local environment agency plan

WEST CORNWALL

CONSULTATION REPORT

JUNE 1997

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ENVIRONMENT AGENCY

YOUR VIEWS

This is the third Local Environment Agency Plan (LEAP) produced by the Cornwall Area of the Environment Agency. Previously, two Catchment Management Plans (CMP) had been produced by the Cornwall Area of the National Rivers Authority (NRA).

This Consultation Report is our initial view of the issues facing the catchment. Public consultation allows people who live in or use the catchment to have a say in the development of our plans and work programmes. We welcome your ideas on the future management of this catchment:

- Have we identified all the issues?
- Have we identified all the options for solutions?
- Have you any comments on the issues and options listed?
- Do you have any other information or views that you wish to bring to our attention?

This is your opportunity to influence our future plans.

We look forward to hearing from you.

Geoff Boyd
Area Manager, Cornwall

Please send your comments by 22 August 1997, preferably by writing to:

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CONTENTS

Vision

The West Cornwall Catchment is an area of great diversity that is greatly influenced by the various land uses:

- early crops, particularly potatoes
- metalliferous mining throughout the area
- important wildlife habitats

The rivers and their tributaries make an important contribution to the rural economy through agriculture and an equally important contribution to the urban economy through public water supply, effluent disposal, waste disposal, recreation and tourism.

Our vision is of a healthy and diverse catchment, managed in an environmentally sustainable way, that balances the needs of all users with the needs of the environment.

We look forward to a future where there is:

- development of a sustainable agricultural and horticultural system which reduces diffuse pollution and improves the physical habitat of the river system and wetlands for wildlife
- maintenance and, where appropriate, enhancement of biodiversity
- significant reductions in waste and improved standards of disposal and treatment
- achievement of environmentally sustainable use of water resources
- continuing improvements to existing discharges to meet the most appropriate standards
- minimal risk to people and property from flooding
- full development of potential for sustainable salmonid and freshwater fisheries
- increasing enjoyment and appreciation of the water environment
- improvements in the quality of air

The Environment Agency cannot realise this vision on its own and will seek to work in partnership with local authorities, industry, farmers, environmental groups and other interested organisations to turn this vision into reality.

Part 1

INTRODUCTION

The Environment Agency

Who are we?

The Environment Agency is a non-departmental public body established by the Environment Act 1995 and formed on 1 April 1996. We are sponsored by the Department of the Environment with policy links to the Welsh Office and the Ministry of Agriculture, Fisheries and Food.

We have taken over the functions of our predecessors: the National Rivers Authority, Her Majesty's Inspectorate of Pollution (HMIP), the Waste Regulation Authorities (WRAs) and some parts of the Department of the Environment (DoE).

We provide a comprehensive approach to the protection of the environment by combining the regulation of air, land and water into a single organisation. We cannot work in isolation, but seek to educate and influence individuals, groups and industries to promote best environmental practice, and develop a wider public awareness of environmental issues.

Our Vision is:

- a better environment in England and Wales for present and future generations

We will:

- protect and improve the environment as a whole by effective regulation, by our own actions and by working with and influencing others
- operate and consult widely
- value our employees
- be efficient and businesslike in everything we do

Our Aims are:

- to achieve significant and continuous improvement in the quality of air, land and water, actively encouraging the conservation of natural resources, flora and fauna
- to maximise the benefits of integrated pollution control and integrated river basin management
- to provide effective defence and timely warning systems for people and property against flooding from rivers and the sea

- to achieve significant reductions in waste through minimisation, re-use and recycling and to improve standards of disposal
- to manage water resources to achieve the proper balance between the needs of the environment and those of abstractors and other water users
- to secure, with others, the remediation of contaminated land
- to improve and develop salmon and freshwater fisheries
- to conserve and enhance inland and coastal waters and their use for recreation
- to maintain and improve non-marine navigation
- to develop a better informed public through open debate, the provision of soundly based information and rigorous research
- to set priorities and propose solutions that do not impose excessive costs on society

Sustainable development

In 1987, the World Commission on Environment and Development (the Brundtland Commission) defined sustainable development as that *which meets the needs of the present without compromising the ability of future generations to meet their own needs.*

Sustainable development brings together four sets of values: environmental protection, providing for the future, quality of life, and fairness, to create a new policy which integrates environmental, developmental, social and economic concerns.

One of the primary reasons for setting up the Environment Agency was to provide a means of helping the government deliver its sustainable development strategy. Section 4 of the Environment Act (1995) defines the Agency's aims and states that *the minister shall give statutory guidance on objectives and the contribution to sustainable development.* Guidance has been published by the Department of the Environment', and the key elements are that the Agency should:

- take a holistic approach to the protection and enhancement of the environment
- take a long-term perspective
- maintain biodiversity by exercising its statutory obligations with respect to conservation
- discharge its regulatory functions in partnerships with business in ways which maximise the scope for cost effective investment in improved technologies and management techniques
- provide high quality information and advice on the environment

Our management of the catchment will take forward these key elements as our contribution towards sustainable development.

Our umbrella duties

There are a number of umbrella duties which we carry out for all our functions:

Rural Areas - when considering any proposal, we must have regard to any effect which the proposals would have on economic and social well-being of local communities in rural areas. Some of our activities, such as meeting statutory objectives, emergency actions and the taking of legal actions are not subject to this appraisal

- Costs and Benefits - we are required to pay regard to the likely costs and benefits when deciding whether to exercise our powers. Costs include both financial costs and costs to the environment; benefits include those which communities will enjoy, both now and in the future

- Conservation - we must have regard to conservation in our pollution control functions, and we have a duty to further conservation in all our other functions. We also have a duty generally to promote the conservation of flora and fauna dependent on the aquatic environment

What we do not do

We do not cover all aspects of environmental legislation and service to the general public. Your local authority deals with all noise problems; litter; air pollution arising from vehicles, household areas, small businesses and small industries; planning permission (they will contact us when necessary); contaminated land issues (in liaison with ourselves); and environmental health issues.

This Local Environment Agency Plan

This Local Environment Agency Plan (LEAP) slots into a sequence of Catchment Management Plans (CMPs) which were being prepared by the NRA to cover all river catchments in England and Wales. We will use LEAPs to cover the same topics as Catchment Management Plans but they will also deal with other topics to cover the full range of our responsibilities.

A holistic approach to environmental management is required to plan for sustainability and improvement. LEAPs allow the full range of management issues to be identified and considered within a geographical area which is both relevant and meaningful. They are strategic in nature, since individual catchments cover large areas of land, often straddling local authority boundaries.

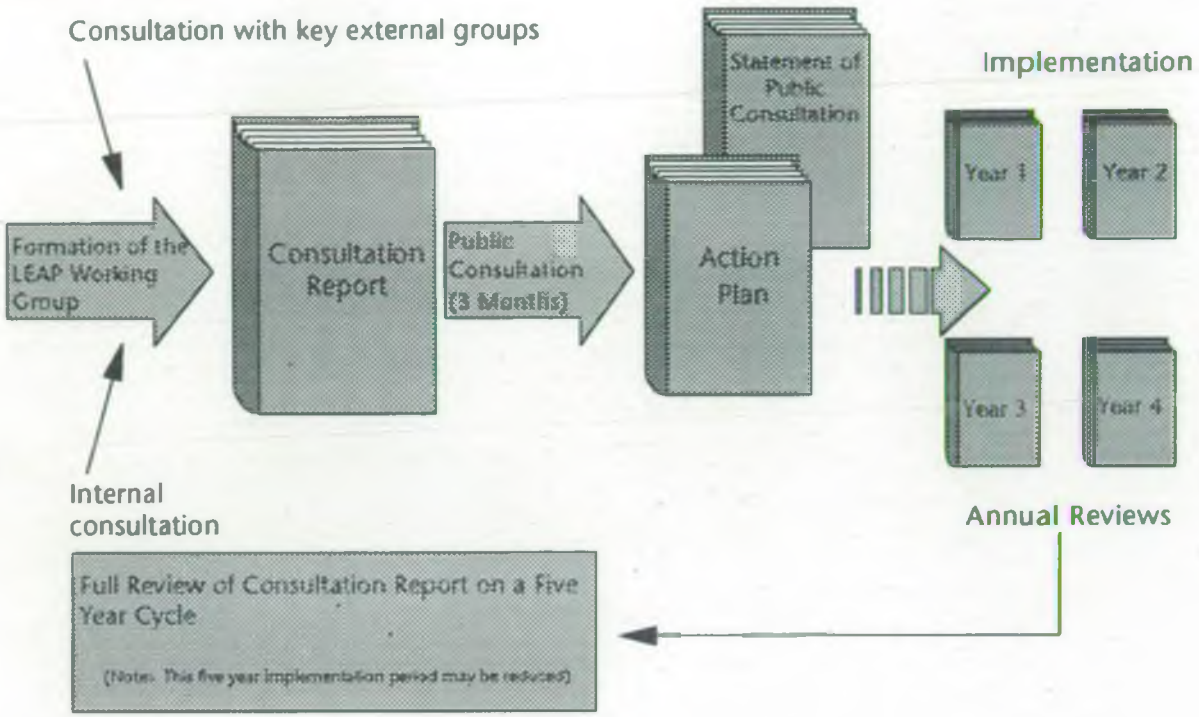
Economic and political constraints will influence what we are able to do. For example the funds that the water service companies and other industries invest in pollution control will make a difference to the extent of water quality improvements that we are able to achieve.

Local Environment Agency Plans and Development Plans

While we can control some of the things that influence the quality of the environment, we have only limited control over the way that land is developed. This is the responsibility of local planning authorities.

- Local authorities prepare statutory development plans; the policies in these plans will guide the way that land is developed in the future. We advise and guide local planning authorities to encourage them to adopt policies that protect the environment from harmful development. Where we can, we will reinforce these policies when we comment on planning matters or if we are making our own decisions.

The LEAP Process



This Consultation Report

This Local Environment Agency Plan Consultation Report gives you the opportunity to comment on environmental problems or our work. It describes the environmental resources of the area, explains how these resources are affected by human uses or pressures, and outlines issues where we or others need to take action to address problems in the environment.

How to use this plan

This report is split into two parts:

Part 1 includes:

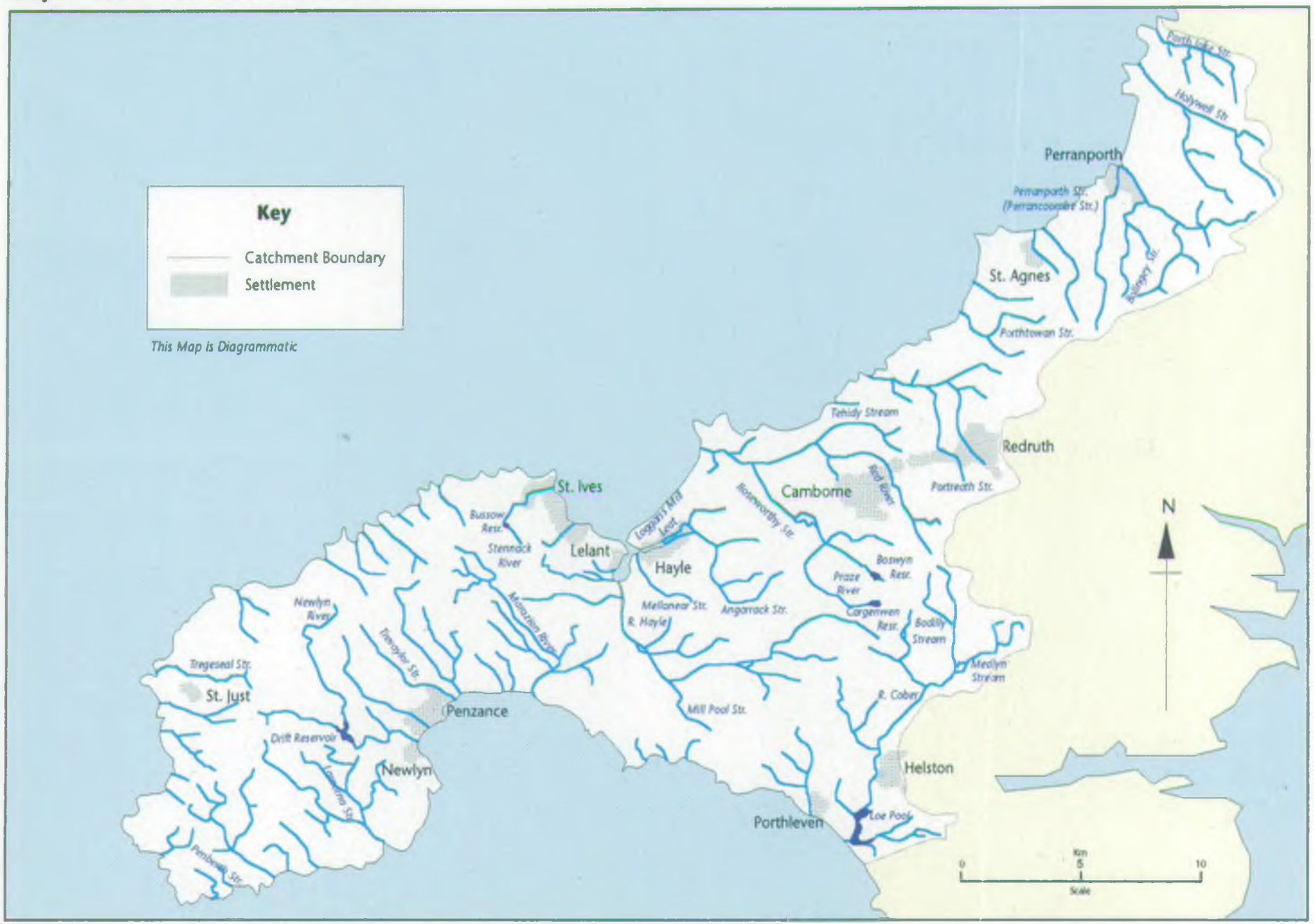
- An introduction;
- An outline of the issues that we face in our management of the catchment. (Issues are supported by more detailed information in Part 2). Options and Actions for the resolution of these issues are also identified;
- Protection through partnership. This section outlines work that we do in collaboration with other organisations and where the work of other organisations plays an important part in helping us to achieve some of our aims and objectives.

