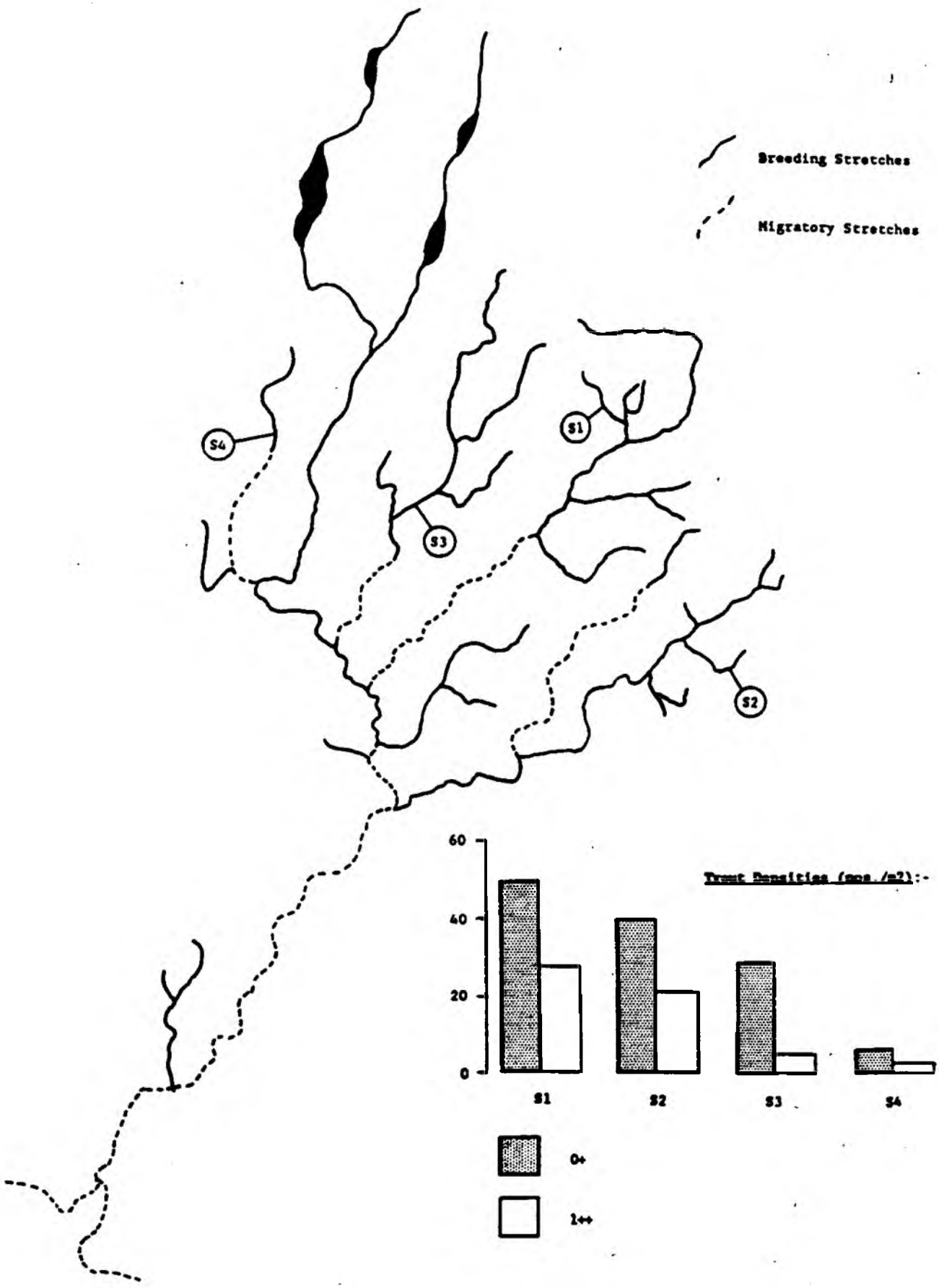
In addition to the environmental requirements relating to general ecosystem conservation, five of these special conservation areas have specific targets in relation to **River Topography:-**

Woodland Sites S2 - S5:-

- To maintain, or improve, the diversity, abundance and extent of bankside vegetation recorded during surveys carried out in 1986.

Eurvg Estuary:-

- To preserve the character and extent of the mudflats, as obtaining in 1985, and in particular to prevent encroachment by recreational and commercial development, and by Spartina grass.



Eurwg Catchment Salmonid Fisheries

6. SALMONID FISHERY

6.1 **General** : This use relates specifically to the maintenance of breeding populations of salmonids, and where appropriate, to the conditions necessary for their successful migration between the river and the sea (in both directions). The wider community of organisms, including the salmonids' food species are already covered under the use : General Ecosystem Conservation.

6.2 **Local Perspective** : This use has attracted widespread publicity in the catchment over the last five years. Given the progressive improvement in water quality, Welsh Water took the opportunity to stock microtagged smolts into the main river on a trial basis, at a rate of 5000 - 8000 per year. The return rate of adults to the river has been relatively high (0.2%), and it has been estimated that, if all artificial barriers to migration were bypassed, the catchment could presently support a naturally spawned return run of some 900 salmon or 2700 sea trout. Since these fish would be expected to spawn chiefly in different river reaches from those used by the non-migratory brown trout, then the existing brown trout stocks would not be expected to decline

6.3 **Environmental Objectives:-**

- o In **Breeding Stretches**, to maintain water quality, water resources and river topography so as to sustain a natural salmonid population appropriate to a river in such a geographical situation.

- o In **Migratory Stretches**, to maintain water quality, water resources and river topography so as to protect passage of salmonids to and from fresh water.

6.4 **Environmental Requirements:-**

Water Quality (Breeding Stretches):-

- o Water Quality Suite 2 : List I Substances (See Appendix)
- o Water Quality Suite 4 : List II Substances (Salmonids)
- o Water Quality Suite 5 : Chlorine, H2S, Temperature, Phosphorus (Salmonids)
- o Ammonia (unionised) : 21ugN/l (95P)
- o Ammonia (total) : 780ugN/l (95P)
- o Dissolved Oxygen : >9mg/l (50% values); >7mg/l (All)
- o BOD : <3mgO2/l (95P)

Water Quality (Migratory Stretches - freshwater):-

- o As for Cyprinid Fishery Use

Water Quality (Migratory Stretches - estuary):-

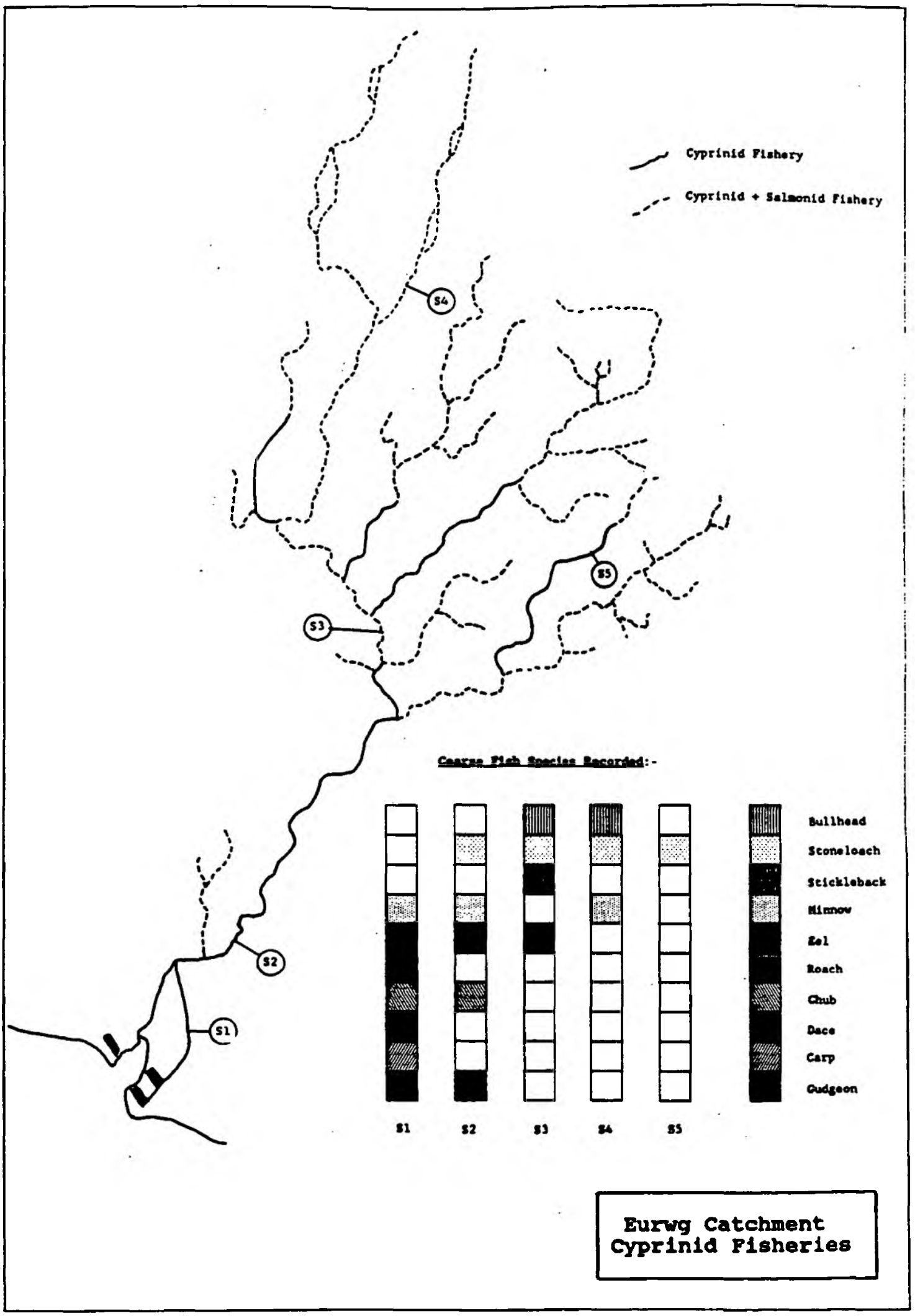
- o Water Quality Suites 2 & 4
- o Ammonia (unionised) : 21ugN/l (AA); 42ugN/l (95P); 84ugN/l (Max)
- o Dissolved Oxygen : >3mg/l (All); >7mg/l (AA)

Water Resources:-

- o Abstraction must not reduce the river flow below the natural Q95
- o Maximum summer abstraction (April-October) : 10 x daily Q95

River Topography:-

- o In **Breeding Stretches**, the available spawning area should match the holding capacity of the stretch concerned.
- o In **Migratory stretches**, all artificial barriers by-passable at Q95


Cyprinid Fishery
Cyprinid + Salmonid Fishery
S1
S2
S3
S4
S5
Coarse Fish Species Recorded:-
Bullhead
Stoneloach
Stickleback
Minnow
Eel
Roach
Chub
Dace
Carp
Gudgeon
S1
S2
S3
S4
S5
Eurwg Catchment
Cyprinid Fisheries

7. CYPRINID FISHERY

7.1 **General** : This use relates specifically to the maintenance of breeding populations of non-salmonid fish, which in most cases will be a sport fishery and not a food source. The wider communuity of organisms, including the cyprinids' food species, are already covered under the use : General Ecosystem Conservation.

7.2 **Local Perspective** : An idea of the coarse fish populations present in the Eurwg can be gained from the data opposite. The low diversity recorded from the middle and upper catchment may be interpreted as a consequence of the river's "natural" character, as opposed to the result of pollution, since trout were recorded in the majority of the sites investigated. Exceptions to this are the reaches of the Alun and Cynrig Fach indicated on the map, which were virtually fishless.

On a more encouraging note, the Roach populations in the Dock Feeder show a growth rate that compares favourably with other sites in Britain and successful spawning has taken place over the last four years.

7.3 **Environmental Objectives:-**

- o To maintain water quality, water resources and river topography so as to sustain a natural cyprinid population appropriate to a river in such a geographical situation.