Part 2

- Includes a detailed account of the uses and pressures on the area. This section forms a useful reference document and will provide background information relevant to the issues identified in Part 1.

References are given in superscript throughout the document (i.e. [1])

Map 1 West Cornwall Catchment



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Catchment Statistics

Table 1 : Catchment statistics

Area Drained	584 km^2
Principal Towns	Penzance, Camborne, Redruth, Helston, St Ives
Approx. population	134,000
Length of Main River	34.38 km
Length of Controlled Water	205 km
District Councils	Penwith District Council, Carrick District Council, Kerrier District Council
Annual licensed abstraction volumes Surface water	36,700 Ml
Groundwater	2,715 Ml
Average Annual Rainfall	1090 mm

Table 2 : Drainage areas

River	Area drained upstream of;	Area drained (km^2)
Cober	Tidal Limit	53.75
Mounts Bay Streams	Tidal limits	153.00
Lands End Streams	Tidal limits	128.50
Hayle	Tidal Limit	55.50
Red and North Coast	Tidal limits	193.25

Catchment Characteristics

The Rivers Cober, Hayle and Red, together with coastal streams drain a large part of West Cornwall from Pentire Point West in the north to Gunwalloe in the south. Major urban concentrations in the catchment are Camborne/Redruth, Penzance and St Ives. The proximity of the sea gives the area much of its character and colours its way of life. Historic mining has left a legacy of old mines adits and spoilheaps, particularly in the Camborne/Redruth area. The rest of the catchment is rural in character, ranging from moorland to horticulture and meadowland.

Landscape

This catchment includes some of the most distinctive, classic 'Cornish' landscapes. The western third, West Penwith, is a treeless, exposed, ancient landscape, a product of the underlying granite, severe exposure to the Atlantic elements and a long agricultural history. The district is characterised by tracts of heathland, many of which are unenclosed, and small, irregularly-shaped fields bounded by Cornish hedges, many of which date from prehistoric times. Short streams in steep valleys drain the peninsula. These valleys often support scrubby vegetation. Along the coast there are spectacular granitic rock formations. Mining remains punctuate the skyline in places, especially around St Just,

with some mineworkings occupying locations on the cliff faces themselves. Scattered farmsteads occur across the hinterland.

Mirroring the Penwith peninsula is the granite upland of Carnmenellis in the extreme east of the catchment. This also has a fabric of small fields, areas of heathland and rough grassland and mining remains.

Between these areas is a more fertile lowland, given over to dairying, early vegetable production and bulb growing. Wooded hedges occur between the fields, although significant tracts of woodland are scarce. The coastline is variable, with high, heather-clad clifftops with characteristic mining remains interspersed with large sand dune systems and relatively sheltered small fishing coves and ports. Many of Cornwall's more sizeable towns occupy this area, having developed around the traditional mining, fishing and farming industries.

The various landscapes within Cornwall have been subdivided and described in detail in the document 'Cornwall, A Landscape Assessment' produced by the Countryside Commission in 1995. The historical evolution of landscape in Cornwall underpins this document.

Wildlife

The Penwith peninsula supports a high proportion of all the lowland heathland in Cornwall. Heathland has a distinctive set of species, and is recognised as a priority habitat for conservation in the European context. Belts of maritime heathland wrap around much of the coastline here, enhancing their conservation value further.

The two largest sand dune systems in Cornwall occur on the north coast of this catchment. They are both noted for their high floristic and invertebrate species diversity.

Due to the location of this part of Britain, jutting out into the Atlantic, the whole area is of great strategic importance to migratory bird species, as it constitutes first or last landfall. Hayle Estuary, Marazion Marsh and several coastal valleys in West Penwith are particularly important sites. In winter, when many of their feeding grounds can be ice-locked, this area attracts huge influxes of birds seeking milder feeding grounds.

Many derelict mining sites in this area are becoming well known as important nature conservation sites as they hold populations of rare lower plants (e.g. mosses) and invertebrates. Many of these species are distinctive as they have developed tolerance to mining contaminants.

Historic Environment

The area has a long history and a wealth of historic remains. We have commissioned a historic audit of the Hayle and St Ives Bay area the results of which will be published in summer 1997.

Economy

The whole of the catchment is very heavily visited and tourism is an important part of the local economy. Visitors come for traditional seaside holidays and for water based activities, such as sailing and surfing. Newlyn is an important fishing port and fishing takes place all around the coast.

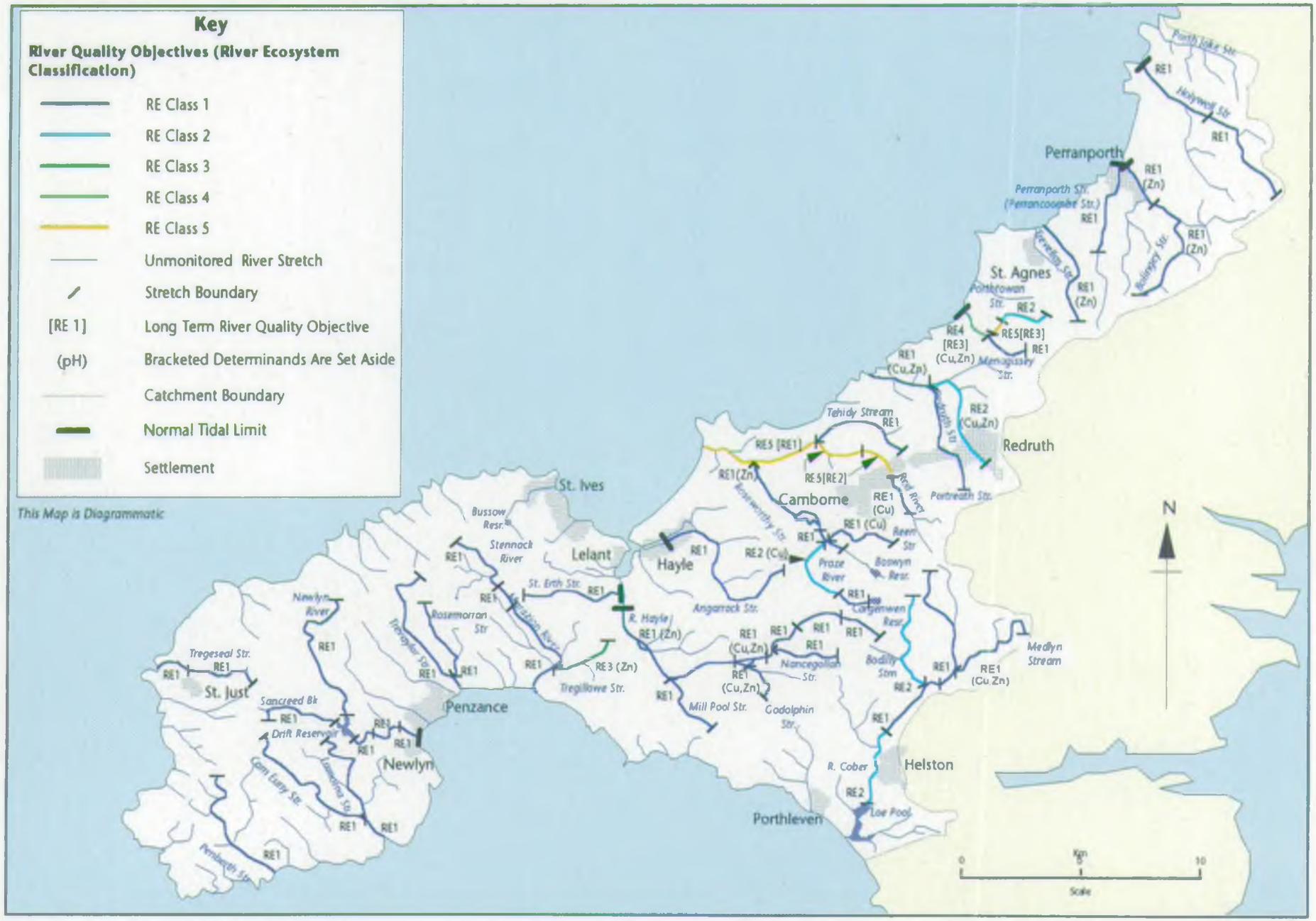
Dairying is the predominant farming activity, with mixed farming and rough grazing taking place on poorer land. Early potatoes and horticulture are important in some localities.

Cornwall's last working tin mine, South Crofty, is located in the catchment.

Part 1

ISSUES

Map 2 Proposed River Quality Objectives (River Ecosystem Classification)



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ISSUE 1 : PROPOSED RIVER QUALITY OBJECTIVES

Background

The water quality targets that we use in all rivers are known as River Quality Objectives (RQOs). RQOs are used for managing water quality and are based on the River Ecosystem (RE) classification scheme. The River Ecosystem scheme is made up of five water quality classes (RE1 to RE5). These classes reflect the chemical quality needed by different types of river ecosystem including the types of fishery they can support RQO (See Appendix B, Table 1). We have proposed our River Quality Objectives (RQOs) using a classification scheme known as River Ecosystem which was introduced by the National Rivers Authority, following public consultation, in 1994. This scheme replaces a former scheme introduced by the Water Authorities in the late 1970s known as the National Water Council (NWC) scheme. Further details of the RE scheme and how we have translated RQOs for the catchment to this scheme are available on request.

How RQOs will be set

All RQOs must be achievable and sustainable. This means that we must be able to identify what needs to be done to meet the RQO. We must also be able to ensure, as far as is practicable to do so, that water quality can be maintained at this level in the future.

We set RQOs based on the need to protect current water quality and future use. The available investment to improve water quality, including, for example *South West Water's* AMP2 investment programme agreed with Government (see page 96) needs to be acknowledged.

We aim to meet these River Quality Objectives by a certain date within the next 5 to 10 years.

Setting long term RQOs

In addition, we will set long term RQOs where there are no resources available to ensure that the RQO is achievable or sustainable within the next 5 to 10 years.

We will use these long term RQOs as a basis for setting consents for new discharges and planning for future water quality improvements.

"Set Aside" of data

In certain circumstances we can "set aside data", that is we will not take into account some or all the results for a particular determinand when we assess compliance with an RQO (See Appendix B, Table 2).

For example we will "set aside" data where high concentrations of metals or low pH are caused by the natural geology of the catchment. This allows us to protect good water quality reflected by other water quality parameters in the RE classification.

Proposals for RQOs and long term RQOs for the catchment

The RQOs based on the RE classification we are proposing for the catchment are shown on Map 2 and in Appendix B, Table 3. We aim to achieve these proposed RQOs from 1997 unless a later date is shown next to the class, for example: RE2 (1998),where we aim to achieve RE Class 2 from 1 January 1998.

Long term RQO proposals

In addition there are 5 stretches where we are proposing additional long term RQOs (as well as RQOs) that we would like to achieve but for which there are currently no resources to make improvements. These are also shown in Appendix B, Table 3 and on Map 2; for example [RE2] indicates that a long term RQO of RE2 applies in that stretch.

Compliance with proposed RQOs and Long Term RQOs

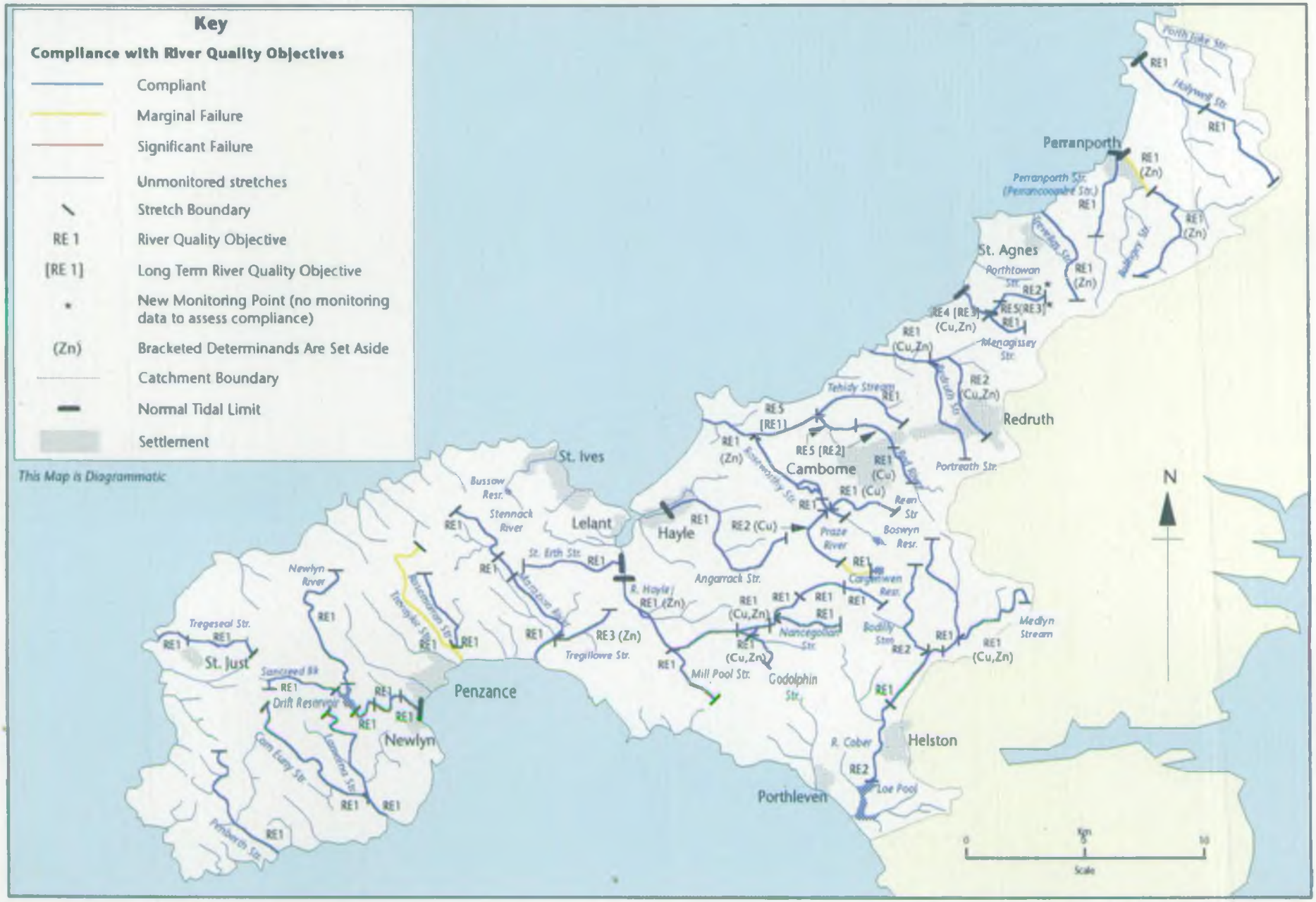
Map 3 shows where current water quality fails to meet its RQO. This assessment is based on three years of routine monitoring data from the Public Register collected between 1993 and 1995. We have shown failures to meet RQO as "significant" and "marginal" failures. Significant failures are those

where we are 95% certain that the river stretch has failed to meet its RQO. Marginal failures are those where we are between 50% and 95% certain that the stretch has failed to meet its RQO.

Of the 53 monitored river stretches (205 km) in the catchment there are 3 stretches (8.9km) which marginally fail to meet their RQO and 3 that fail to meet their long term RQO.The reasons for these failures are explained below.

River	Stretch name	Reason for RQO non-compliance	Reason for long term RQO non -compliance	Possible cause
Trevaylor Stream	Source to Mean High Water	Biochemical Oxygen Demand		Unknown See Issue 13
Red River	Above South Crofty Mine to Roscroggan Bridge		Total ammonia, Zinc, (Significant), Copper (Marginal)	Tolvadden Storm Sewer Overflow, metalliferous mining activity. See Issues 7 and 11
Red River	Roscroggan Bridge to Kieve Bridge		Zinc (Significant), Total ammonia (Marginal)	Reskadinnick Storm Sewer Overflow, metalliferous mining activity. See Issues 7 and 11
Red River	Kieve Bridge to Mean High Water		Total ammonia (Significant), Zinc (Marginal)	Influence of Storm Sewer Overflows on stretches upstream, metalliferous mining activity. See Issues 7 and 11
Praze River	Cargenwen No 1 Reservoir to Praze	Biochemical Oxygen Demand		Agricultural runoff during low flows. See Issue 6
Bolingey Stream	Perranwell to Normal Tidal Limit	Dissolved Oxygen		Low flows through marshy area. Existing sample site is difficult to sample. See Issue 14

Map 3 1995 Compliance with Proposed River Quality Objectives (River Ecosystem Classification)



Information correct as of May 1997

West Cornwall Local Environment Agency Plan
Environment Agency

ISSUE 2 : AIR QUALITY

Background

Air pollution may be in the form of gas or particulate matter. Its dispersion and dilution depends on the nature of pollution and climatic conditions. Its impact may be local, especially with regard to particulate matter which will often settle on nearby land or water. Or it may be global, for example affecting the ozone layer or the concentrations of greenhouse gases such as carbon dioxide. It is vital that we protect the air since the future health of mankind and the environment depends on it.

Effects

2.1 Air pollution

Levels of ground level ozone in parts of the catchment are generally above those at which damage to vegetation may occur. There have been exceedences of World Health Organisation (WHO) air quality guidelines for effects of nitrogen oxides (NO_2 and NO) on vegetation in some localities. Management of these issues will be picked up in the work of the Cornwall Air Quality Forum.

Noise pollution from RNAS Culdrose has been raised as an issue of local importance in the Helston Area. The legislation on this subject is implemented by the Local Planning Authority, in this case Kerrier District Council. The Environment Agency has no controls over noise pollution. We understand that monitoring of noise is undertaken by RNAS Culdrose.

Option for action	Responsibility	Benefits	Constraints
2.1 Air Pollution * Draw up air quality strategy for the catchment	Cornwall Air Quality Forum	Information for management decisions leading to environmental improvement	Availability of information

Further detail on the area can be found in Part II, Supporting Information:
Air Quality

ISSUE 3 : IMPACTS ON FRESHWATER AND ESTUARINE FISHERIES

Background

Natural fisheries are important conservation assets and are also of commercial value for angling. Fish are good indicators of the overall health of our rivers. We use information from our routine population surveys and fishing catch returns to assess the diversity and health of fish populations. We are currently involved in implementing a classification scheme following a research and development project which will enable us to set targets for the catchment and also to put the fisheries into a national context.

Many rivers in the catchment naturally contain brown trout which have adapted to local conditions (water quality and habitat). However some rivers have scope for improvement.

Major impacts on the fishery in the plan area are principally poor water quality and some poaching. Poor water quality can be due to inputs from agriculture, effluent disposal and historic mining areas. See Issues 6, 11 and 7.

Examples in the area

3.1 Poaching

No large scale poaching occurs on the freshwater system, however some illegal rod fishing takes place on the River Cober. Illegal fixed netting for undersized bass and adult salmon and sea trout also occurs within the restricted areas (see Map 10).

Rigorous and high profile enforcement within the rivers, estuaries and coast needs to be maintained by the Environment Agency, Ministry of Agriculture Fisheries and Food (MAFF) and Cornwall Sea Fisheries Committee (CSFC). Whilst the Agency endeavours to respond quickly to all reports of poaching, reductions in staff and funding mean that we rely heavily on information from other bodies and the general public to alert us quickly to poaching incidents. We can then target resources effectively to combat the problem.

Increase minimum bass size limit

Currently there is a difference in the size limit for bass caught within and outside the estuary. Within the estuary we are the sea fishery authority and the minimum landing size is 36cm. Outside the estuary Cornwall Sea Fisheries Committee (CSFC) are the authority and the size is 37.5cm. CSFC have asked us to raise the minimum landing size limit to 37.5cm to make enforcement easier. We have agreed to pursue this, and will be seeking permission from MAFF to create a new byelaw. External consultation will be required as part of this process.

Netting for herring

Traditional netting for herring takes place within St Ives and Penzance Bay. This is technically illegal and exemption permits will be needed to regularise the existing situation. We will look at this issue in consultation with the relevant parties.

3.2 Introductions and escapees

Within the catchment there are stillwater lakes containing a variety of fish species not found within the river system. We are concerned about the occurrence and impact of fish escapees on native species. For example, a parasite occurring in eels is thought to be linked with introduced species.

3.3 Water quality

Poor juvenile trout populations were found on several of the area's streams. Some of the causes, for example, historic metalliferous mining in parts of the Hayle Valley (where there are few fish) have such an impact that the fishery is unlikely to improve in the near future. Biological monitoring indicates a chronic impact from metals on the Angarrack Stream which is supported by historic chemical data.

A study of eels on the Newlyn River carried out in 1988 identified high levels of toxins in samples of flesh (see Issue 6). Additionally there is concern over eel survival at sea and research work is being undertaken to investigate the decline in the European eel which we are supporting.

3.4 Potential improvements

Results from surveys have indicated poor fish densities on the River Cober at Vellanewson, the headwaters of Boswarna Stream, some sites on the Lamorna Stream and Bottoms on the Penberth Stream. The trout population in Angarrack Stream has dropped between the 1987 and 1994 fish surveys. The causes of these low densities are not known and investigation is required to assess causes and potential for improvement. Improving water quality and the results of fisheries surveys indicate that with further improvements there is the potential to develop a larger salmonid fishery on some rivers.

Within the plan area there are several obstructions that are considered to prevent access of migratory fish and where action might be undertaken. Assessment of these obstructions is required to see if action is possible.

Options for action	Responsibility	Benefits	Constraints
3.1 Poaching			
* Rigorous and high profile enforcement to prevent poaching	Agency/ MAFF/ CSFC	Protect stocks	All options: Cost/ resources
* Create byelaw to increase minimum bass size limit	Agency	Assist enforcement	
* Investigate legalising herring netting	Agency	Legalise appropriate practices	Identification of netters
3.2 Introductions and escapees			
* Update database on distribution of non-native species within still water fisheries	All options: Agency	Provide data for decision making	All options: Cost/ resources
* Regular inspections of still water fisheries		Reduce illegal non-native introductions	
* Monitoring of non-native escapees recorded during fisheries work		Provide data for decision making	
* Publicise the effects of escapees, regulations and hazards of fish disease		Better public understanding	
* Advise on measures to prevent escapees			
3.4 Potential improvements			
* Investigate cause of decline in fish numbers	All options: Agency	Enable effective action	All options: Cost/ resources
* Identify areas for potential improvement		Prioritisation of available resources	
* Survey obstructions to assess economically feasible actions		To enable prioritisation and open up new areas	

Further detail on the area can be found in Part II, Supporting Information: Fisheries

ISSUE 4 : SEA LEVEL RISE

Background

The Intergovernmental Panel for Climate Change predictions for sea level rise are used with allowances for any land movement (tectonic changes). The net sea level rise estimates are then used to establish the anticipated effects over the life of a flood defence scheme. The approach is to design the works so that as sea level rise occurs the defences can be raised without having to rebuild the whole structure.

Raising the level of defences above that necessary today can only be justified where evidence of actual sea level rise supports the need. The current allowances for the South West Region of the Agency are a rise of 5mm/year until the year 2030 and 7.5mm/year thereafter. A further potential effect of global warming is that of increased storminess, which could lead to increased wave action and annual rainfall, resulting in increased flooding.

We have designed our flood defence schemes with an allowance for a rise in sea levels. A review of the condition of existing sea defences was undertaken in March 1996. This needs to be regularly updated.

Effects on the area

4.1 Flooding

Whilst we plan for a rise in sea level when constructing new and maintaining existing defences flooding might occur in new locations. The forthcoming Shoreline Management Plans will recommend preferred options for the management of coastal defences, taking into account such changes.

4.2 Ecological impacts

Intertidal habitats may be lost, unless they recreate naturally or through human intervention. Any intervention could have knock-on effects for other fringing habitats. Assessment of the potential for preservation or recreation at different locations, and consequences of each needs to be carried out.

The Shoreline Management Plan Scoping Study made a recommendation that the whole of the Hayle Estuary be included in further work. This will include a detailed review of anticipated changes due to sea level rise on the important saltmarsh and bird feeding areas within the estuary.

Marazion Marsh is protected by existing coastal defences from saline intrusion and lowering of the water table. The Shoreline Management Plan should identify threats to this current situation and options to address them.

Options for action	Responsibility	Benefits	Constraints
4.1 Flooding			
* Make recommendations for the management of defences	Shoreline Management Plan (SMP)	Clearer understanding of coastal processes	Cost
* Undertake appropriate modification of existing flood defence schemes	Agency/Local authorities/ MAFF	Alleviation of flooding	Cost
* Design of new flood defence schemes taking account of sea level rise	Agency/Local authorities/ MAFF	Alleviation of flooding	Impacts on other parts of coastal system
4.2 Ecological Impacts			
* Identify sites vulnerable to habitat loss	SMP	Provide basis for decisions	Cost
* Assessment of suitable sites for habitat re-creation	Biodiversity Action Plans	Maintain existing size of habitats	Cost

Further detail on the area can be found in Part II, Supporting Information:
Flood Defence, Landscape, Wildlife and Historic Features, Contaminated Land.