7.4 **Environmental Requirements:-**

Water Quality:-

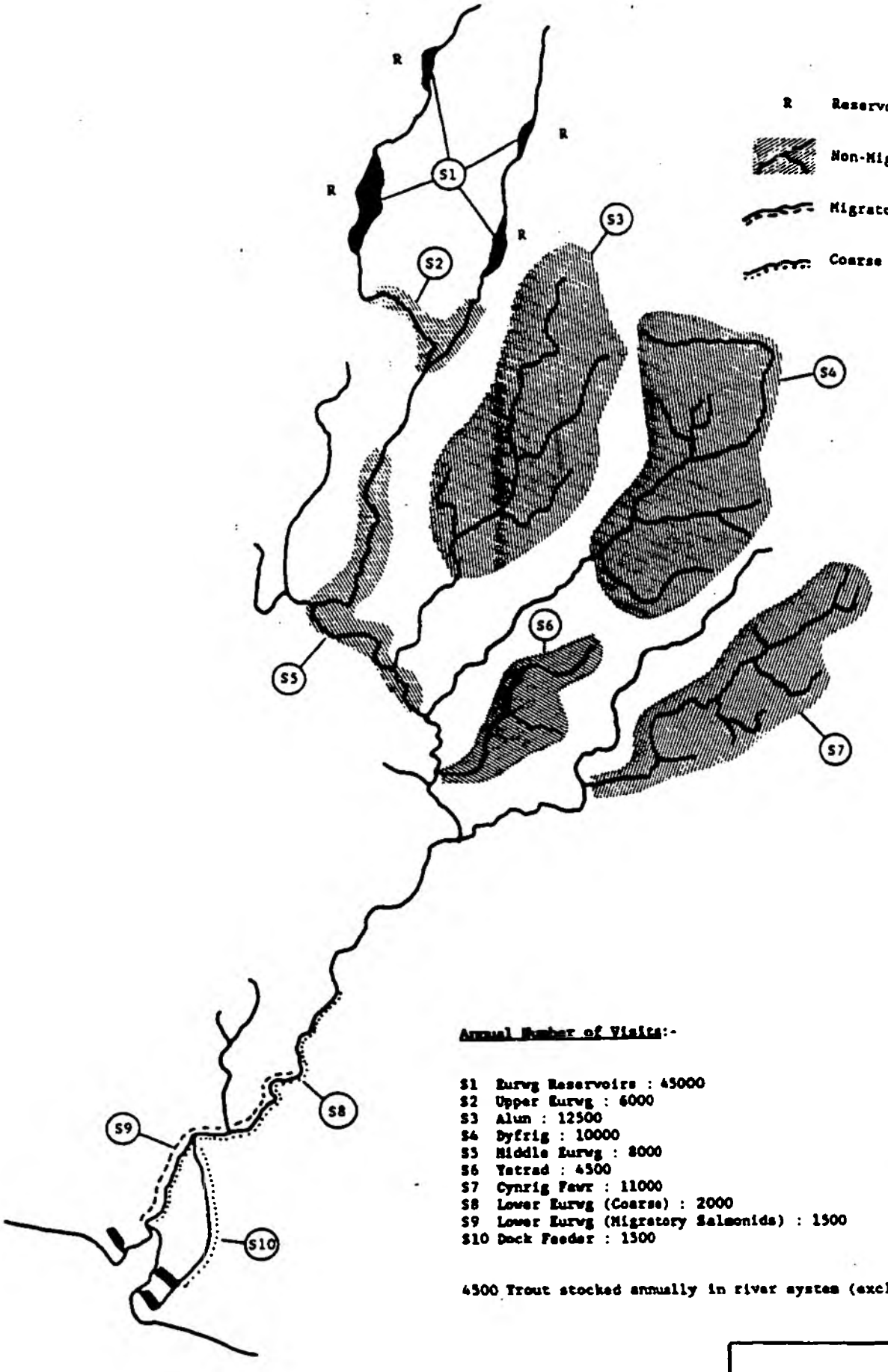
- o Water Quality Suite 2 : List I Substances (See Appendix)
- o Water Quality Suite 3 : List II Substances (Cyprinids)
- o Water Quality Suite 6 : Chlorine, H2S, Temperature, Phosphorus (Cyprinids)
- o Ammonia (unionised) : 21ugN/l (95P)
- o Ammonia (total) : 780 ugN/l (95P)
- o Dissolved Oxygen : >7mg/l (50% values); >5mg/l (All)
- o BOD : <6mgO2/l (95P)

Water Resources:-

- o Abstraction must not reduce the river flow below the natural Q95
- o Maximum Summer Abstraction (April-October) : 15 x daily Q95

River Topography:-

- o Areas supporting spawning, either directly, or indirectly through supporting specific plant species, should match the holding capacity of the stretch concerned.



Annual Number of Visits:-

S1 Eurwg Reservoirs : 45000
S2 Upper Eurwg : 6000
S3 Alun : 12500
S4 Dyfrig : 10000
S5 Middle Eurwg : 8000
S6 Ystrad : 4500
S7 Cynrig Fawr : 11000
S8 Lower Eurwg (Coarse) : 2000
S9 Lower Eurwg (Migratory Salmonids) : 1500
S10 Dock Feeder : 1500

4500 Trout stocked annually in river system (excluding reservoirs).

Eurwg Catchment Angling

8. ANGLING

8.1 **General** : This use relates specifically to the protection of anglers, and to the manipulation of river conditions so as to enhance the sport. The fish themselves and the wider community of organisms are already protected under the uses : General Ecosystem Conservation, Salmonid Fishery and Cyprinid Fishery, as appropriate.

8.2 **Local Perspective** : As would be expected from the river's character, angling in the Eurwg catchment is predominantly for trout. Fishing pressure is high with great reliance placed on artificial stocking. The presence of impassable artificial barriers means that angling for migratory salmonids is currently confined to the main river downstream of the dock feeder weir with three clubs jointly controlling most of this stretch. Sea trout predominate in the declared catch, which currently runs at around 275 per year. With the attention now given to migratory salmonids in the Eurwg, this must be regarded as a potential growth area.

The current level of coarse fishing is unknown, but seems to be largely confined to eel fishing in the lower main river. However, anglers' catches indicate that cyprinid populations have risen, following improvements in water quality and an increase in stocking. Populations in the dock feeder, particularly of roach, have improved dramatically over the last ten years and this fishery, strategically situated right in the heart of Llaneurwg, looks set to attract increasing numbers of anglers over the next few years.

8.3 **Environmental Objectives:-**

- o To maintain water quality, water resources and river topography, so as to protect anglers.
- o To maintain water quality, water resources and river topography, so as to provide suitable conditions for successful angling.

8.4 **Environmental Requirements:-**

Water Quality:-

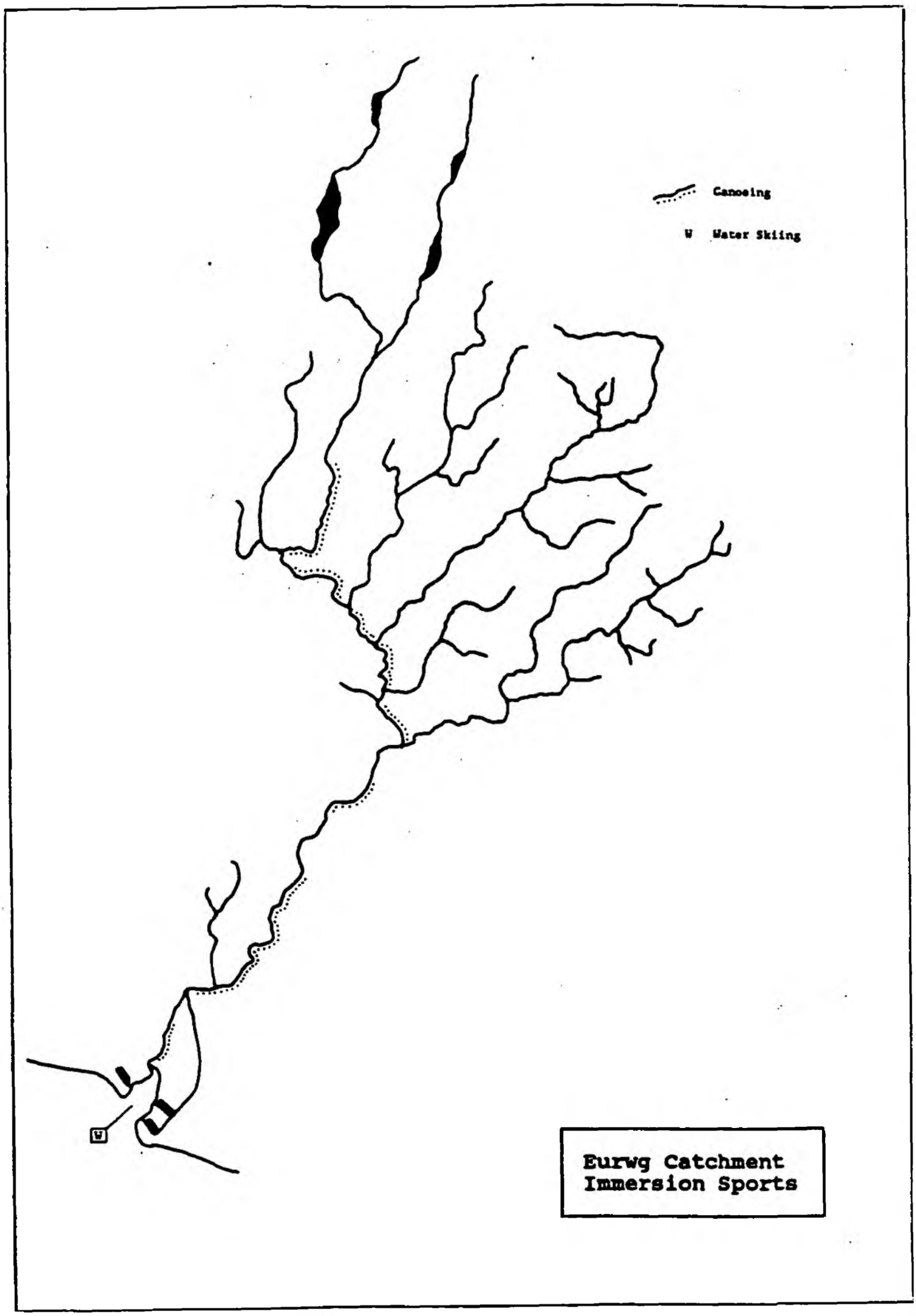
*** Guidelines on public health implications awaited ***

Water Resources:-

- o Abstraction must not reduce the river flow below the natural Q95.
- o Maximum summer abstraction (April-October) : 10 x natural daily Q95

River Topography:-

- o Safe access to and from the watercourse or still water, as appropriate.
- o On rivers, weirs (to create pools) at locations agreed with other river users.


Canoeing
W Water Skiing
W
Eurwg Catchment
Immersion Sports

9. IMMERSION SPORTS

9.1 General : This use deals only with those sports, such as canoeing and water skiing, where there is a risk of intimate contact with water. Principal areas of concern are the health of the participants and the river conditions required for the successful pursuit of the activity in question. Swimming is excluded, since it is judged to carry a particular risk which warrants separate consideration.

9.2 Local Perspective: At present, the catchment is not heavily used for immersion sports. A guide has been produced (not by the NRA), describing in some detail the potential of the main river for canoeing, but indications are that current interest amounts to only some 200 person-visits per year. There is some sailing and water skiing activity in the estuary, but this is severely restricted by the mudflats and the high tidal rise and fall.

However, this picture may change in the future. The Victoria Dock in Llaneurwg is now closed to commercial shipping and there are plans to convert the area into a "Little Venice". As part of the proposals, it has been suggested that the water supplied by the Dock Feeder could be treated to a degree that would make it suitable for water sports. On a larger scale, if the wider Llaneurwg Docklands Redevelopment Scheme goes ahead, there is bound to be pressure for some sort of recreational activity on the freshwater impoundment that would be created.

9.3 Environmental Objectives:-

- To maintain water quality, water resources and river topography, so as to protect those involved in immersion sports.

- To maintain water quality, water resources and river topography, so as to provide suitable conditions for the activity concerned.