ISSUE 5 : PROTECTION OF HABITATS, WILDLIFE AND HISTORIC FEATURES

Background

Within the plan area there are a range of international, national, county and locally important habitats, wildlife and historic features, many of which have some form of designation aimed at their protection. There are also many sites which have no particular designation, and species which do not depend solely on specific protected sites.

It should be our aim to achieve more sustainable use of, and development within, the catchment, allowing us to meet current needs without compromising the environment and the ability to meet future needs.

Examples in the Area

5.1 Semi-natural habitat

Conservation 'features' are under threat from current human activities. Many losses have occurred within areas designated for protection, showing that such measures have not always been adequately employed. We feel that a target of no further loss should be set.

Conservation in this broad sense should be an integral part of all activities, and many of the issues and proposed actions within this document promote sustainable use of resources, or seek to make up for serious losses or impacts. A more targeted approach of specific conservation actions is being developed through the 'Cornwall Local Biodiversity Initiative' currently being progressed by a wide range of interested bodies in Cornwall, and through English Natures' 'Natural Areas' Initiative.

5.2 Water level management

There are three wetland Sites of Special Scientific Interest (SSSI) in this area for which water supply/level is of particular relevance and may require management.

Marazion Marsh SSSI contains the largest reedbed in Cornwall, as well as other wet habitats such as grazing marsh and willow carr. The area is a Royal Society for the Protection of Birds (RSPB) reserve, managed specifically for the needs of wildlife. During summer 1995, water levels fell to such an extent that a temporary dam was created near the beach as an emergency measure to allow water to back up into the reserve.

Loe Pool SSSI is the largest natural freshwater body in Cornwall. It is managed by the National Trust and has considerable nature conservation and amenity value. English Nature are due to produce a Site Management Statement soon which could indicate that a change in water level regime could be beneficial to nature conservation.

Loggans Moor SSSI is botanically the richest meadow surviving in West Cornwall. Several recent developments in the vicinity have given cause for concern with regard to the effect on the water table under the site.

We will be involved in producing Water Level Management Plans for Loe Pool and Loggans Moor sites by April 1998.

Tregembo Marsh acts as a natural wetland treatment system reducing high levels of metals in the Hayle River. Downstream of the marsh concentrations of zinc and copper are significantly reduced compared to upstream and the water supports greater amounts of wildlife, including fish. We currently manage upstream and downstream of the marsh to prevent flooding. It is essential that this is balanced with the protection of the marsh to ensure continued treatment.

5.3 Historic audit

The Agency is carrying out a Historic Audit of the Hayle Estuary, similar to the valuable projects already completed (by others) for the Fal and Tamar basins. Phase 1, a desk study, is almost complete.

Options for action	Responsibility	Benefits	Constraints
5.1 Semi-natural habitat * Implementation of protection through existing designations * Draw up and implement Biodiversity Action Plans	Local Planning Authorities/ Landowners Conservation groups	Both options: Protection and enhancement of environment	Cost
5.2 Water level management * Draw up Water Level Management Plans	English Nature/ Agency/ landowners	Increased understanding of system and better site management	Cost
5.3 Historic audit Finish desk study of Hayle Estuary and carry out field assessment to complete project	Agency/ others	Improved knowledge of the historic environment to enable its protection	Cost

Further detail on the area can be found in Part II: Supporting Information: Conservation

ISSUE 6 : IMPACT OF AGRICULTURE AND HORTICULTURE

Background

Agricultural land covers approximately 84% of the catchment and the way this land is used has a large impact on the environment. There is a declining trend in the numbers and severity of pollution incidents relating to farming. This has probably resulted from the extensive, proactive pollution prevention work carried out by the former NRA and the subsequent positive response from the farming community. However, farming continues to have an impact on water quality within the catchment.

Land is already used for the disposal of agricultural and industrial wastes and sewage sludge. In 1998 the disposal of sewage sludges at sea will be prohibited by the EC Urban Waste Water Treatment Directive increasing disposal to land. Good management practices and the use of existing codes will mean this could benefit the land, however there is a risk pollution if care is not taken.

There is a continuing demand for water to irrigate crops in some of the arable parts of the catchment, particularly associated with the potato and brassica industry. Abstraction licences are required.

Effects on the area

6.1 Water pollution

Marginal non-compliance with RQO on the Praze River may have been caused by agricultural runoff at a time of low flows.

Loe Pool is eutrophic and algal blooms occur in many summers. Loe Pool has been proposed as a Sensitive Area under the EC Urban Waste Water Treatment Directive. (see Issue 11, section 11.3). Studies have shown that Helston STW inputs nutrients to Loe Pool, however agricultural practices also contribute to the total loading through diffuse sources. Farms in the area will be visited to ensure best practice.

6.2 Pesticides

During 1988, following a national survey by MAFF of organochlorine pesticide residues, eels from a number of waters including the Newlyn River were analysed for pesticides. The 1988 Newlyn River eel samples failed the Environmental Health Standard for dieldrin (which is derived from Aldrin) and subsequent analysis revealed aldrin treated daffodil bulb fields as the source. In May 1989 MAFF imposed a ban on the use of aldrin for bulb growing activities. Eels and trout from the Newlyn River have been sampled for pesticides every year since 1988. Since 1988 evidence from water quality, sediment and macroinvertebrate samples indicates a continuing but reducing pesticide problem.

Penwith District Council currently wish to continue deterring the eating of eels and trout from the lower Newlyn River. The responsibility for determining the safety of eating fish eaten from the lower river lies with MAFF.

6.3 Waste

Poor waste management can result in pollutions. Waste applied to existing semi-natural habitats may result in a loss of conservation value. (Semi-natural habitat - Habitats or communities that have been modified to a limited extent by man, but still consist of species naturally occurring in the area.) Application of industrial wastes to land for agricultural benefit are currently an exempted activity and so do not require a formal waste management licence from us. When dealing with notifications for such activity we will seek to dissuade landowners from depositing on semi natural habitats.

6.4 Crop irrigation

The area is well known for its production of early potatoes and brassicas. The seasonal spray irrigation of these can lead to a heavy demand on water resources during a dry spring or summer. This is usually met by water storage in irrigation reservoirs and flooded mine systems. We will promote the use of winter filled storage systems for irrigation reservoirs.

Many proposals for irrigation reservoirs are on sites that have an existing nature conservation interest such as wet heathland or marsh. We ensure through our licensing procedures that the development

has the minimum impact on the ecology and landscape of the area. Consent is required to cover construction of new seepage fed excavations for irrigation use. The Agency, through its Ponds Project, has developed a methodology to predict the likely impact of construction of seepage fed excavations for use as irrigation reservoirs.

In 1995 we investigated approximately 36 cases of illegal abstraction from ground or surface waters in this catchment. In 1996 this fell to 12, probably due to increased rainfall. Illegal abstractions can result in overuse of the resource, with significant impacts on other interests such as licensed abstractors and wildlife. The Agency's Licensing Inspector polices the area for illegal abstractions assisted by reports from members of the public which are all investigated and acted upon where appropriate.

Options for action	Responsibility	Benefits	Constraints
6.1 Water pollution			
* Monitor and investigate inputs	Agency	Achieve compliance with River Quality Objectives	Cost
* Minimise nutrient inputs from fertilizers into Loe Pool	Farmers/ National Farmers Union/ MAFF	Prevent eutrophication	Cost
6.2 Pesticides			
* Continue to sample numbers of eels and eel tissue for pesticides. * Carry out intensive study of eels in one subcatchment * Advise on land management to prevent soil loss and pesticide runoff	Agency / Penwith District Council Agency MAFF	Information for further action	Cost
6.3 Waste			
* Encourage protection of semi natural habitat from waste disposal activities	Agency/ landowners	Maintain biodiversity	
6.4 Crop Irrigation			
* Publicise the adverse effects certain proposals can have on the environment	Agency / Conservation bodies	Prevent or minimise damage to the environment	Resources Topography or land ownership often limits the degree of flexibility possible
* Public to supply information to Agency on abstractions * Enforce legislation	Public Agency		

Further detail on the area can be found in Part II, Supporting Information:
Agriculture
Fisheries
Landscape, Wildlife and Historic Features

ISSUE 7 : IMPACT OF METALLIFEROUS MINING ACTIVITIES

Background

Historically, the catchment has been one of the most important and extensively mined areas in the South West, principally for tin and copper and contains South Crofty, the last working tin mine in Cornwall. Underground workings have altered groundwater flows and intercepted surface water drainage which can be discharged via mine workings, rather than flowing back into rivers and streams.

Water quality, particularly in the Red River, has been affected by mine drainage over hundreds of years. Mine pumping to lower water levels exposes metal sulphides (principally iron pyrite) in the rock to air and bacterial action, conditions which promote oxidation and generate acidity. The recovery of groundwater levels within the abandoned workings leads to the accumulated products of pyrite oxidation being flushed from the system.

Effects on the Plan Area

7.1 Water pollution

EC Dangerous Substances Directive

The monitoring point on the Red River, downstream of South Crofty tin mine failed to comply with the Environmental Quality Standard (EQS) for copper and zinc in 1993, 1994 and 1995. There was also EQS exceedence for copper upstream of the discharge. The South Crofty tin mine discharge consent is currently under appeal with the DoE.

There have been EQS exceedences for both copper and zinc in 1993 downstream of abandoned mines on the Red River, Redruth Stream, Reen Stream and Roseworthy Stream. Environmental Quality Standard exceedence for copper and zinc also occurred in the Redruth Stream in 1994 (see page 99in Part 2).

Operational monitoring

The EQSs for copper and zinc at Gwithian Towans on the Red River have been exceeded every year over the period 1990-1995. In some years the EQSs for arsenic, lead and iron have also been exceeded.

The EQSs for copper and zinc have been exceeded at St Erth on the River Hayle every year over the period 1990-1995. The River Hayle also drains an area which has been extensively mined in the past. High levels of copper have been found in the coastal discharge from the abandoned Geevor Mine.

Mussels (*Mytilus edulis*) and seaweed (*Fucus* sp.) sampled from Off Tavis Vor, Long Rock, Top Tieb, Lelant Saltings and Chapel Porth have been shown to bioaccumulate (build up) high levels of metals.

River Quality Objectives

Two stretches on the Red River, Above South Crofty Mine to Roscroggan Bridge and Roscroggan Bridge to Kieve Bridge significantly fail to comply with their Long Term RQOs due to zinc. The stretch Kieve Bridge to Mean High Water marginally fails to comply with its Long Term RQO due to zinc. The stretch Above South Crofty Mine to Roscroggan Bridge also marginally fails to comply with its Long Term RQO due to copper. High metal levels in the Red River occur as a result of inputs both from abandoned mines and the discharge from South Crofty.

7.2 Ecological and archaeological impact

Poor trout populations are evident in the middle reaches of the Hayle River (between the Binnerton Adit and Relubbus), throughout the Angarrack Stream and the upper reaches of the Roseworthy Stream. This is most likely to be through the impacts of high metals levels from historic metalliferous mining

Many former mining sites are particularly rich in unusual brypophyte communities (lower plants such as mosses and liverworts), others are important for Odonata (dragonflies and damselflies). Cornwall Wildlife Trust are producing 'Key Bryophyte and Odonata Site' reports to highlight the most important areas. These two documents will provide a framework for deciding on the future management of old mining sites. Gaps exist in knowledge of some sites and there is a need to produce a definitive report on the conservation value of all mine sites in the county before any significant management is proposed. Biodiversity Action Plans may be a route for achieving this.

Many of the spoil heaps and adits have been abandoned for over 100 years. Many have stabilised and are re-vegetating. The vegetation is in itself of great interest for scientific study and much research work is being carried out on the colonising species of plants and animals by institutions around the UK. However, proposals that involve disturbing the ground can cause further environmental impacts.

A report produced through the Derelict Land Advisory Panel[2] highlights many of the issues relating to the conservation values of metalliferous mining sites and their protection. Additionally we are concerned that metalliferous mining sites are prone to flytipping due to their run down appearance. Such flytipping may reduce the value of sites.

There may be an issue regarding the inappropriate management of archaeological remains on mine sites. There is a need for a thorough awareness of what archaeological value a site has before any changes are made. Normally this assessment is made when planning proposals are being drawn up. A more pro-active approach to the cataloguing of features and their management requirements would highlight any threats to the resource.

7.3 Contaminated ground

Widespread contamination of ground (above natural levels) has occurred from the former operation of metalliferous mine workings in the area. Elevated concentrations of heavy metals, compared with background levels, are often encountered in ground that has been previously backfilled with mining waste or spoil, or along river banks or in river estuary sediments where long term accumulation of metals can occur. Leaching of heavy metals from such ground, or the interception of minewater drainage, may subsequently impact upon both local groundwater and surface water quality.

During any work on spoil heaps or contaminated sites any soil containing metalliferous mining waste exported off site must be disposed of in an appropriate licensed landfill. Development of such a facility within a historic mining area with an effective completion arrangement could be a suitable way of meeting local needs and minimising environmental risks. This would help to ensure that mining wastes are not transported long distances outside mining areas with the associated risk of dispersing metalliferous contaminants over wide areas.

The Red River has been the centre of mining processes for hundreds of years and much metalliferous waste has accumulated in the silts and banks. It runs through a raised channel (levee) at a higher level than the surrounding floodplain. There are a number of issues relating to the management of the valley and the variety of different interests, including archaeology, conservation, recreation and flooding. Kerrier District Council has investigated environmental improvements works along the Red River Valley, much of which it owns. We would be looking to them to take this further through the planning process where long term management can be openly discussed.

Options for action	Responsibility	Benefits	Constraints
7.1 Water pollution * Review sources of copper and zinc on the Red River	Agency	Highlight possible options for action	
7.2 Ecological and archaeological impact * Prepare inventory of conservation interest of former mine sites * protect sites through the planning system	Cornwall Wildlife Trust/Cornwall Archaeological Unit Local Planning Authorities	Ensuring the distinctive biodiversity and archaeological interest of mine sites is conserved	Compilation of single document to hold all relevant information i.e. time, cost
7.3 Contaminated ground * Develop a site to take metaliferous waste * Produce Local Plan policies/ Planning Brief for the management of the Red River floodplain	Local Planning Authorities / Developer/ Agency Kerrier District Council	Conserve existing landfill space Planned environmental protection and improvement	Cost, possible environmental impact

Further detail on the area can be found in Part II, Supporting Information:
Mining and Quarrying
Contaminated Land
Landscape, Wildlife and Historic features

ISSUE 8 : IMPACT OF DEVELOPMENT

Background

New developments have significant implications for the land, air and water environment. They require the extraction and processing of building materials and may generate significant amounts of waste through construction. They alter the natural landscape, causing increased surface water runoff which could lead to flooding and introduce activities which bring a higher risk of pollution. Built development can have many direct and indirect impacts on nature conservation, archaeology, landscape and recreation. New housing and industry increases the demand on services, including water supply, and result in increased amounts of waste. Air emissions, particularly from industrial premises can affect the local and wider environment.

Effects on the area

8.1 Flooding

There are areas that have been troubled with flooding in the past which have been relieved by flood alleviation schemes. These were built by our predecessors and have allowed further development to go ahead in the respective subcatchments. However, there are still areas where further development will increase flood risk. In order to manage such development part of our ongoing work is to give development control advice to local planning authorities.

Major capital flood protection proposals can have potential impact on river processes and wetland habitats, as they involve engineering works in the floodplain or river valley. For any capital scheme we carry out an environmental assessment and incorporate mitigation and compensation elements in the design. This applies equally to fluvial or coastal defence schemes. The Shoreline Management Plan process will help to provide prescriptive information on the latter.

Currently in our capital programme are schemes to alleviate existing flooding at Porthleven, Portreath, Perranporth and the repair or replacement of the River Hayle Tidal Barrier and we are looking at a possible scheme at St Ives.

We are expecting Kerrier District Council to complete Stage 3 of the improvements to the Helston Town Leat.

A programme of flood risk data survey, interpretation and provision to planning authorities is in hand, though currently predominantly for "main rivers" (for definition see page 75) . Floodplain information for main rivers for the catchment should be available to local authorities by Summer 1997.

Building in a certain place can lead to higher rates of runoff entering watercourses which then passes downstream, possibly leading to flooding. This has an effect on the watercourse, which may undergo increased erosion or an altered flow regime. It can also reduce the amount of rain entering groundwaters, leading to reduced summer flows. More research into the exact effects of this on animals and plants would be helpful and could lead to mitigation measures being identified. One measure that could be more widely adopted is source control; the selective use of structures such as soakaways as part of a development to promote infiltration. These would help to replenish groundwater as well as reduce the erosion potential in watercourses, however their use must be site dependant.

8.2 Water pollution

There are a number of locations where consented discharges are having an environmental impact where we recommend development restraint, for instance Camborne, where combined sewer overflows are impacting on the Roseworthy Stream (see Table 14 and Table 6) and will progressively seek improvements.

Water quality problems associated with urban runoff also occur. Surface water runoff from new development can carry pollutants such as oils. There are a number of methods of source control which can be designed into new developments and used with infrastructure such as inteceptors to limit such pollution. These are highlighted on a video 'Natures Way'[3].

Praa Sands is not on main sewerage and have seen a proliferation of septic tanks over the years. The cumulative effect of a large number of septic tanks concentrated in a small area can cause environmental impact, particularly to groundwater. We will monitor development closely in these areas, controlling the installation of private treatment systems through our powers under the Water Resources Act 1991.

The Environment Act introduced new duties on water service companies to provide public sewers for domestic properties that were built by June 20th 1995 in either rural or urban areas where there are environmental or amenity problems which exist or are likely to arise. This duty is subject to environmental, engineering and economic criteria. Any owners, occupiers, Parish or District Council may apply to SWW for a scheme. If there is a disagreement over the need for a scheme or the implementation of the new duty then the Agency will be called in to arbitrate.

8.3 Review of old mineral permissions

Under the Environment Act 1995, all old Minerals Planning Permissions (post 1947 Act) are to be reviewed and given 'modern day' conditions. The Agency is a statutory consultee in this process. Many of these old sites are no longer used, but may still have valid permission. As many sites have developed valuable nature conservation interest following cessation of working, if it were to recommence it is imperative that strong conditions should be put in place. Other sites may be inappropriate for reopening altogether. Some sites may have geological or archaeological value as well or instead. A thorough assessment of each site is needed prior to conditions being drawn up.

8.4 Wildlife

New development is one of the major threats to semi-natural habitats and the species they support. Cornwall Wildlife Trust, through the 'LIFE' project, are mapping the levels of change in such habitats, and what they have been converted to. In the first instance loss of semi-natural habitats is resisted if suitable mitigation cannot be found.

Several sites in the catchment have been subject to hard-engineered coastal protection schemes. At least one of them resulted in the partial covering over of a geological SSSI. Shoreline Management Plans are also likely to generate site specific option recommendations for coastal defence in this area.

Options for action	Responsibility	Benefits	Constraints
8.1 Flooding			
* Plan development to prevent increase of flooding risk	LPAs /Agency / developers	No additional flooding problems	None known
* Construct flood alleviation schemes at Porthleven, Portreath, Perranporth, River Hayle Tidal Barrier	Agency/LPAs MAFF	Alleviate flooding	Cost
* Produce Section 105 survey to identify flood risk in the catchment	Agency	Updated information on flooding problems	Cost for ordinary watercourses
* Promote source control through policies and increasing awareness	Agency/ LPAs	Improved environment	
8.2 Water pollution			
* Develop first time sewerage	LPAs/SWW	No further environmental effects	Engineering and economic
8.3 Review of old mineral permissions			
* Review all existing Planning Permissions for mineral extraction	Mineral Planning Authority	To ensure that environmental needs are fully considered	Many sites to cover, many interests to balance
8.4 Wildlife			
* Resist any development which results in loss of semi-natural habitat	Planning authorities	Protect biological diversity	

* Re-create habitat where loss is unavoidable	Planning authorities		More expensive and less effective than protecting original habitat

Further detail on the area can be found in Part II: Supporting Information
Built Environment
Flood Defence
Effluent Disposal
Landscape, Wildlife and Historic Features
Protection through Partnership

ISSUE 9 : MEETING CURRENT AND FUTURE DEMAND FOR WATER

Background

The availability of water resources is a high profile topic. We are in a position to develop public awareness of this issue and guide people towards a more sustainable use of water.

The Environment Agency has a duty under the 1991 Water Resources Act to conserve, redistribute, augment and secure the proper use of water resources in England and Wales. In fulfilling this role the Environment Agency must also carry out its general duties of environmental conservation and have regard to the statutory obligations of water companies.

The catchment falls within South West Water's (SWW) Colliford Strategic Supply Zone. We have produced demand forecasts for the area served by the Colliford Strategic Supply Zone (Tomorrow's Water [4]) looking at two scenarios, 'high' and 'low' demand growth. Comparing these forecasts to the current drought reliable yield of 166 Ml/d for the zone shows that in 2021 under the 'high' scenario there will be a deficit of 57Ml/d whilst under the 'low' scenario there will be a deficit of 17Ml/d.

Much of the public water supply comes from outside the catchment and issues related to these sources have been discussed in other plans.

Effects on the area

9.1 Meeting public water supply

Comparing the current level of developed resources with the current demand for water there should be no difficulty in meeting current demands in an average year. However, it is becoming increasingly important to manage peak demands which place considerable strain on the supply system as well as the environment.

In order to secure the best use of developed water resources we will promote the following staged approach:

Demand management; within the catchment this will involve both SWW and consumers

Resource management; within the catchment this will involve leakage control by SWW and the planned use of the abstractions within the catchment (see Table 18 on page 89).

9.2 Conservation

Specific conservation concerns centre around the effects of abstraction on watercourse ecology and on sensitive wetland habitats. A number of sites in the catchment are subject to specific monitoring of water levels for conservation reasons, but others are not. Recent emergency Drought Orders have highlighted the need for good baseline information.

9.3 Coping With droughts

The 1995 drought has not altered our view that there is a resource surplus in the Colliford Zone. However, following the experience of 1995, SWW have undertaken a wide range of measures to enable them to take a much greater proportion of the licensed resource than they were previously able to. SWW have also instigated demand and resource management actions.

In addition, we are currently in the process of agreeing a detailed Drought Management Plan (DMP) for the Colliford Strategic Supply Zone, with SWW. This will establish a staged programme of water conservation measures to be taken as a drought intensifies. These will include proper operational management of public water supply sources. For example; maximising the use of river abstractions within licensed limits to conserve reservoir storage, demand (customer) management such as hosepipe bans as well as Drought Orders/Permits, where these are deemed necessary.

9.4 Non - public water supply abstractions

It is possible that there may be local environmental problems associated with full uptake of the few consumptive private abstractions in the catchment. The Agency will continue to monitor the net commitment to private water abstractions and have a regard to the amount of licensed volume take

up and its effects. Future abstraction needs will continue to be addressed through the abstraction licensing procedure.

Options for action	Responsibility	Benefits	Constraints
9.1 Meeting public water supply * Modelling of Colliford Strategic Supply Zone to: estimate the yield, assist with making the best use of available resources, and help to identify the need for future developments * Encourage demand management and leakage control * Review reservoir operating rules	SWW/ Agency	All options: Efficient use of water resources Improved water environment	All options: Resources Co-operation of the water company
9.3 Coping with droughts * Produce and implement a Drought Management Plan	SWW/ Agency	Environmental protection	Resources/ Co-operation of the water company

Further detail on the area can be found in Part II, Supporting Information:
Abstraction and Water Supply
Landscape, Conservation and Historic Features

ISSUE 10: GENERATION AND MANAGEMENT OF WASTES

Background

With the exception of household waste no detailed information exists on the amounts of waste generated within the plan area. However, estimates have been pulled together as part of the ongoing work by Cornwall County Council to produce a waste management strategy (due for consultation in Spring 1997). This document will be the first review of all waste arisings in Cornwall and a proposed strategy for dealing with waste. It is estimated that mining and quarrying generate approximately 75% of total waste produced. Management of such wastes is dealt with by the County Council in their Waste Local Plan (in preparation).

Agricultural wastes are the next most important by volume, (approximately 20%), though much of this is a useful by-product rather than a waste.

Whilst only small by volume, household, commercial and industrial (non construction and demolition waste) can be some of the most potentially polluting. These are mostly taken to landfill sites with the exception of special or hazardous wastes, 90% of which are "exported" from the County.

There is a significant amount of potentially contaminated land in the catchment, which might become waste if redevelopment occurs. Much of this is due to metals levels, which would be exceptional in a national context, but not at a local level.

Effects on the area

10.1 Pollution

Illegal tipping

The plan area includes numerous concentrations of former metalliferous mining activity which has left a legacy of contaminated ground. Many of these despoiled areas are relatively remote and often unenclosed, which has lead to considerable indiscriminate fly-tipping at some locations, for example Tolgarrick near Redruth and the north slope of Carn Brea. Fly tipping waste can also enter watercourses and cause pollution and localised flooding, for example Chyandour Brook, Tregeseal Stream and Trevaylor Stream. We investigate such incidents, take necessary enforcement action, advise landowners and oversee remedial works.

Land reclamation schemes, such as that proposed at Tolgarrick, can upgrade the sites and prevent vehicular access for future illegal tipping. The introduction of licence fees and landfill tax has resulted in the re-use of waste in further construction works. These have a potential to pollute the environment if inappropriate wastes are used.

10.2 Waste facilities

United Downs, the main landfill site for West Cornwall is going to be full sometime in the next 5 years. Due to the length of time required to plan, approve and start up new facilities key waste management decisions are required in the next 2 years.

The civic amenity site at Penzance is currently closed due to operational difficulties and this facility is being provided temporarily at St Erth. The future provision of civic amenity sites for Penwith is currently under review.