9.4 Environmental Requirements:-

Water Quality:-

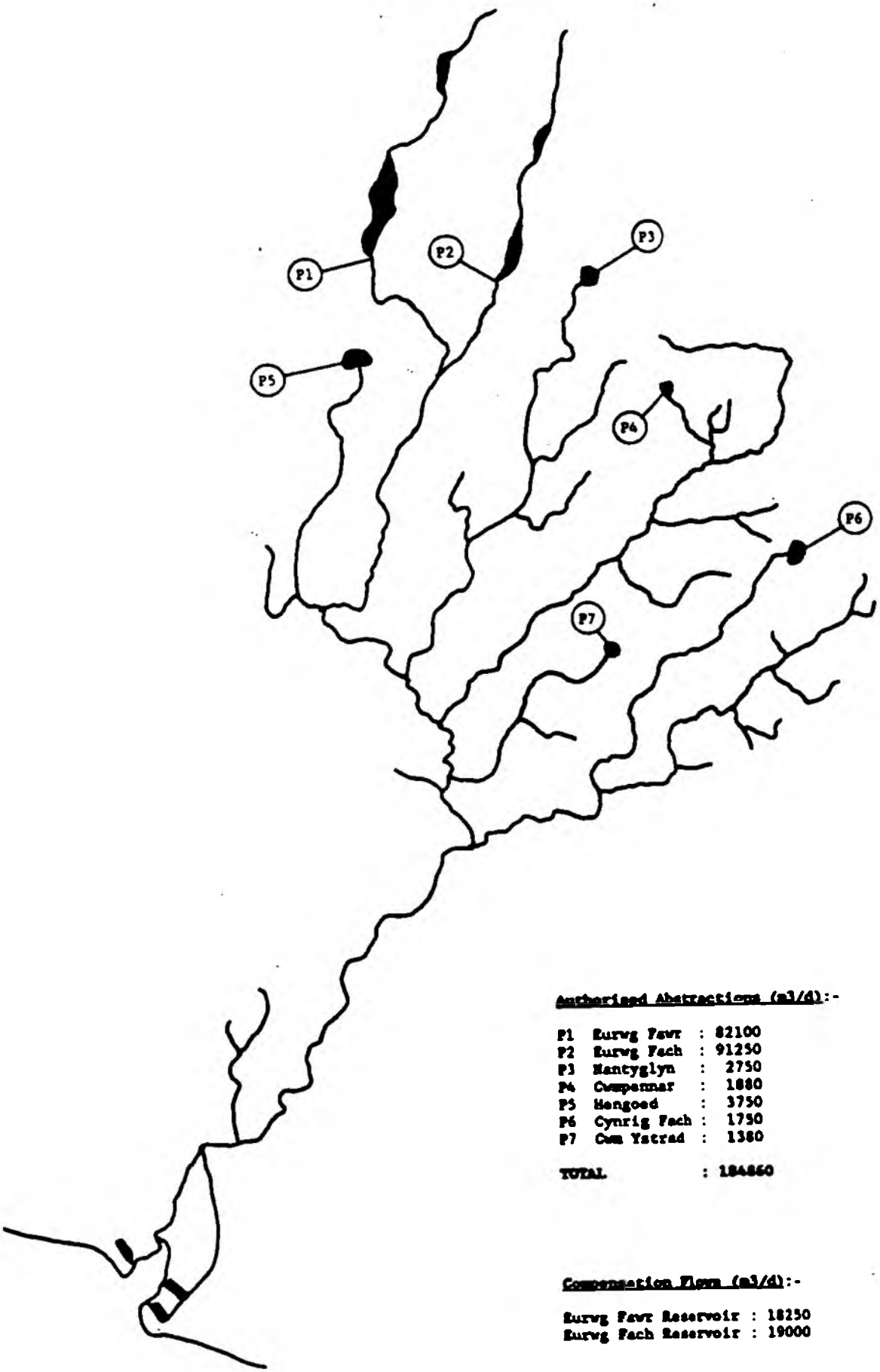
*** Guidelines on public health implications awaited ***

Water Resources:-

- Abstraction must not reduce the river flow below the natural Q95.
- Maximum summer abstraction (April-October) : 10 x daily natural Q95

River Topography:-

- Safe and easy access to and from the watercourse, for both participants and their equipment.



Authorised Abstractions (m3/d):-

P1	Eurwg Fawr	: 82100
P2	Eurwg Fach	: 91250
P3	Nantyglyn	: 2750
P4	Cwmpenmar	: 1880
P5	Hengoed	: 3750
P6	Cynrig Fach	: 1750
P7	Cwm Ystrad	: 1380
TOTAL		: 184860

Compensation Flows (m3/d):-

Eurwg Fawr Reservoir : 18250
Eurwg Fach Reservoir : 19000

Eurwg Catchment
Potable Water Abstraction

10. POTABLE WATER ABSTRACTION

10.1 **General** : This use deals with safeguarding the supplies of water abstracted either directly from the river, or after storage in a reservoir. Raw waters are divided into three categories, according to their general quality, and the degree of treatment required before human consumption is specified accordingly.

The main concern with this use is for net abstraction, and in order to protect dbwnstream uses two particular conditions are specified:-

- o Abstraction should not reduce the river flow below a minimum acceptable flow.
- o The total net abstraction during a specified period should not exceed a specified multiple of the natural Q95. The value of this multiple depends upon the perceived sensitivity of the particular downstream uses of the catchment.

10.2 **Local Perspective** : With the historical widespread pollution in the middle and lower reaches of the Eurwg catchment, potable water abstractions are exclusively from the headwaters, and almost entirely from the Eurwg Fawr and Eurwg Fach Reservoirs. While the total licensed potable abstraction amounts to some 20% of the total annual runoff from the catchment, this is insufficient to meet demand, and is augmented by supplies from the neighbouring Cledwyn catchment, which itself can receive water from the Erddig via a transfer pipeline. In a normal year, 30% of the water supplied is from neighbouring catchments; in the drought years of 1977 and 1984, this figure rose to 42%.

Under the terms of the EC Surface Waters Directive, all the water abstracted for potable supply in the catchment is designated as requiring A2 treatment, and the quality of the supplies must therefore be maintained accordingly.

10.3 **Environmental Objectives**:-

- o To maintain water quality, water resources and river topography so as to safeguard potable abstractions.

10.4 **Environmental Requirements**:-

Water Quality:-

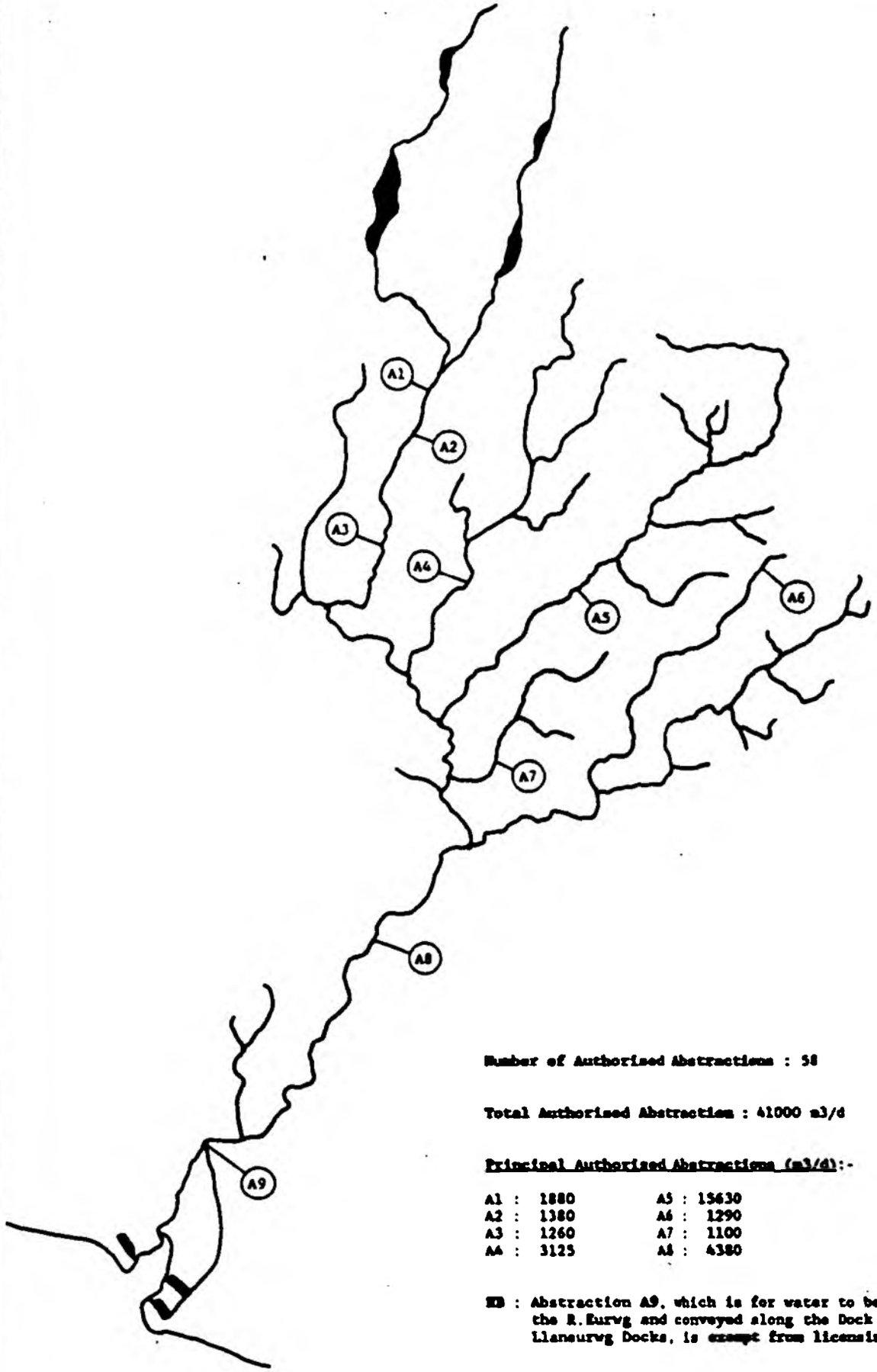
- o Water Quality Suite 7 : Potable Abstraction (A2 Treatment) (See Appendix)
- o Ammonia (total) : 1.5 mgN/l
- o Dissolved Oxygen : >50% sat.
- o BOD : <5 mgO2/l

Water Resources:-

- o Terms specified in the licence : authorised daily abstractions listed opposite.

River Topography:-

- o All intakes to be kept clear of obstruction.



Number of Authorised Abstractions : 58

Total Authorised Abstraction : 41000 m3/d

Principal Authorised Abstractions (m3/d):-

A1 :	1880	A5 :	15630
A2 :	1380	A6 :	1290
A3 :	1260	A7 :	1100
A4 :	3125	A8 :	4380

NB : Abstraction A9, which is for water to be taken from the R.Eurwg and conveyed along the Dock Feeder to Llaneurwg Docks, is exempt from licensing.

Eurwg Catchment Industrial and Agricultural Abstraction

11. INDUSTRIAL AND AGRICULTURAL ABSTRACTION

11.1 General : This use relates to supporting abstractions for a whole variety of industrial and agricultural purposes including cooling water, industrial processing water, livestock watering and the spray irrigation of crops. Critical factors to be considered here are the degree, rate, timing and location of water return to the river. For example, industrial process water is generally returned undiminished to the river, with little delay (often to a point downstream of the intake), whereas spray irrigation water is inevitably depleted with any remaining amounts returned to the river as a delayed, diffuse input.

Licences are authorised using the same criteria as those applied for potable abstractions.

11.2 Local Perspective : The industrial nature of the middle and lower catchment, and the predominance of sheep-farming in the naturally wet upland areas, mean that only very small amounts of water are abstracted for agricultural purposes. Industrial abstractions have also declined over the last ten years with the progressive replacement of traditional industries with high technology "dry" installations. The major remaining abstractions are shown opposite.

The single significant problem in relation to this use concerns the absraction from the Eurwg to Llaneurwg Docks along the Dock Feeder. The weir constructed to support this abstraction is an impassable barrier to the upstream migration of salmonids, and the large volumes abstracted mean that downstream flow is severely depleted during prolonged dry weather, as experienced during the drought years of 1977, 1984 and 1989.

11.3 Environmental Objectives:-

- o To maintain water quality, water resources and river topography, so as to safeguard industrial abstractions and, where water is used for agricultural processes, to maintain water quality so as to protect the health and well-being of affected animals, avoid damage to crops and safeguard public health.

11.4 Environmental Requirements:-

Water Quality:-

- o Specific to the abstraction concerned. No particular criteria stipulated for the industrial abstractions in the catchment

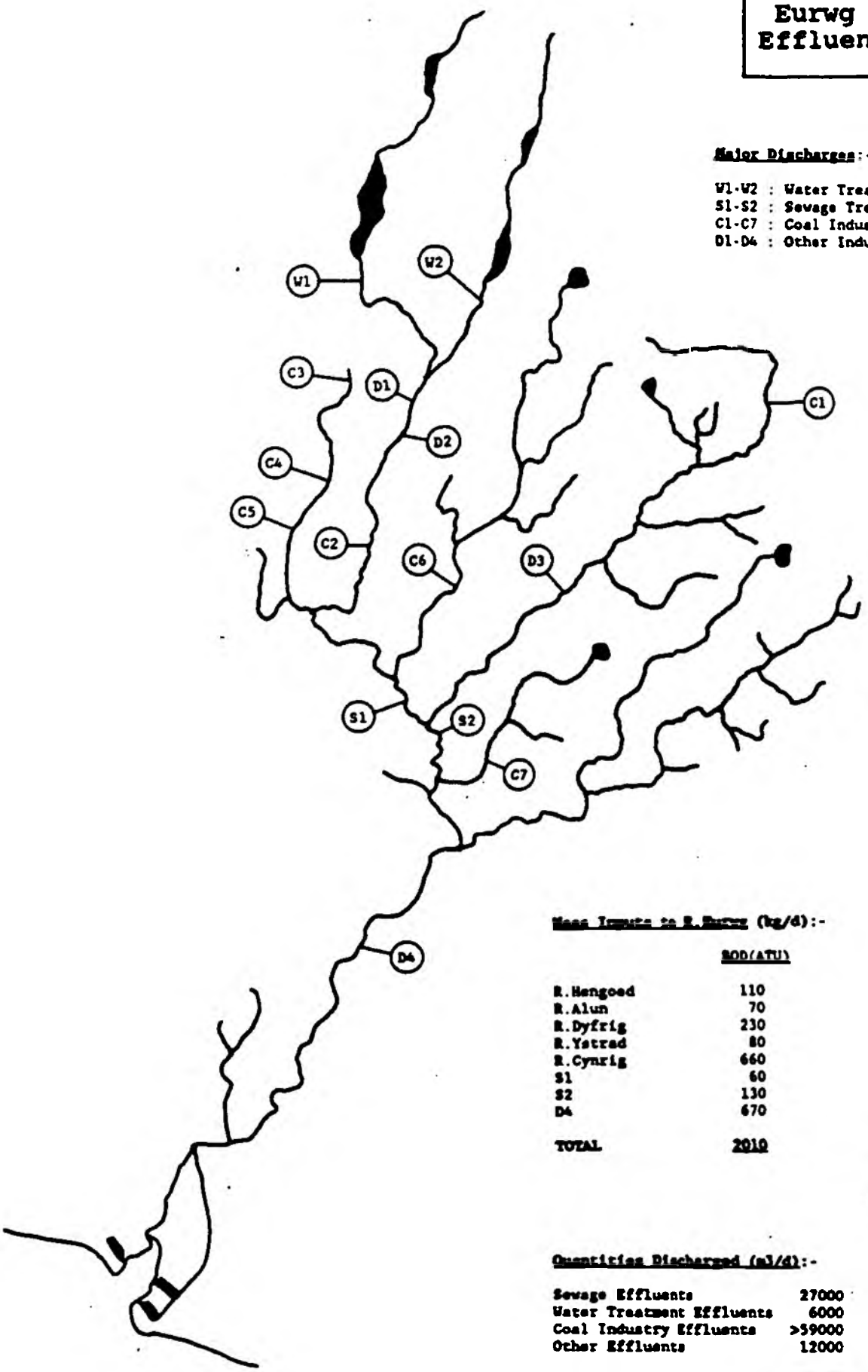
Water Resources:-

- o Terms specified in the licence : authorised daily abstractions listed opposite.

River Topography:-

- o Weirs may be required to maintain the abstraction.
- o All intakes to be kept clear of obstruction.

Eurwg Catchment Effluent Disposal



Major Discharges:-

W1-W2 : Water Treatment Works
S1-S2 : Sewage Treatment Works
C1-C7 : Coal Industry
D1-D4 : Other Industry

Mean Inputs to R.Eurwg (kg/d):-

	BOD(ATU)	Ammoniacal N
R.Hengoed	110	1
R.Alun	70	10
R.Dyfrig	230	45
R.Ystrad	80	15
R.Cynrig	660	5
S1	60	320
S2	130	15
D4	670	25
TOTAL	2010	436

Quantities Discharged (ml/d):-

Sewage Effluents	27000
Water Treatment Effluents	6000
Coal Industry Effluents	>59000
Other Effluents	12000
TOTAL	>104000

12. EFFLUENT DISPOSAL

12.1 **General** : This use relates to the disposal of domestic, industrial and agricultural effluents to the river system. The particular feature of this use is that it has no intrinsic requirement for any particular environmental conditions to be met; rather it is constrained by the need to protect other uses from the effects of its discharge.

The conditions to met by a particular discharge are set out in a specific consent. They are calculated based upon the upstream water quality and flow rate in the receiving watercourse, and the degree of downstream water quality degradation that can be tolerated before other uses are adversely affected. It follows that, if there is any susequent deterioration in upstream water quality, or river flow degradation beyond the values assumed in calculating the consent, then downstream uses could be put at risk.

12.2 **Local Perspective** : The industrial decline, particularly over the last ten years, means that the pressure on the catchment from this direction has abated considerably. However, certain major problems remain. Sewage from the Upper Eurwg, Hengoed and Alun sub-catchments is collected by trunk sewers for treatment at Penymynydd STW (S1), an activated-sludge plant which provides a high degree of BOD-removal but virtually no nitrification: the ammonia load from this source is therefore high. Sewage from the Dyfrig sub-catchment is treated at the Dyfrig Valley STW, a percolating filter plant which achieves good ammonia removal. Sewage from the Cynrig Fawr and Cynrig Fach, and from virtually the whole of the remaining lower Eurwg catchment is conveyed by trunk sewer direct to sea.

Major problems still occur because of the condition of the sewer system. In some cases sewers have fractured; in other cases, overflows which are designed to relieve pressure on the sewerage system during heavy rainfall operate prematurely due to incorrect setting or blockages in the sewer. In either case, the result is the same: untreated sewage discharged direct to the river.

12.3 **Environmental Objectives:-**

- To allow the discharge of domestic, industrial and agricultural effluents to the watercourse in such a way that other uses are not compromised.

12.4 **Environmental Requirements:-**

Water Quality:-

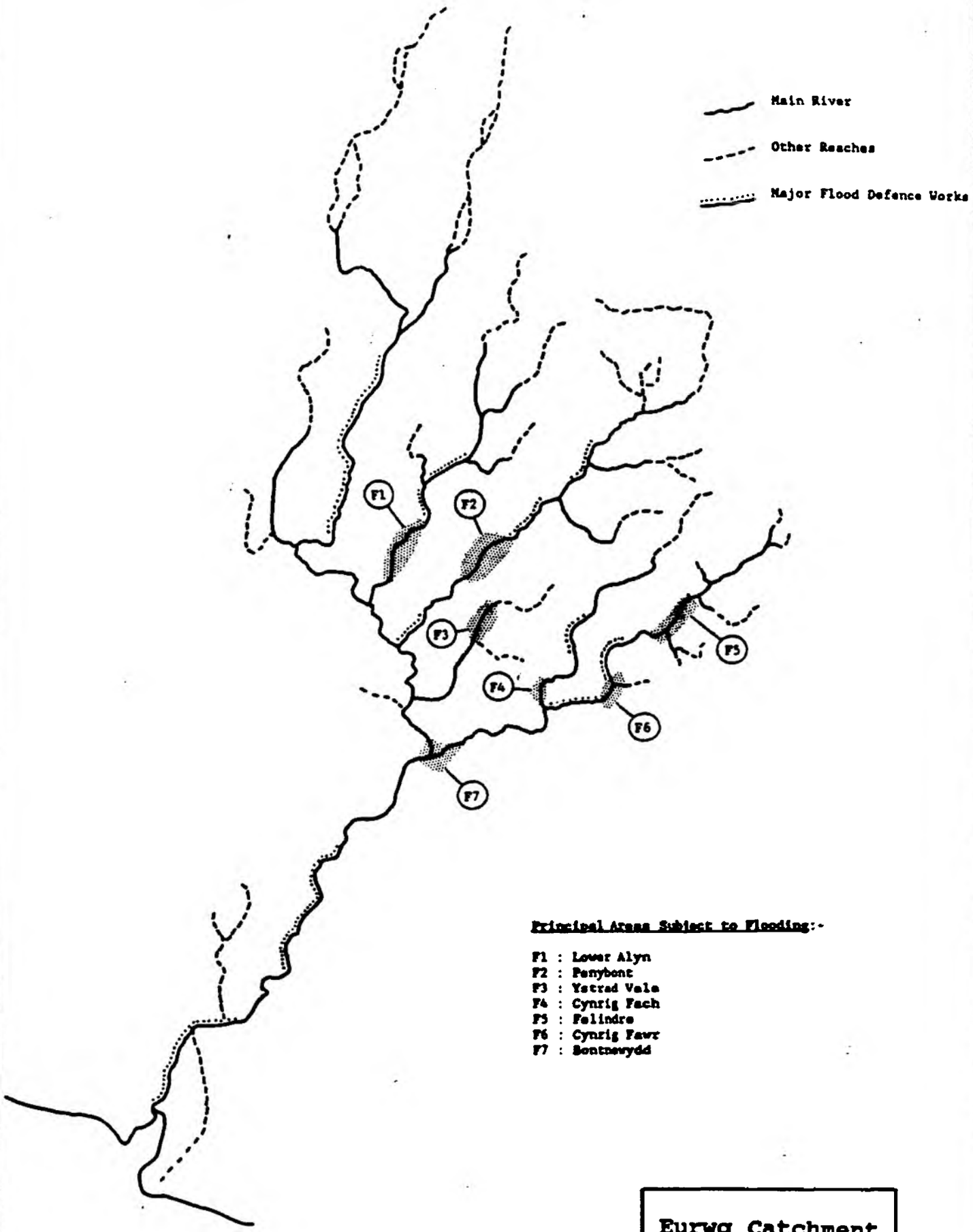
- No deterioration in upstream water quality, beyond that assumed in setting the consent.

Water Resources:-

- No diminution of upstream flow, below that assumed in setting the consent.
- Abstraction must not reduce the river flow below the natural Q95.

River Topography:-

- Outfalls must be situated so as to achieve a specified degree of effluent mixing with the river contents, within a specified distance, the precise terms to vary for different consents.



Principal Areas Subject to Flooding:-

F1 : Lower Alyn
F2 : Penybont
F3 : Ystrad Vale
F4 : Cynrig Fach
F5 : Felindre
F6 : Cynrig Fawr
F7 : Bontnewydd

Eurwg Catchment Flood Defence

13. FLOOD DEFENCE

13.1 **General** : This use deals with the containment of water within the river channel, particularly at times of high flow, and with its controlled release to the wider flood plain, in order to relieve pressure at more sensitive locations such as towns. Flood flows are described in relation to their return period: the larger the flow, the longer the return period. In built-up areas, flood defences are commonly designed to withstand a flood with a return period of 100 years. Conversely, river defences in agricultural areas upstream and downstream of a town could be deliberately designed for breaching by, say, a five-year return flood. The advantage of this is that the flood flow reaching the town would be balanced by the upstream breach, and backing-up would be reduced by the downstream breach.

For management purposes, a portion of the catchment is formally designated as the "Statutory Main River" (see opposite). On the main river, formal consent is required for all proposals to interfere with the bed or banks of the river or obstruct the flow thereof. On the main river, the NRA also has powers to control actions of others within 7m of the channel on both sides, and to carry out works on the river if it so desires. The NRA has powers over all other watercourses where persons wish to culvert them, pipe them or erect dams or other obstructions to flow; again, formal consent is required.

The nature of the works carried out for flood defence means that, in the past, this use has come into some conflict with other river uses - notably conservation and fisheries. However, great progress has been made over the last ten years, in devising practices whereby the river can achieve its hydraulic performance target but without significant habitat degradation.

13.2 **Local Perspective** : Widespread flooding in the catchment during the winters of 1973 and 1979 brought widespread damage to property, and intense public pressure for remedial works. Over the last ten years, flood defences in Llaneurwg have been substantially upgraded, and much work has also been carried out in the valleys. On the Eurwg, virtually the whole stretch from Groeslon to the confluence with the Hengoed has been extensively worked, along with a substantial stretch north of Llaneurwg. On the tributaries, only the Hengoed has not experienced major schemes. Nevertheless, problem areas still remain and these are shown opposite. The most serious is in Bontnewydd, where high flows in the Eurwg cause extensive backing-up of the Cynrig, and flooding problems in the old town centre.