A major feasibility study, aided by European funding, has been undertaken by a group for a Hayle Waste to Energy Project at St Erth. The proposed facility would receive household and commercial wastes at the site where materials recovery and other waste treatments would take place. The scheme envisages progression towards a waste to energy plant. At the time of writing the project is in the planning and funding stages.

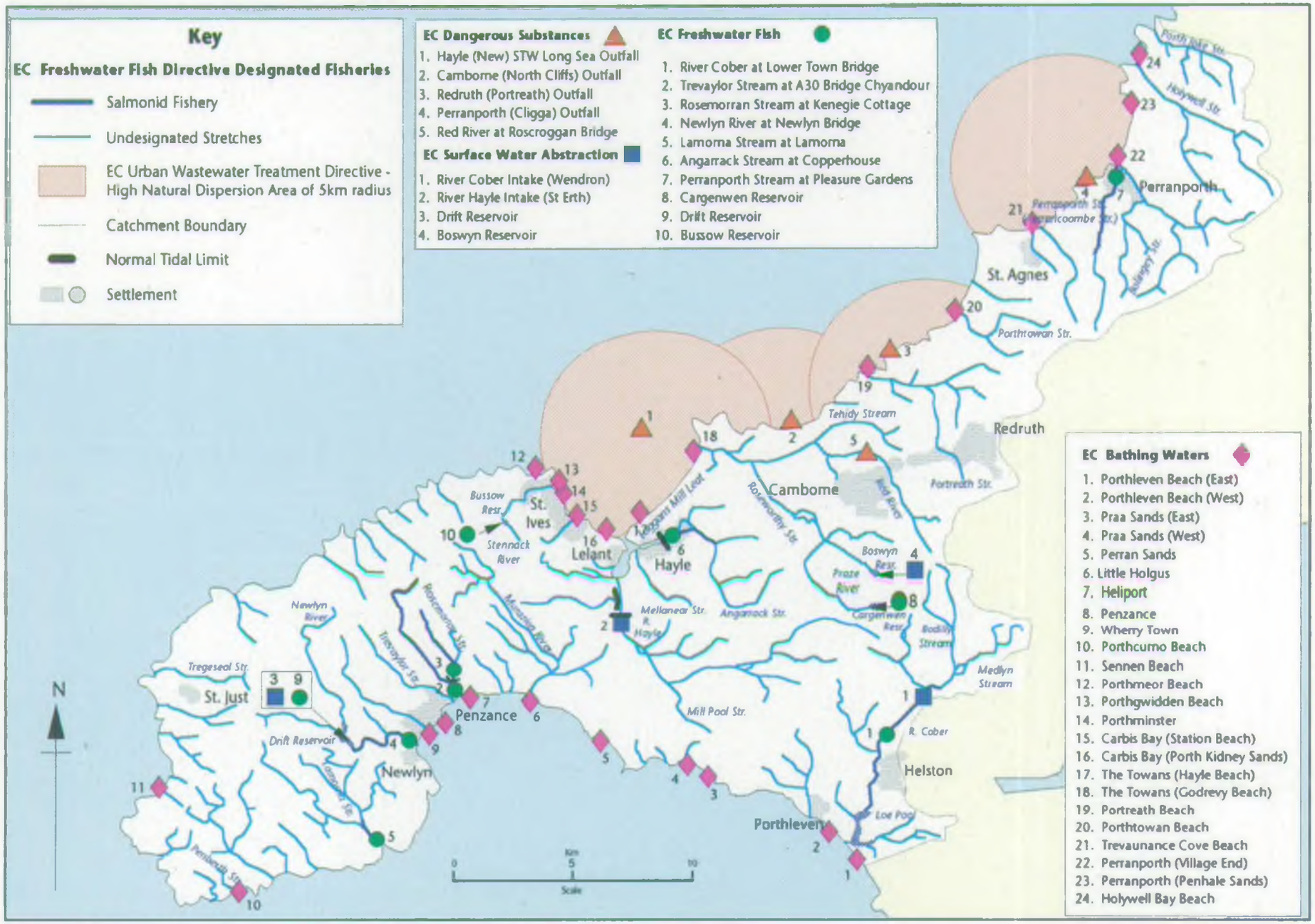
The County Council's Waste Local Plan for Cornwall will identify the criteria for the provision of sufficient and adequate facilities as guidance to potential operators and to direct planning policy. Specific proposals will then be vetted by the County Planning Authority in consultation with the Agency.

There is an established hierarchy of planning for waste, from national strategy to regional and local planning. There is a requirement on the Environment Agency to produce a regional strategy to outline the current and future needs for waste management. This work will be undertaken in two distinct phases, firstly data on current requirements will be collected in a waste arisings survey. This information will also feed into the national strategy. The second stage is the production of the regional strategy. Due to pressures on facilities the county council has had to embark on the production of a local Waste Strategy for consultation, ahead of national and regional plans.

Options for action	Responsibility	Benefits	Constraints
10.1 Pollution			
* Rigorous enforcement and publicity to stop fly tipping and monitoring of exempt (construction) activities	Agency	All options: Environmental improvements	Cost
* Remedial works on notorious sites to reduce access for illegal tipping	Cornwall County Council / LPAs/ landowners		
* Reporting of fly tipping by the Public	Public		
10.2 Waste facilities			
* Encourage the development of necessary facilities, particularly those which recover value from wastes	Agency/ Cornwall Planning Authority/ District Councils Developers	All options: Adequate planning for future management of wastes and a more sustainable use of the earth's resources	Availability of suitable sites
* Identify suitable new sites			
* Draw up sustainable waste strategies	Cornwall County Council		
* Promote waste minimisation	Cornwall County Council/ Agency		Public acceptance Resources
* Implement relevent Waste Regulations	Agency/ Cornwall County Council/ District Councils		

Further detail on the area can be found in Part II: Supporting Information
Waste Management
Mining and Quarrying

Map 4 EC Directives Monitoring



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West Cornwall Local Environment Agency Plan
Environment Agency

ISSUE 11: IMPACT OF SEWAGE DISCHARGES

Background

Rivers have a natural ability to render the main constituents of many effluents harmless, providing that effluent disposal is properly controlled. Throughout the catchment there are numerous sites which operate with a discharge consent from the Environment Agency to discharge effluent into freshwaters, estuaries and off the coast. Discharge consents only apply to point source discharges; specific, identifiable discharges of effluent from a known location.

Effects on the area

11.1 River Quality Objectives (RQOs)

Three stretches on the Red River (Above South Crofty Mine to Roscroggan Bridge, Roscroggan Bridge to Kieve Bridge and Kieve Bridge to Mean High Water) fail to comply with their long term RQOs due to ammonia. The first and third stretch were significant failures to comply and the second stretch was a marginal failure. These stretches are affected by the Tolvaddon and Reskadinnick Storm Sewer Overflows (SSO). Water quality in these stretches will improve once the planned SSO improvements have taken place. However, these stretches run through an urban area and other action may be necessary to achieve the long term RQOs.

We have analysed water quality data and identified three sewage treatment works within the catchment which could cause non compliance with the River Quality Objective targets we are proposing (see Issue 1). In all three cases biological monitoring indicated that the discharge is impacting on aquatic invertebrate life (see Table 6). All of the works are currently complying with their discharge consents so there is a need to tighten the consent over a period of time. We are proposing therefore to seek improvements from SWW in the next round of Asset Management Plans (see Part 2, Effluent Disposal). The sewage treatment works are Porthtowan, Helston (see 11.3 below) and Tregaseal.

11.2 EC Bathing Waters

Porthleven Outfall has contributed to failures of the EC Directive standards at Porthleven West and Porthleven East. SWW have identified improvements and the scheme is nearing completion. Trevaunance Point outfall has contributed to the failures at Trevaunance Cove. The outfall has been replaced and treatment provided. We have determined the long-term discharge consent and will require SWW to install ultraviolet treatment by the 1997 bathing season.

11.3 Urban Wastewater Treatment Directive (UWWTD)

St Buryan STW has been identified under the appropriate treatment provision of the Directive. This works will receive improved secondary treatment by the end of 2005. Improvements need to be made to numerous private Deemed consents within the plan area under the Directive, also by the end of 2005. Some of these have already been undertaken.

Loe Pool has been proposed as a Sensitive Area (Eutrophic). We have produced a report to support its designation. The qualifying discharge, Helston STW, has a population equivalent of 11,000. If designated nutrient stripping would be required at the STW. Loe Pool is of great conservation value and eutrophication is considered to be a major threat to the site.

The sea off St Ives and Perranporth is identified as High Natural Dispersion Areas (HNDAs). Comprehensive studies are currently being undertaken by SWW for the discharges at Penzance/St Ives and Perranporth to identify whether primary treatment will be sufficient to protect the environment. We are responsible for ensuring that comprehensive studies are carried out correctly. (Sewage from the Penzance and St Ives areas is treated at Hayle (New) STW and discharged via the Gwithian long sea outfall).

11.4 Operational monitoring programme

There was an exceedence of the EQS for mercury in St Ives Bay in 1995. The cause of the exceedence of the EQS is unknown but was due to only one positive result. All other results in 1995 were below the limit of detection, as were all results in 1996 and 1997 to date. We propose that the discharge should be monitored for mercury and if found it should be placed as a consent condition on the Hayle (New) STW licence.

Biological assessment has shown an impact on the Praze Stream by Praze-an-Beeble STW. SWW have undertaken temporary improvement works which have resulted in improved water quality. There is a need for these improvements to be made permanent.

11.5 Aesthetic pollution

Concern by local residents about the nuisance of sewage on Porthtowan Beach has resulted in Carrick District Council serving an abatement notice on SWW. This requires SWW to screen the outfall at North Cliffs by July 1997

Options for action	Responsibility	Benefits	Constraints
11.1 River Quality Objectives (RQOs)			
* Longer term improvements to Porthtowan, Helston and Tregaseal (St Just) STWs	SWW	Compliance with River Quality Objectives	
11.2 EC Bathing Waters			
* SWW Improvements are underway at: Porthleven Outfall Perrannuthnoe	SWW	Compliance with EC Bathing Waters Directive	Cost
* Ultraviolet treatment required at St Agnes and Perranporth STWs	SWW		
11.3 Urban Wastewater Treatment Directive			
* Improve Tolvaddon and Reskadinnick Storm Sewer Overflows	SWW	Improve water quality, compliance with River Quality Objectives	All options: Cost
* SWW Improvements are required at St Buryan	SWW	Compliance with EC Directive	
* Designation of Loe Pool as a Sensitive Area	DoE	Would require improvements having an environmental benefit	
* Produce comprehensive studies for HNDAs.	SWW	Both options:Compliance with EC Directive	
* Audit studies for HNDAs	Agency		
11.4 Operational monitoring programme			
* Consent for mercury at Hayle STW	Agency	Improved water quality	
* Long term improvements to Praze-an-Beeble STW	SWW	Maintain improved water quality	
11.5 Aesthetic pollution			
* Screening of North Cliffs Outfall	SWW	Improved amenity	

Further detail on the area can be found in Issue 1 and Part II, Supporting Information: Effluent Disposal

ISSUE 12: IMPACT OF SHIP REPAIR YARDS

Background

The Environment Agency is the statutory authority in England and Wales for regulating the largest and most complex industrial processes which discharge waste to air, water and land. To do this we use a system known as Integrated Pollution Control (IPC). Operators of IPC processes are required to have an authorisation issued by the Agency.

Effects on the area

12.1 Water pollution

Penzance Dry Dock is engaged in the maintenance of ships, including the application and removal of Tributyltin (TBT) anti-fouling compounds from ships. The Agency is currently determining an IPC authorisation for the dock. Further investigations of the effects of the dock on the environment may be required.

Options for action	Responsibility	Benefits	Constraints
12.1 Water pollution			
* Investigate potential effects of dockyard processes on the environment	Agency	Reductions in TBT	Cost
* Issue IPC authorisation	Agency		BATNEEC*

* BATNEEC - Best Available Technique Not Entailing Excessive Cost

Further detail on the area can be found in Part II, Supporting Information: Controlled Processes

ISSUE 13: UNKNOWN CAUSES OF POOR WATER QUALITY

Background

Our monitoring under various EC Directives and water quality classifications has identified a number of problems where we do not know the cause. In such cases we normally undertake investigations to identify the cause.

Effects

13.1 River Quality Objective failure

There have been intermittent high Biochemical Oxygen Demand (BOD) levels in the Trevaylor Stream during 1995 and 1996. The cause is unknown. The river stretch marginally fails to comply with its RQO due to BOD.

13.2 Poor invertebrate biology

Routine biological sampling has indicated poor water quality on a number of watercourses where the cause has not been definitely identified. They are:
Tregilliowe Stream - thought to be nutrient enrichment
Chyandour Brook - thought to be urban contamination such as oil
Hollywell Stream - thought to be organic enrichment

Options for action	Responsibility	Benefits	Constraints
13.1 River Quality Objective failure * Investigate cause of failure on the Trevaylor Stream	Agency	Compliance with water quality classification	Resources
13.2 Poor invertebrate biology * Investigate causes and take remedial action	Agency	Improved water quality	Resources

Further detail on the area can be found in Issue 1 and Part II, Supporting Information: Conservation

ISSUE 14: NATURAL CAUSES OF POOR WATER QUALITY

Background

Our monitoring under various EC Directives and water quality classifications has identified a number of problems where we feel the cause is natural. In such cases we normally undertake investigations to confirm this and undertake actions as appropriate.