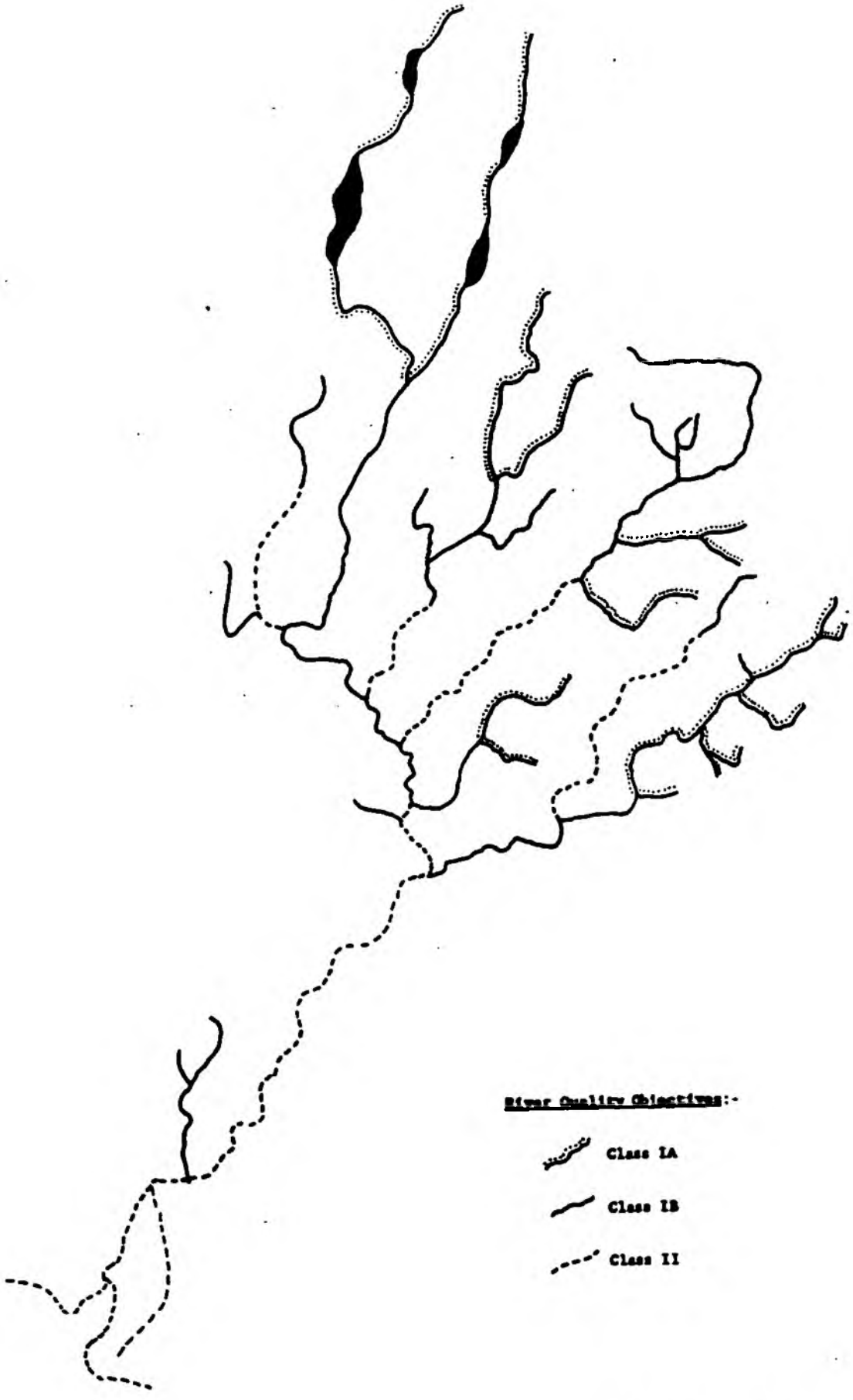
13.3 **Environmental Objectives:-**

- To ensure that 99% of the properties within the catchment are protected to a 1 in 100 year return period standard.

13.4 **Environmental Requirements:-**

River Topography:-

- In protected areas, the river bank should not be breached by a flood flow with a specified return period : generally 100 years for built-up areas.
- In flood plains, the river bank should be breached by a flood flow with a specified return period.



Eurwg Catchment
River Quality Objectives

14. RIVER QUALITY OBJECTIVES

14.1 General : In 1979, River Quality Objectives were set for rivers throughout England and Wales, in terms of the NWC Quality Classification, which deals simply with Dissolved Oxygen, BOD(ATU) and Ammonia. While rivers in class I are, for example considered capable of supporting natural salmonid fisheries, and those in class II cyprinid fisheries, this classification scheme is not specifically use-orientated, and is therefore of only limited usefulness in practical catchment management. Nevertheless, the RQO's set in 1979 remain a performance objective for the catchment and must therefore be considered.

The RQO's set in 1979 were "long-term" RQO's, and it was generally considered that 2001 should be the target date for compliance. However, this target may be somewhat overtaken by events. The NRA Water Quality Survey Working Group have proposed a radical shake-up of the classification scheme, with a view to making it expressly use-related, and therefore more relevant to the needs of water quality management.

14.2 Local Perspective : Following a major rundown in the coal industry after the miner's strike, long term RQO's for the Eurwg Catchment were reassessed in 1985 (see opposite). Broadly, the rationale adopted was that:-

- o Stretches in the upper reaches where "pristine" conditions were considered to be attainable were designated class IA.
- o Remaining stretches in the upper and middle catchment, with a salmonid fishery objective, were designated class IB.
- o Stretches in the middle and lower reaches, with a migratory salmonid and a cyprinid fishery objective, were designated class II.

14.3 Environmental Objective:-

- o To achieve the NWC Water Quality class, for which the reach has been designated.

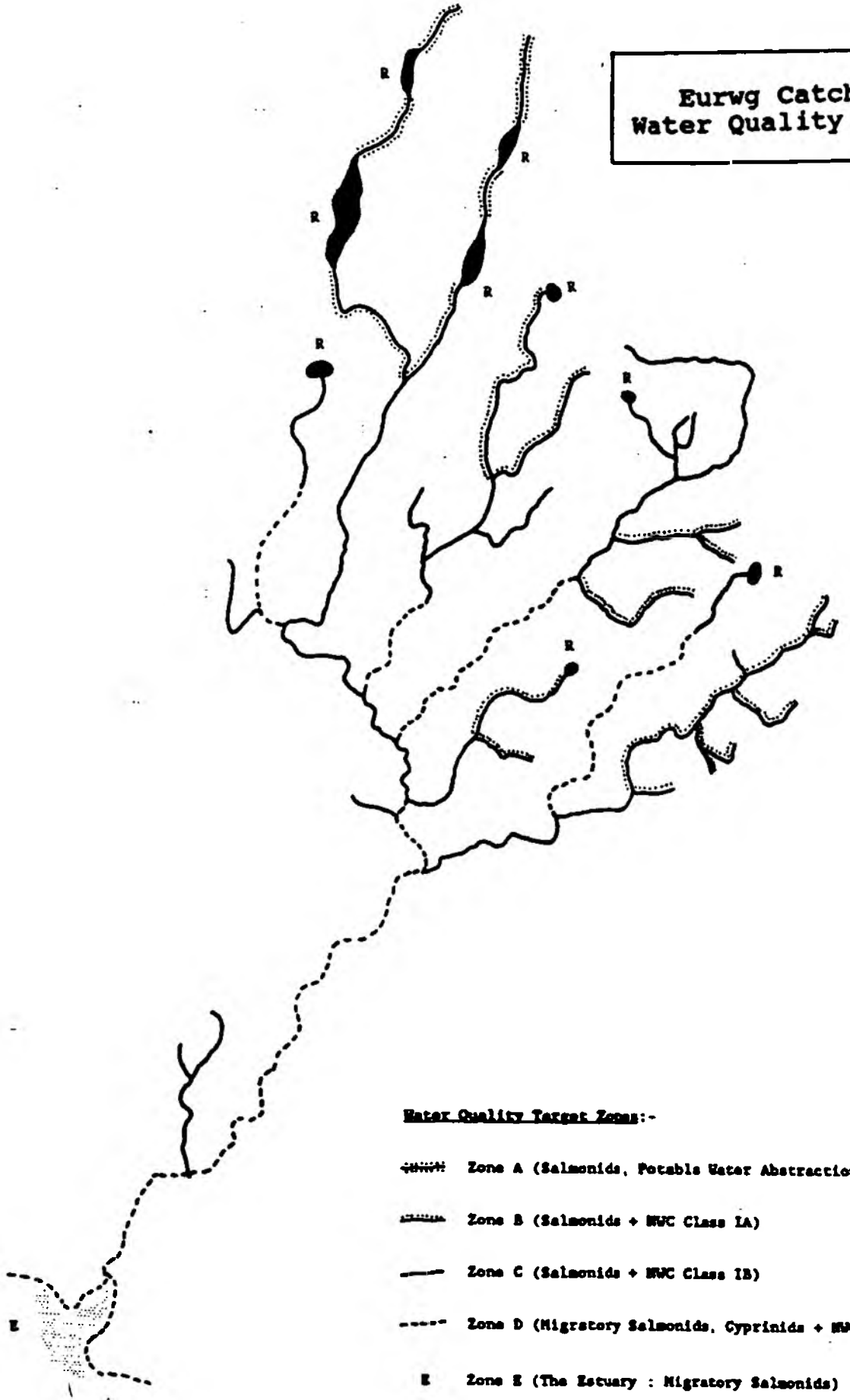
14.4 Environmental Requirements:-

Water Quality:-

	NWC Class		
	IA	IB	II
Dissolved Oxygen %sat. (5P)	>80	>60	>40
BOD(ATU) mgO2/l (95P)	3.0	5.0	9.0
Ammonia (total) mgN/l (95P)	0.31	0.7	---

5P : 5 %ile value; 95P : 95 %ile value

Eurwg Catchment Water Quality Targets



Water Quality Target Zones:-

- Zone A (Salmonids, Potable Water Abstraction + NWC Class 1A)
- Zone B (Salmonids + NWC Class 1A)
- Zone C (Salmonids + NWC Class 1B)
- Zone D (Migratory Salmonids, Cyprinids + NWC Class II)
- E Zone E (The Estuary : Migratory Salmonids)
- R Zone F (Reservoirs : Potable Water Abstraction)

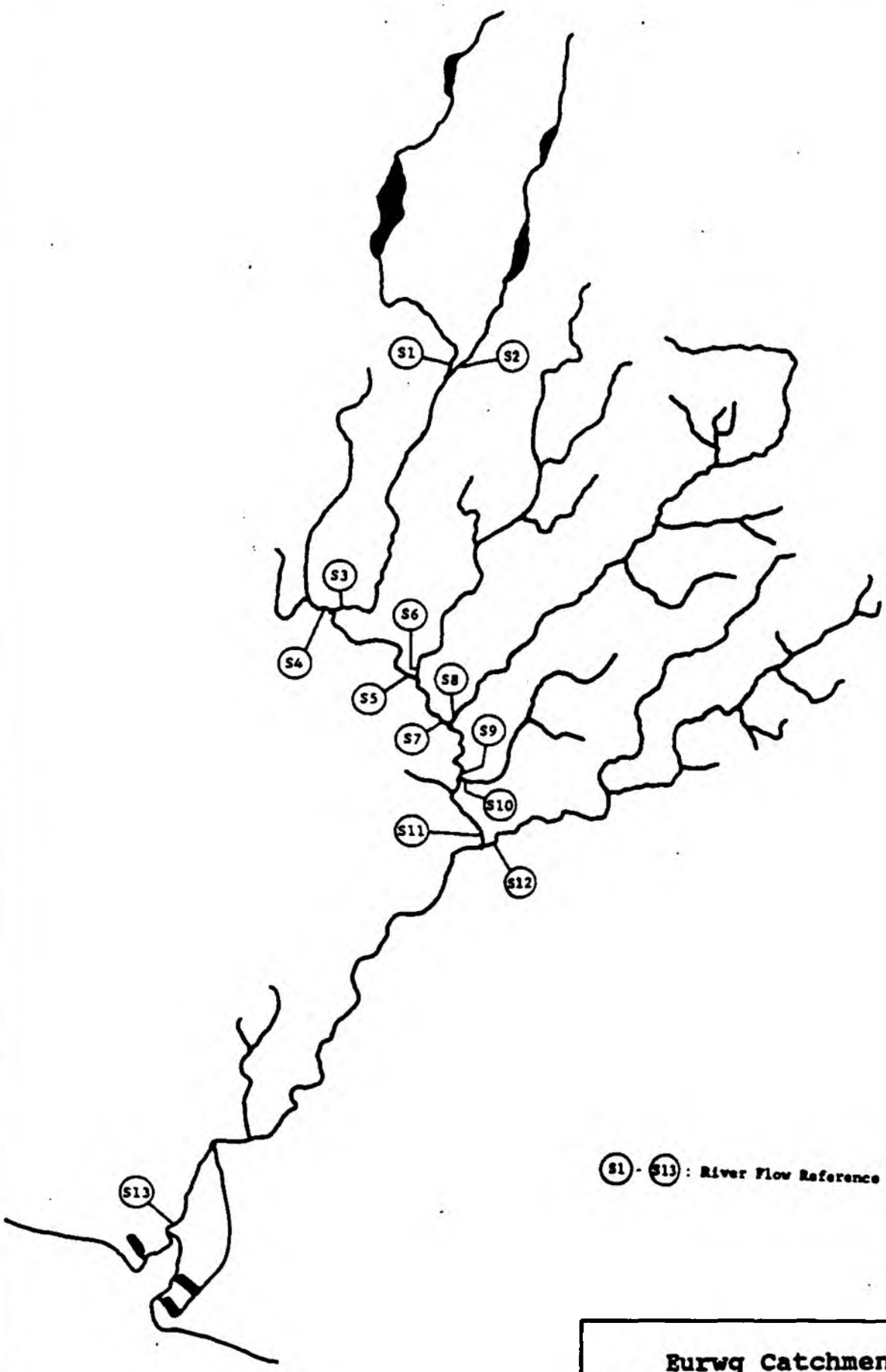
15. WATER QUALITY TARGETS

15.1 **General** : The water quality requirements for all the uses can now be combined to give a single "synoptic map" summarising the targets for the whole catchment. Clearly the quality requirement that applies for any given determinand in a particular stretch is equal to the strictest use-related requirement that applies.

15.2 **Local Perspective** : Consideration of the eleven different uses in the catchment generates six zones (which are not necessarily continuous), where the following water quality requirements apply:-

	WATER QUALITY ZONE					
	A	B	C	D	E	F
Water Quality Suite 1 Aesthetic Criteria	*	*	*	*	*	*
Water Quality Suite 2 List I Substances	*	*	*	*	*	*
Water Quality Suite 3 List II (Cyprinids)				*	*	*
Water Quality Suite 4 List II (Salmonids)	*	*	*			
Water Quality Suite 5 Chlorine, H2S, Temp, Phosphorus (Salmonids)	*	*	*			*
Water Quality Suite 6 Chlorine, H2S, Temp, Phosphorus (Cyprinids)				*	*	
Water Quality Suite 7 Potable Abstraction (A2 Treatment)	*					*
Ammonia (unionised) ugN/l	15 AA 21 95P	15 AA 21 95P	15 AA 21 95P	15 AA 21 95P	21 AA 42 95P	15 AA 21 95P
Ammonia (total) ugN/l	310 95P	310 95P	700 95P	780 95P	780 95P	6780 95P
Dissolved Oxygen mgO2/l	>9 50P >7 All	>9 50P >7 All	>9 50P >7 All	>7 50P >5 All	>7 50P >3 All	>7 50P >5 All
Dissolved Oxygen % sat.	>80 5P	>80 5P	>60 5P	>40 5P		
BOD mg/l	3 95P	3 95P	3 95P	6 95P		5 95P
BOD(ATU) mg/l	3 95P	3 95P	5 95P	9 95P		

* Water Quality Suite applies; AA : Annual Average; 95P : 95 %ile Value(etc.)



Eurwg Catchment
Water Resources Targets

16. WATER RESOURCES TARGETS

16.1 **General** : As with water quality, the water resources targets for the whole catchment can now be summarised. In this case, the two prime criteria are:-

- o That abstraction should not reduce the river flow below the natural Q95
- o That total abstraction over the period April-September should not exceed a given multiple of the daily natural Q95.

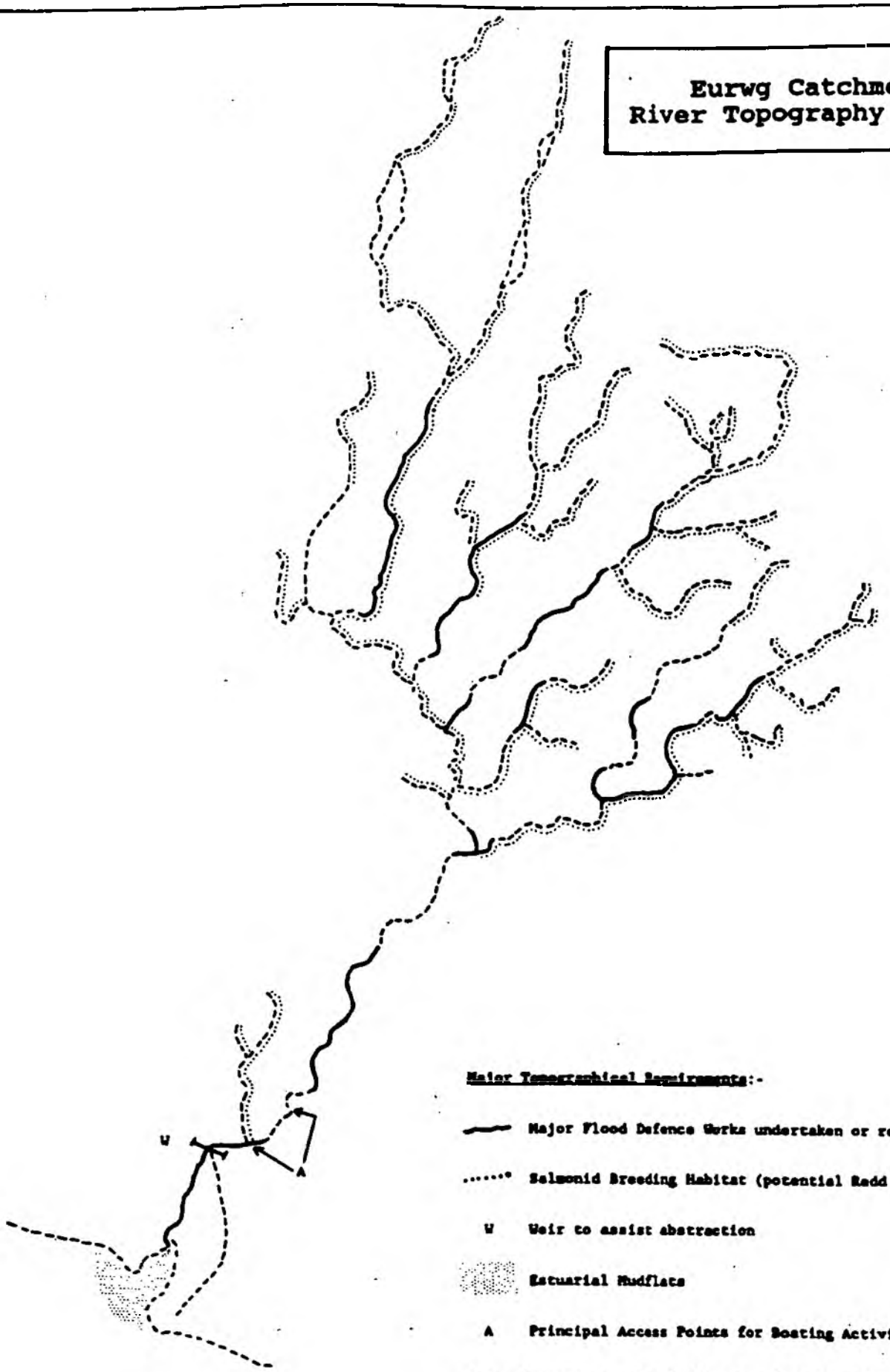
16.2 **Local Perspective** : Consideration of uses in the catchment, in relation to the natural Q95 at strategic locations, gives the following water quantities available for net dry weather abstraction, upstream of the point in question:-

	Natural Q95 (m3/d x 1000)	Total Permissable Dry Weather Abstraction (m3 x 1000)	Daily Permissable Dry Weather Abstraction (m3/d)
S1	20	200	1100
S2	35	350	61920
S3	77	770	4230
S4	10	100	550
S5	92	920	5050
S6	51	510	2800
S7	148	1620 *	8900 *
S8	42	420	2310
S9	196	2220 *	12200 *
S10	12	120	660
S11	214	2400 *	13200 *
S12	82	820	4500
S13	328	3540 *	19450 *

* The Dry Weather Flow from the sewage works at Penymynydd and Dyfrig Valley represents a maintained input to the river, over and above the natural Q95, and the additional amounts involved can be counted against abstraction. The Dry Weather Flows involved are:-

- o Penymynydd STW : 14000 m3/d
- o Dyfrig Valley STW : 12000 m3/d

Eurwg Catchment
River Topography Targets



Major Topographical Requirements:-

Major Flood Defence Works undertaken or required

Salmonid Breeding Habitat (potential Redd Sites)

W Weir to assist abstraction

Estuarial Mudflats

A Principal Access Points for Boating Activities

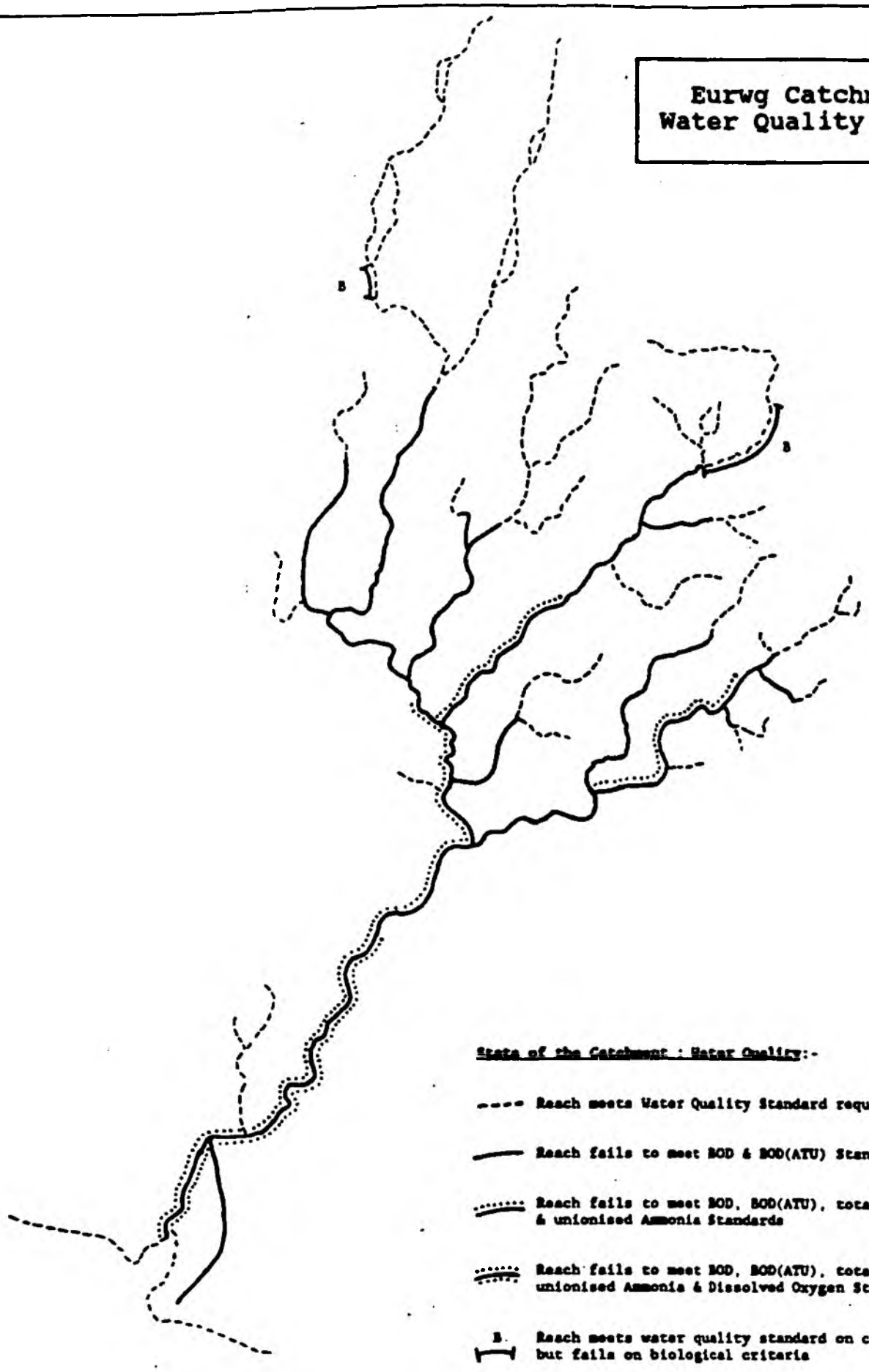
A requirement to maintain/improve river habitat in relation to General Ecosystem Conservation applies throughout the Catchment.