Effects

14.1 River Quality Objective failure

The stretch from Perranwell to the Normal Tidal Limit of the Bolingey Stream marginally fails to comply with its RQO due to Dissolved Oxygen (DO). These low DO concentrations could be caused by low flows through a marshy area. The monitoring point should be relocated to enable a more representative sample to be taken.

Options for action	Responsibility	Benefits	Constraints
14.1 River Quality Objective failure * Move monitoring point on Bolingey Stream	Agency	Representative sample	none known

Further detail on the area can be found in Issue 1

ISSUE 15: WATER CONTACT IN RIVERS

Background

There is no statutory legislation against which we can monitor or regulate bacteriological or viral water quality with the exception of the EC Bathing Waters Directive. No designations for freshwaters have been made under this Directive as yet in this country.

Many rivers flow over beaches prior to discharging to the sea. These rivers make attractive features for paddling and playing in.

On Porthtowan Beach coastal processes produce sand barriers which hold back the freshwater stream creating a pool which is used by people on the beach. Concern has been expressed that the quality of water in this pool may be unsuitable for human health. Monitoring of the stream, like other streams in the plan area, show that bacteriological standards would occasionally exceed the mandatory standards of the Bathing Waters Directive.

Options for action	Responsibility	Benefits	Constraints
15.1 Human health			
* Bulldozing barriers to prevent creation of pools	Carrick District Council	All options: protect human health	Cost
* Designate stream as a bathing water	Carrick District Council/DoE		Cost
* Place signs alerting people to any danger	Carrick District Council		Negative publicity

Further detail on the area can be found in Part II, Supporting Information: Recreation and Amenity

ISSUE 16: MANAGEMENT OF LOE POOL

Background

There are a number of separate issues relevant to Loe Pool, which it is felt should best be resolved in conjunction with each other, and with the involvement of the same interested parties.

The issues are:

Water level management
Water quality
Educational possibilities
River maintenance
Amenity use
Development/implementation of the Site Management Statement for SSSI
Hydroelectric power generation

The Agency has management responsibility for most of these issues, and could be the lead in taking management ideas and plans forward. The LEAP process is ideally suited to this. It is intended that the Agency will set up a small forum to meet occasionally to take the management ideas further and report back to LEAP Steering group.

Options for action	Responsibility	Benefits	Constraints
16.1 Management of Loe Pool * Set up management forum for Loe Pool and lower Cober Valley	Agency/ all bodies with interest in Loe Pool and lower Cober Valley	Integrated management of Loe Pool	Cost

Further detail on the area can be found in Issues 11 and 6

Part 2

PROTECTION THROUGH PARTNERSHIP

There are a range of initiatives by various bodies which at some level cover the area of this plan. These are both statutory and non statutory in nature and cover a variety of topics from environmental to social and economic. A number have produced, or are producing some form of documentation. It is important for all parties that where different interests overlap discussion occurs on those areas of common interest. In this way we can integrate action, being more efficient in our actions, avoiding duplication (or conflict) and make the most of limited budgets. A summary of those initiatives most relevant to this plan is given on page 42.

Planning Authorities

Possibly the most important agencies are the County and District Planning Authorities, who are responsible for controlling development within the catchment, particularly through the County Structure Plan, Local Plan and Minerals Local Plan process. The Agency is a Statutory Consultee for Structure and Local Plans and certain types of development proposals. The Agency works closely with LPAs to ensure that Development Plans contain appropriate policies to protect the environment.

Development will normally have an effect on the environment but it can also provide opportunities for conservation and recreational enhancements or fund improvements to problems caused by contamination, flooding, infrastructure deficiencies or environmental nuisances.

The Agency, in liaison with LPAs, seeks sympathetic development with the environment. However, in certain situations, such as deficient sewerage and/or sewage treatment services or severe flood risk river catchments, the Agency will recommend formal development restraints.

Shoreline Management Plans (SMPs)

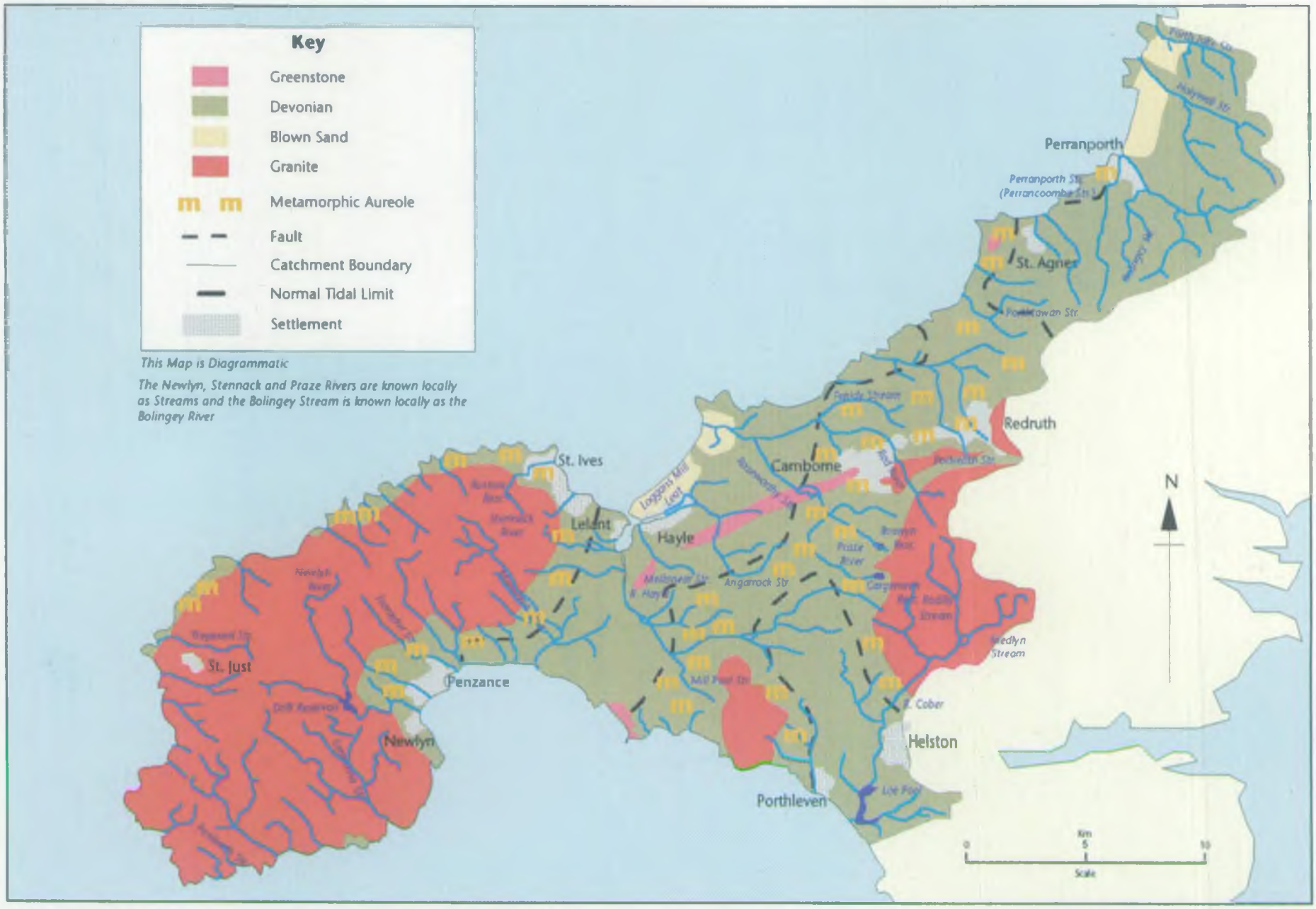
SMPs are being produced, by a coastal group with statutory interests working together, for the coastline covered within this plan. They provide a forum for an integrated review of coastal processes and sustainable coastal defence policies to set objectives for the future management of the shoreline.

PART 2: SUPPORTING INFORMATION

Table 3: Initiatives in plan area

Plan	Responsibility	Geographic area	Subject matter	Outputs	Dates	Steering Group	Contact
LEAP	Environment Agency	Freshwater systems from Gunwalloe to Porth Joke	Environmental management, water, land and air	Consultation Report Action Plan Annual Review	Jun 1997 Dec 1997	Y	Environment Agency Cornwall Area
County Structure Plan	Cornwall County Council	Entire county	Strategic planning - social, economic, environmental	Draft plan Deposit plan	Sep 1994 Nov 1995	Y	Planning Dept Cornwall County Council
Local plans - Carrick DC Penwith DC Kerrier DC	District Councils	Individual districts	Detailed planning - social, economic, environmental	Draft plans Deposit plans	1994/ 1995	Y	Planning Depts at relevant District Council offices
Minerals local plan	Cornwall County Council	Entire county	Strategic & detailed planning - minerals issues	Draft plan Deposit plan	Dec 1994 Feb 1996	Y	Planning Dept Cornwall County Council
Shoreline Management Plan	Relevant District Councils and Agency	Lizard to Land's End Land's End to Hartland Point	Coastal processes management policies	Draft management plan Scoping study Draft management plan	 Feb 1997 Sept 1998	Y Y	Planning Dept. Kerrier District Council
Natural Areas	English Nature	Same as LEAP	Biodiversity and landscape	Framework documents to be trialled nationally	unknown		English Nature
Landscape assesment of Cornwall/New Map	Countryside Commission	Same as LEAP	Landscape quality, description, enhancements, archaeology	2 reports	1995 and 1994		Countryside Commission
Waste Management Strategy	Cornwall County Council	Cornwall County	Strategic management of wastes	Consultation Draft Final report	Spring 1997	Y	Cornwall County Council
RSPB management plans for Hayle and Marazion reserves	RSPB	Hayle Estuary and Marazion Marsh	Habitat and species management	Five year plan	1997		RSPB

Map 5 Geology



Information correct as of July 1996

The Newlyn, Stennack and Praze Rivers are known locally as Streams and the Bolingey Stream is known locally as the Bolingey River

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Environment Agency

Physical Characteristics

Geology

The western section of the catchment is dominated by the granite of the Land's End peninsula whilst the catchment's boundary is the higher open country with gently rounded summits typical of the Cammenellis granite. Surrounding the granite masses are wide margins of thermally altered rocks. The rest of the area is made up of, in the north, the interbedded sandstones and slates of the Devonian Gramscatho Beds and, in the central and southern parts, the Devonian Mylor Slates in which sandstone is more rare. Sand dunes, known locally as towans, are well developed around St. Ives Bay.

During the Pleistocene Period about 2 million years ago, though sea ice reached the Isles of Scilly and parts of West Cornwall coast, ice cover did not extend into the mainland area itself. As a result of this, the weathered rocks have not been removed but rather form a mantle of 1 to 2m thickness over most of the district. In hollows, valleys and coastal embayments such accumulations may reach a thickness of up to 30m.

Crossing the catchment is a belt of hydrothermal metalliferous tin copper mineralisation. This belt, containing the highest concentration of mineral lodes in the 'Old World', has been exploited since the Bronze Age.

During the 1980s a project was undertaken to extract geothermally heated water from the Carnmenellis granite. Owing to economic pressures, funding was withdrawn and the project ceased. There are, at present, no plans to reactivate it.

Hydrogeology

There are no major aquifers within the catchment. However, useable groundwater is present both in the weathered zone and in fissures in the bedrock. As a result of this, the rocks have been classified by the Agency as minor aquifers. Groundwater discharges from these minor aquifers provide for river baseflow during dry weather. The extensive mining activity has created significant additional drainage pathways within the rock, in mine shafts, tunnels and drainage adits. Within the catchment there are a large number of boreholes and wells supporting small local demands. In addition, groundwater is abstracted from adits and disused mine shafts.

One of the accepted problems associated with closing mines is that of pollution caused by overflowing minewaters. Whilst a mine is worked, the water table is kept unnaturally low through pumping. Once the pumps are switched off, the water table will revert to its normal level. The serious pollution that was caused when the pumps at Wheal Jane were switched off was widely publicised at the time. Geevor Mine near Pendeen ceased mining operations in 1991. The rising water level was closely monitored by the National Rivers Authority, but in the event, no pollution incident occurred. The only mine now operating in the South West is South Crofty.

Map 6 Hydrometric Network and Flood Defence Schemes

Information correct as of July 1996

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Hydrology

The catchments are generally steep and impervious. However, mining activities over much of them have influenced the rivers. The River Hayle is embanked, which has led to it behaving more like a "groundwater" river, i.e. slow to respond to rainfall, but equally slow to recess with lesser peaks than would be expected and are experienced by most of the surrounding shorter rivers which are often very flashy. There are three gauging stations in the catchment. Details of these are shown on Table 4 . The data from St Erth gauging station at NGR SW 549 341 on the River Hayle shows a relatively small flow range - the significant influence of mining on the River Hayle. The maximum was 7.46 cumecs (cubic metres per second) instantaneous flow on 30/12/93, minimum daily mean flow of 0.136 cumecs on 29/8/76 and an average daily flow of 0.995 cumecs.