17. RIVER TOPOGRAPHY TARGETS

17.1 General : As with water quality and water resources, the overall river topography targets for the catchment can now be summarised. The nature of the features that are included under the term "river topography", means that the targets involved can vary widely in scale. The intention here is not to identify, for example, points of access to the river wherever they are required, but rather to indicate the major topographical requirements of various reaches in relation to the uses concerned.

17.2 Local Perspective : Major topographical requirements are identified on the map opposite. In addition to the features shown, there is a requirement for migrating salmonids to have free access from the estuary to all the spawning reaches indicated.

Eurwg Catchment Water Quality Status



18. STATE OF THE CATCHMENT : WATER QUALITY

18.1 General : Having set water quality targets for the catchment, it is now possible to assess the state of the catchment against these targets. It is not the intention here either to state the cause of any problem, or to suggest possible solutions. The problems are simply identified for future attention during the Phase 2 stage of the Catchment Management Planning Process.

18.2 Problems identified:-

- o There is widespread failure to achieve the BOD and BOD(ATU) standards in the main river downstream of Groeslon, and in the lower reaches of all tributaries.

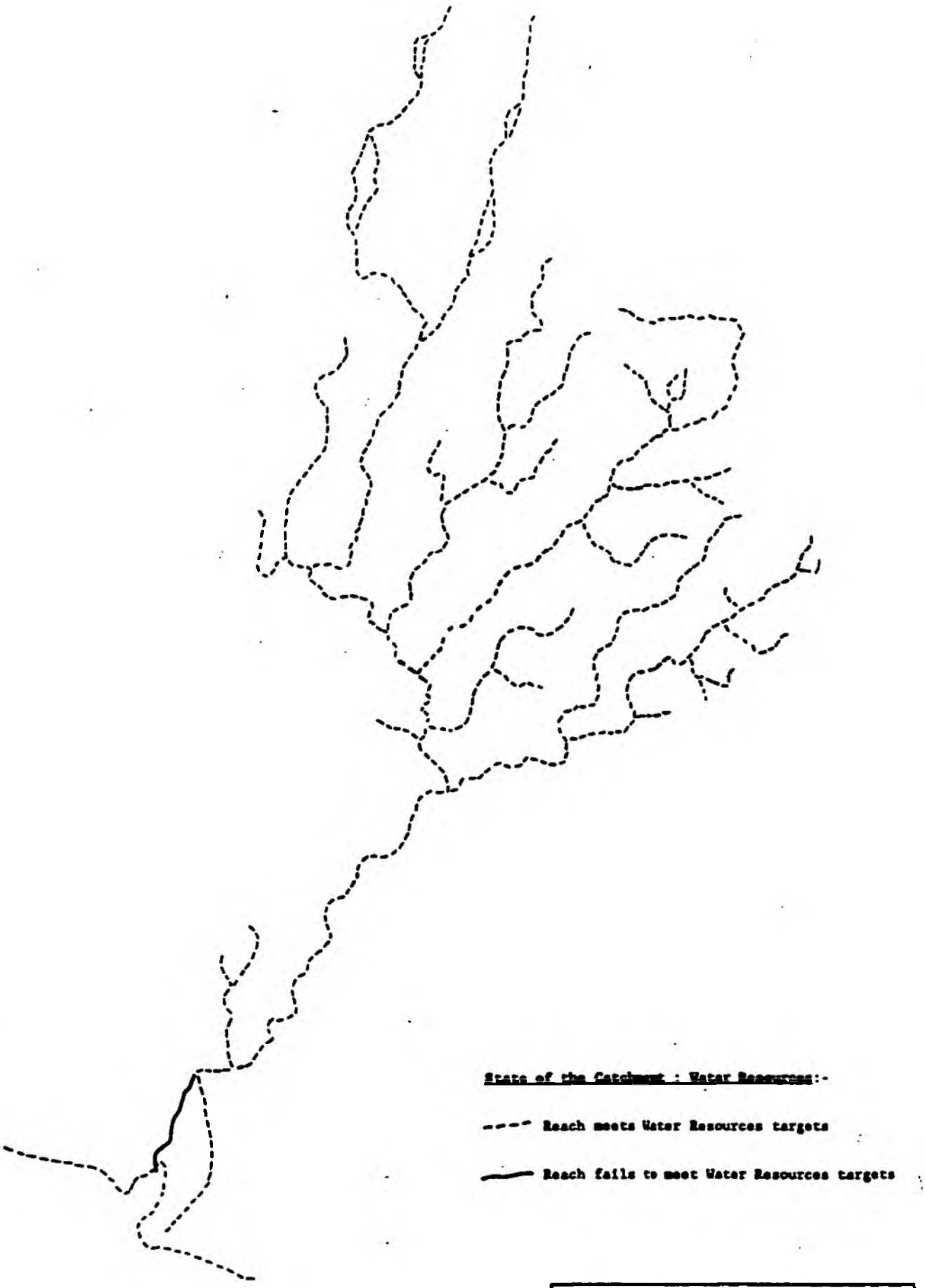
- o There is a failure to achieve the total and unionised Ammonia standard in the main river downstream of Penymynydd Sewage Works, in the R.Dyfrig downstream of discharge D3, and in the Cynrig Fawr downstream of Felindre.

- o The main river fails to achieve the Dissolved Oxygen standard downstream of discharge D4.

- o Two stretches, the Eurwg Fawr downstream of the Water Treatment Works, and the Dyfrig downstream of colliery discharge C1, both met their water quality requirements on a simple examination of chemical data. However the biological quality of these two reaches is so poor, relative to the apparent water chemistry, that they have both been signalled for detailed further investigation.

- o In addition to these problems, there is a widespread problem of litter throughout the urbanised parts of the catchment, which detracts from the Public's view of the river environment, and contravenes basic aesthetic requirements.

- o These problems relate to the current situation. If the proposed Eurwg Barrage goes ahead, there will implications for water quality which need to be addressed, particularly in relation to any proposed recreational uses of the freshwater impoundment that would be created.



Eurwg Catchment
Water Resources Status

19. STATE OF THE CATCHMENT : WATER RESOURCES

19.1 General : Having set water resources targets for the catchment, it is now possible to assess the state of the catchment against these targets. It may be noted here that abstractions from the reservoirs at the head of the catchment are not counted against the permissable dry weather abstractions. The rationale behind this is that the water concerned is, in fact, collected during the winter months. The two principal reservoirs in the Eurwg catchment are, of course, obliged to maintain a compensation flow to the river throughout the year.

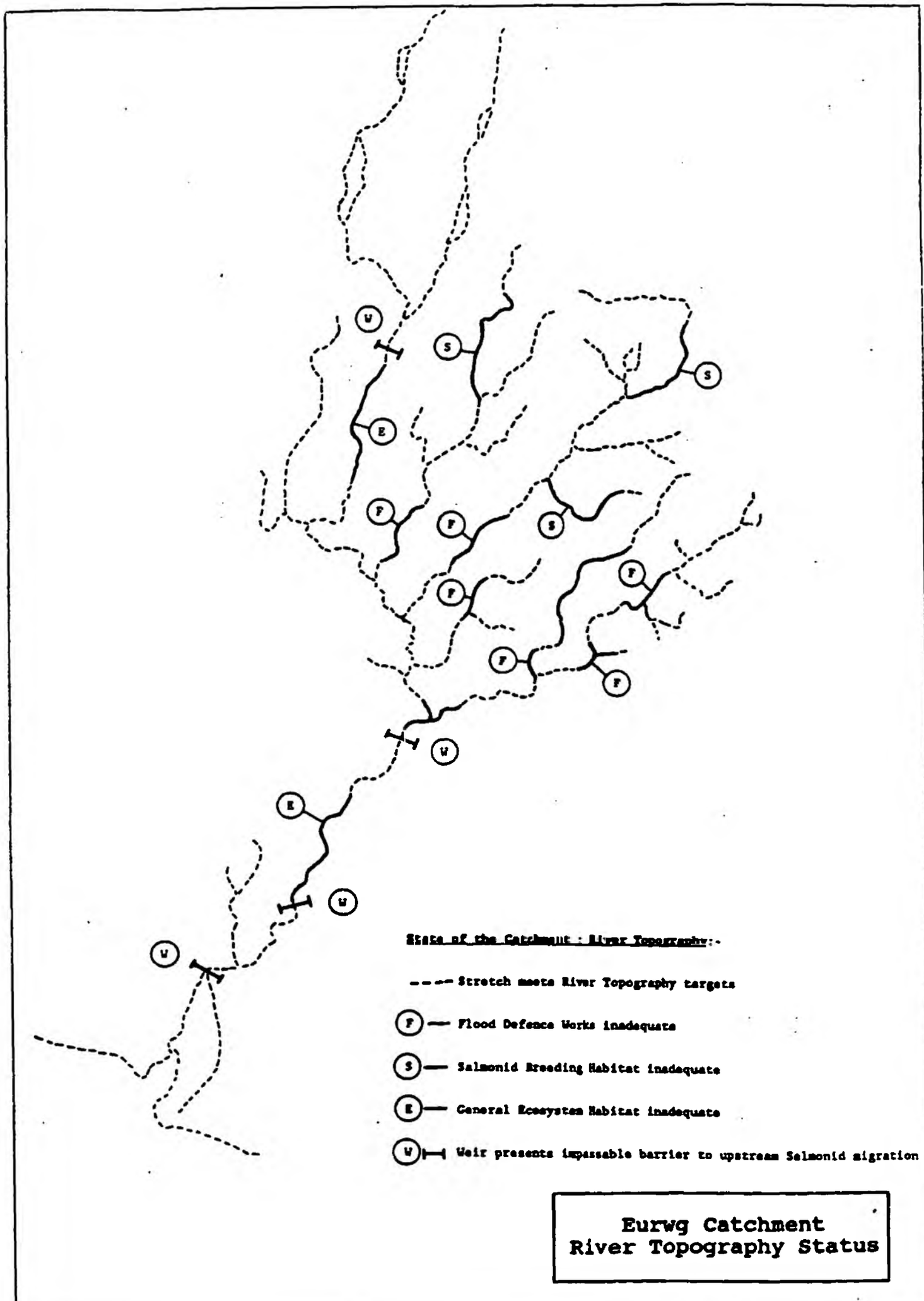
19.2 Problems identified:-

The catchment fails to achieve its water resources targets over only one stretch: the main river downstream of the Dock Feeder takeoff. The situation arises because the abstraction is exempt from licensing, and can not therefore be effectively controlled.

The problem is a major one; the volume abstracted typically amounts 90000 m3/d. This figure is over four times that which would be allowed for a licensed abstraction at this point, under the Authority's guidelines on environmental objectives for uses which share the river.

The adverse environmental consequences of this abstraction can be summarised:-

- During a typical year, river flow is lower than Q95 for around 40 days, as oppposed to 18 days that would otherwise be the case.
- During the low flow conditions experienced in the drought years of 1976, 1984 and 1989, minimum actual flows in the river were reduced to 30% of Q95, as opposed to 70% that would otherwise be the case.


W
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Stats of the Catchment : River Topography:-
Stretch meets River Topography targets
F — Flood Defence Works inadequate
S — Salmonid Breeding Habitat inadequate
E — General Ecosystem Habitat inadequate
W — Weir presents impassable barrier to upstream Salmonid migration
Eurwg Catchment
River Topography Status

20. STATE OF THE CATCHMENT : RIVER TOPOGRAPHY

20.1 General : Having set river topography targets for the catchment, it is now possible to assess the state of the catchment against these targets.

20.2 Problems identified:-

o Despite the large scale of remedial works udertaken over the last ten years, flood defence works are still inadequate at the following locations:-

- R.Alun, downstream of Maesgarw.
- R.Dyfrig in Penybont.
- Middle reaches of the R.Ystrad.
- R.Cynrig Fach, upstream of the confluence with the Cynrig Fawr.
- R.Cynrig Fawr in Felindre, and further downstream.
- R.Cynrig upstream of the confluence with the R.Eurwg.

o The availabilty of suitable gravels for redd excavation by salmonids is severely restricted in the following reaches:-

- Upper reaches of the R.Alun.
- Upper reaches of the R.Dyfrig.
- On the tributary of the R.Dyfrig indicated.

o Habitat in relation to General Ecosystem Conservation presents greatest scope for improvement on two long stretches of the main river:-

- Downstream of Groeslon.
- Upstream of Llaneurwg.

o The four weirs indicated on the map presently pose a complete barrier to upstream migration by salmonids.

o These observations relate to the current situation. If the proposed Eurwg Barrage goes ahead, there will be implications for groundwater level and for salmonid migration, which need to be addressed. Large areas of mudflats currently used as winter feeding grounds by shorebirds would also be lost.

21. CONCLUSIONS

21.1 **General** : Problems have been identified in the following areas, and these will be addressed in the Phase 2 Plan.

21.2 **Water Quality:-**

- o Failure to achieve the BOD and BOD(ATU) standards in reaches of both the main river, and the tributaries.
- o Failure to achieve the Ammonia standards in reaches of the main river, the R.Dyfrig and the R.Cynrig Fawr.
- o Failure to achieve the Dissolved Oxygen standard in the lower reaches of the main river.
- o Poor biological quality in reaches of the R.Eurwg Fawr and the R.Dyfrig.
- o Widespread problems of litter throughout the urban areas.

21.3 **Water Resources:-**

- o An excessive unlicensed abstraction along the Dock Feeder from the R.Eurwg in Llaneurwg.

21.4 **River Topography:-**

- o Flooding of urban areas from the R.Alun, R.Dyfrig, R.Ystrad, R.Cynrig Fach and the R.Cynrig Fawr.
- o Poor availability of suitable gravels for redd-excavation by salmonids in reaches of the R.Alun and the R.Dyfrig.
- o Generally poor habitat on two long reaches of the main river.
- o Four weirs on the main river present an impassable barrier to upstream migration by salmonids.

21.5 In addition to these problems, which relate to the current situation, potential problems have been identified in relation to the proposed Eurwg Barrage. These are concerned principally with the the quality of water in the freshwater impoundment, the raising of groundwater levels and the loss of feeding grounds for shorebirds.

APPENDIX : WATER QUALITY SUITES

Water Quality Suite 1 : Aesthetic Criteria

Parameter	Units	Value	Status
AESTHETIC CRITERIA			*
Colour	visual inspection	no abnormal change	I
Mineral oils	visual inspection	no visible surface film	I
	olfactory inspection	no odour	I
	mg/l after extraction and weighing dried residue	≤0.3	G
Surface-active substances (methylene-blue active)	visual inspection	no lasting foam	I
	mg/l as lauryl sulphate	≤0.3	G
Phenols	olfactory inspection	no specific odour	I
	mg/l	≤0.05	I
Transparency	m	1	I
Tarry residues, solid floating material	visual inspection	absent	G

DISSOLVED OXYGEN

Aerobic conditions (≥10% saturation) should be maintained to avoid effects of deoxygenation, particularly production of hydrogen sulphide, ammonia or methane.

Water quality Suite 1 : Aesthetic Criteria (Cont.)

Parameter	Units	Value	Status
LIST I SUBSTANCES			
The presence of List I substances is not relevant to this use, however, the EC Dangerous Substances Directive[7] applies to all waters. Pollution attributable to persistent synthetic floatable substances or to persistent mineral oils should be avoided (cf AESTHETIC CRITERIA)			

* Status specified in EC Directive (mandatory (I) or guide (G) values based on fortnightly or less frequent sampling) may not be appropriate for this use. The objective is to prevent public nuisance at all times.

APPENDIX : WATER QUALITY SUITES

Water Quality Suite 2 : List I Substances

Parameter	Units	Value	Status
LIST I SUBSTANCES *			
Mercury	µgHg/l	1	AA,T
Cadmium	µgCd/l	5	AA,T
Hexachlorocyclo-hexane	µgHCH/l	0.1	AA,T
Carbon tetrachloride	µgCCl_4/l	12	AA
DDT	µgDDT/l	0.025	AA,T
	µgp.p-DDT/l	0.01	AA
Pentachlorophenol	µgPCP/l	2	AA
Drins	µg/l	0.03) until	AA,T
	µgendrin/l	0.005) 1.1.1994	M
Hexachlorobenzene	µgHCB/l	0.03	AA
Hexachlorobutadiene	µgHCBD/l	0.1	AA
Chloroform	µg$CHCl_3$/l	12	AA

Proposals have been published for the folloving candidate List I substances[11] but these have not so far been adopted: 1,2-dichloroethane, trichloroethylene, perchloroethylene, trichlorobenzene.

* The concentrations of the folloving List I substances in sediments must not increase significantly with time:

cadmium, hexachlorocyclohexane, mercury.

The concentrations of the folloving List I substances in sediments and/or molluscs and/or fish must not increase significantly with time:

DDT, pentachlorophenol, drins, hexachlorobenzene, hexachlorobutadiene.

Water Quality Suite 3 : List II Standards (Cyprinids)

Parameter	Units	Value	Status
LIST II SUBSTANCES			
Arsenic	µgAs/l	50	AA,D
Boron	µgB/l	2000	AA,T
Inorganic tin	µgSn/l	25	AA,T
Organotins (TBT/TPT)	µg/l	TBT 0.02 TPT 0.02	M,T M,T
pH	pH values	6.0-9.0	95P
Iron	µgFe/l	1000	AA,D
Mothproofing agents	µg/l		95P,T
PCSDs		0.05	
sulcofuron		25	
flucofuron		1	
permethrin		0.01	
cyfluthrin		0.001	

The following standards are hardness-related.

		Hardness (mg/l as $CaCO_3$)						
		<50	50-100	100-150	150-200	200-250	>250	
Chromium	µgCr/l	150	175	200	200	250	250	AA,D
Copper	µgCu/l	1	6	10	10	10	28	AA,D
		5	22	40	40	40	112	95P,D
Lead	µgPb/l	50	125	125	250	250	250	AA,D
Nickel	µgNi/l	50	100	150	150	200	200	AA,D
Zinc	µgZn/l	75	175	250	250	250	500	AA,T
		300	700	1000	1000	1000	2000	95P,T,I
Vanadium	µgV/l	20	20	20	20	60	60	AA,T

APPENDIX : WATER QUALITY SUITES

Water Quality Suite 4 : List II Substances (Salmonids)

Parameters	Units	Value	Status
LIST II SUBSTANCES			
Arsenic	µgAs/l	50	AA,D
Boron	µgB/l	2000	AA,T
Inorganic tin	µgSn/l	25	AA,T
Organotins	µg/l	TBT 0.02 TPT 0.02	M,T M,T
pH	pH value	6.0-9.0	95P
Iron	µgFe/l	1000	AA,D
Mothproofing agents	µg/l		95P,T
PCSDs		0.05	
sulcofuron		25	
flucofuron		1	
permethrin		0.01	
cyfluthrin		0.001	

The following standards are hardness-related.

		Hardness (mg/l as $CaCO_3$)						
		<50	50-100	100-150	150-200	200-250	>250	
Chromium	µgCr/l	5	10	20	20	50	50	AA,D
Copper	µgCu/l	1	6	10	10	10	28	AA,D
		5	22	40	40	40	112	95P,D
Lead	µgPb/l	4	10	10	20	20	20	AA,D
Nickel	µgNi/l	50	100	150	150	200	200	AA,D
Zinc	µgZn/l	8	50	75	75	75	125	AA,T
		30	200	300	300	300	500	95P,T,I
Vanadium	µgV/l	20	20	20	20	60	60	AA,T

APPENDIX : WATER QUALITY SUITES

Water Quality Suite 5 : Chlorine, H2S, Temperature, Phosphorus (Salmonids)

Parameter	Units	Value	Status
Residual chlorine	ugHOCl/l	≤5 (at pH 6)	95P,T,I
Hydrogen sulphide (undissociated H_2S)	ugH_2S/l		AA
		<15 °C, <5 mg O_2/l 0.5 (24 hr max 5.0)	
		<15 °C, >5 mg O_2/l 1.0 (" 10.0)	
		>15 °C, >5 mg O_2/l 0.25 (" 2.5)	
		>15 °C, >5 mg O_2/l 0.5 (" 5.0)	
Temperature	°C	≤1.5 above unaffected water	98P,I
		≤21.5	98P,I
		≤10 for breeding of cold-water species	98P,I
Phosphorus (indicative of need to reduce eutrophication)	mg PO_4/l	0.2	T

I = mandatory; G = guide value; AA = annual average;
95P = 95 percentile; T = total; D = dissolved; M = maximum;
98P = 98 percentile

Water Quality Suite 6 : Chlorine, H2S, Temperature, Phosphorus (Cyprinids)

Parameter	Units	Value	Status
Residual chlorine	ugHOCl/l	≤5 (at pH6)	95P,T,I
Hydrogen sulphide (undissociated H_2S)	ugH_2S/l		
	<15 °C, <5 mg O_2/l	0.5 (24 hr max 5.0)	
	<15 °C, >5 mg O_2/l	1.0 (" 10.0)	
	>15 °C, <5 mg O_2/l	0.25 (" 2.5)	
	>15 °C, >5 mg O_2/l	0.5 (" 5.0)	
Temperature	°C	≤3 above unaffected water	98P,I
		≤28	98P,I
		≤10 for breeding of cold-water species	98P,I
Phosphorus (indicative of need to reduce eutrophication)	mg PO_4/l	0.4	T

I = mandatory; G = guide value; AA = annual average; M = maximum;
95P = 95 percentile; 98P = 98 percentile; T = total; D = dissolved

APPENDIX : WATER QUALITY SUITES

Water Quality Suite 7 : Potable Abstraction

Parameter	Units	Values (95P,T,I unless shown otherwise) A1 treatment	A2 treatment	A3 treatment
BACTERIA AND VIRUSES				
Total coliforms (37 °C)	/100 ml	50 (G)	5000 (G)	50 000 (G)
Faecal coliforms	/100 ml	20 (G)	2000 (G)	20 000 (G)
Faecal streptococci	/100 ml	20 (G)	1000 (G)	10 000 (G)
Salmonella	/5 l	0 (G)	0 (G)	
AMMONIA	$\mu gNH_4/l$	0.05 (G)	1.5	4
DISSOLVED OXYGEN	% sat	>70 (G)	>50 (G)	>30 (G)
BOD	mg O_2/l	<3 (G)	<5 (G)	<7 (G)
LIST I SUBSTANCES				
Cadmium	µgCd/l	5	5	5
Mercury	µgHg/l	1	1	1
Total pesticides (includes dieldrin)	µg/l	1	2.5	5
LIST II SUBSTANCES				
Arsenic	µgAs/l	50	50	100
Chromium	µgCr/l	50 50	50 75(M)	50
Copper	µgCu/l	20	50	
Iron	µgFe/l	300(D)	2000(D)	
Lead	µgPb/l	50 50	50 75(M)	50
Nickel	µgNi/l	50	50	
Selenium	µgSe/l	10	10	10
Zinc	µgZn/l	3000	5000	5000

Water Quality Suite 7 : Potable Abstraction (Cont.)

Parameter	Units	Values (95P,T,I unless shown otherwise) A1 treatment	A2 treatment	A3 treatment
Barium	µgBa/l	100	1000	1000
Boron	µgB/l	1000	1000	
Cyanide	µgCN/l	50	50	50
Fluorides	µgF/l	1500		
Organotins	µg/l			
TBT		0.02(M)	0.02(M)	
TPT		0.09(M)	0.09(M)	
Mothproofing agents	µg/l			
cyfluthrin		0.001	0.001	
permethrin		0.01	0.01	
Phenols	µgC_6H_5OH/l	1	5	100
Polycyclic aromatic hydrocarbons	µgPAH/l	0.2	0.2	1
Dissolved or emulsified hydrocarbons	µg/l	50	200	1000
pH	pH value	6.5-8.5	5.5-9.0	
OTHER DETERMINANDS				
Colour	mg/l Pt scale	20	100	200
Temperature	°C	25	25	25
Nitrates	mgNO_3/l	50	50	50
Sulphates	mgSO_4/l	250	250	250

M = maximum; G = guide value; D = dissolved; 95P = 95 percentile;
I = mandatory; T = total