The gauging station at Trenear on the River Cober at NGR SW 676 311 is located just downstream of the abstraction to monitor the prescribed flow for the Wendron Water treatment abstraction. As water from Stithians Reservoir (in the Fal catchment) may be diverted into the river Cober careful interpretation of the data is necessary. The maximum recorded instantaneous flow is 3.8 cumecs with a minimum daily flow of 0.01 cumecs (both of these events were recorded in 1990) and a mean of 0.44 cumecs for the 6 year period of record.

There are currently no flow data available from Penberth gauging station at NGR SW 400 240. This gauging station, which was set up to provide data from a 'natural' site in South West Cornwall, is giving operational problems with regard to different summer and winter controls.

In addition to the three monitoring stations referred to above monthly instantaneous gaugings are carried out at Gwithians NGR SW 585 420 (fortnightly up to the end of March 1997) in support of water quality chemical sampling for monitoring at the harmonised monitoring site on the Red River.

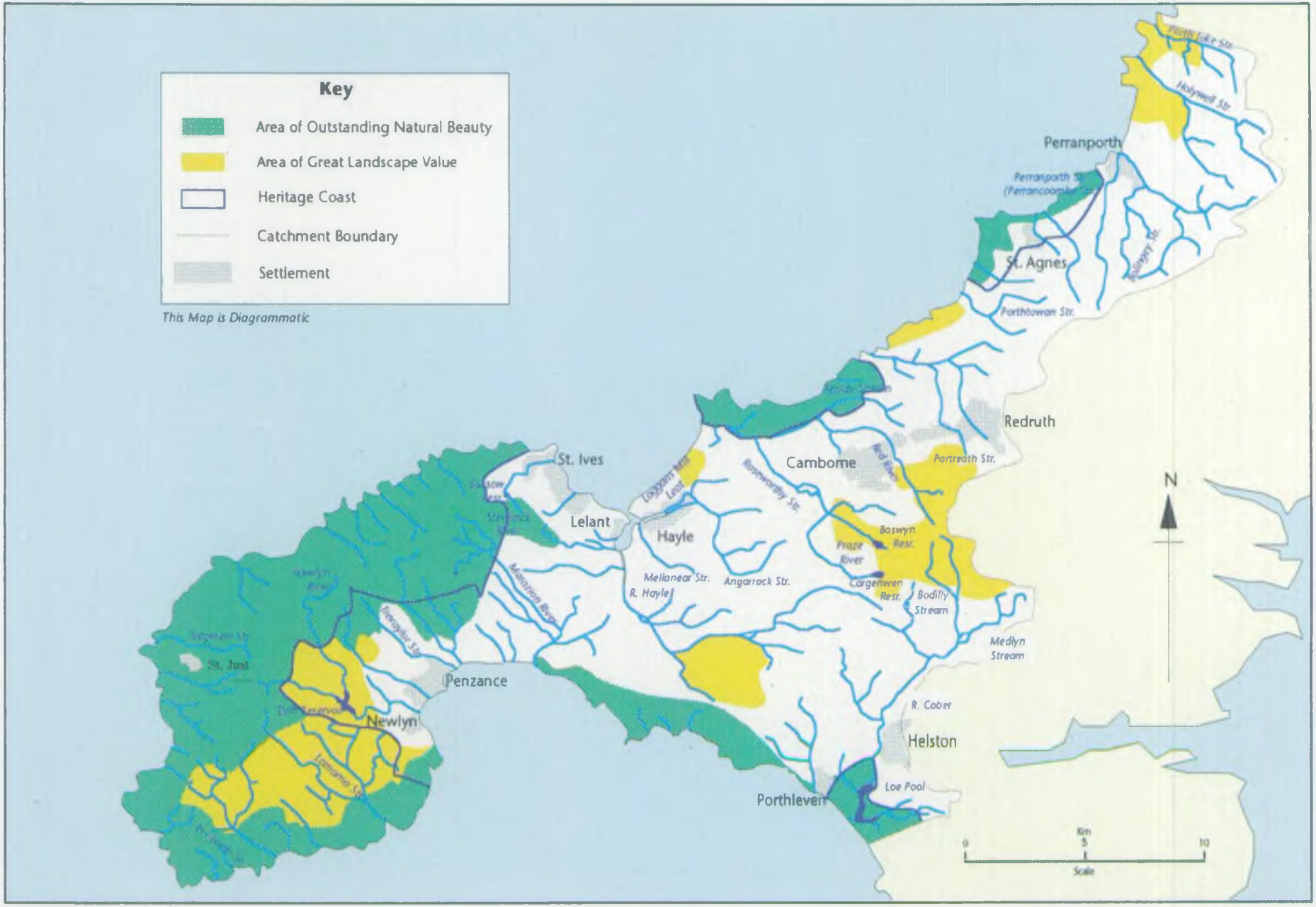
Hydrometric gauging

The Environment Agency hydrometric network is shown on Map 6. The three river gauging stations take river level/flow measurements every 15 minutes. Average flows, catchment areas and length of records at the gauging stations are shown in Table 4. In addition to the gauging stations, data exists from spot measurements taken at locations throughout the catchment. A network of 9 rain-gauges provide good coverage of the catchment (see Map 6). Annual rainfall totals at rain-gauge sites vary from 935 mm to 1266 mm (1961-90 Long Term Average). There are no groundwater monitoring sites within the catchment.

Table 4 : Hydrometric gauging stations

Station	River	NGR	Start Date	Catchment Area (km^2)	Gauged Average Daily Flow (cumecs)
Trenear Intake	Cober	SW 676 311	01/01/87	20.0	0.455
Penberth	Penberth	SW 400 240	16/12/93	13.7	
St Erth	Hayle	SW 549 341	26/02/57	47.6	0.976

Map 7 Landscape



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West Cornwall Local Environment Agency Plan
Environment Agency

Conservation - Landscape, Wildlife and Historic Features

Here we consider the natural environment and the historic built environment. We concentrate in particular on rivers and wetlands.

Our Objectives

To ensure that these features are not degraded through neglect, mismanagement, or insensitive development and wherever we can take measures to enhance them.

The Role of the Environment Agency

In fulfilling all our functions we must contribute to the conservation of nature, landscape and archaeological heritage. We have a *regard* to conserving and enhancing flora, fauna, geological or physiographical features when carrying out our pollution control functions, and a **duty** to *further* conservation when carrying out our other functions. We also have a **duty** generally to *promote* the conservation of flora and fauna dependent on the aquatic environment. An important part of our work is to influence land use planners and land managers to look after rivers and wetlands sensitively. Legislation tells us what we can and can't do to regulate work in rivers and floodplains.

Landscape - Designated Areas

Area of Outstanding Natural Beauty (AONB) - Much of the Penwith peninsula, Mount's Bay coastline and Godrevy to Portreath coastline lies within the Cornwall AONB. These landscapes are of national significance and are afforded special protection from development by Planning Authorities.

Heritage Coast - Most of the Penwith peninsula, along with the Godrevy to Portreath coastline is designated Heritage Coast. This is a national designation applied to coastlines with a rich landscape, conservation and recreational resource. Heritage Coast Plans in these areas seek to develop co-ordinated protection and use.

Areas of Great Landscape Value (AGLV) - A number of parts of this catchment are designated AGLVs. This is a County designation given to landscapes not quite as significant as AONBs. Protection of these areas is afforded through the County Structure Plan.

Wildlife - Designated Areas

Proposed Special Areas of Conservation (SACs) - SACs are currently being proposed across the European Union member states to protect the habitats and species of prime conservation importance within the European Union. Three sites are proposed within this catchment: Tregonning Hill for lower plant value; Godrevy Head to St Agnes; and Penhale Dunes which support rare coastal plants. English Nature can provide further information if necessary.

Sites of Special Scientific Interest (SSSIs) - SSSIs are recognised as nationally important sites, and are afforded specific protection through legislation. Within the catchment there are 35 SSSIs which conserve a variety of different habitats - see Appendix A for details. Seventeen of these sites have been designated for geological reasons - an indication of the complex geology found within the catchment.

National Nature Reserves (NNRs) - Whenever possible, the finest examples of Britain's SSSIs are purchased or leased by English Nature and run as NNRs. Nature conservation is the primary aim of these sites.

Areas of Great Scientific Value (AGSV) - Several AGSVs occur in this catchment. The AGSV designation recognises that important sites such as SSSIs cannot be sustained effectively as isolated islands and seeks to provide (through the County Structure Plan[5]) buffer zones around sites, wildlife corridors to link sites, and emphasise the most important areas of nature conservation to concentrate resources.

Cornwall Nature Conservation sites (CNC sites) - CNC sites are identified by the Cornwall Wildlife Trust as sites of county importance for wildlife. These are not afforded statutory protection, but through the Planning process and other consultations we encourage the relevant individuals or organisations to achieve the proper protection of these sites. See Appendix A for a list of names and the main habitats. As with SSSIs we would not normally issue a consent or licence which would damage a CNC site.

Local Nature Reserve (LNR) - Kerrier District Council has proposed designating the Red River Valley a LNR.

Biodiversity

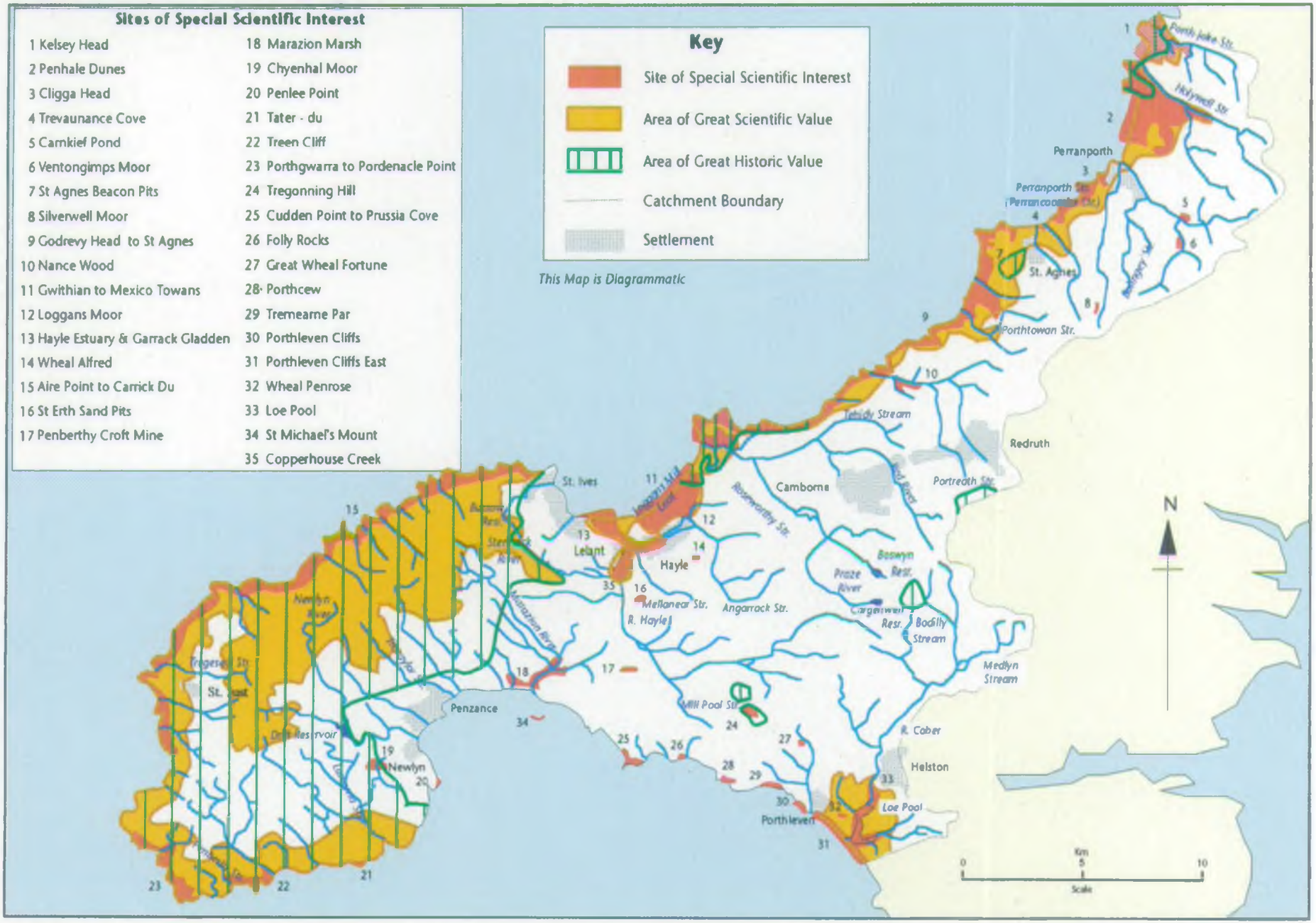
Biodiversity quite simply refers to the variety of life on Earth. We are losing biodiversity. We have also lost over 100 species in the UK this century; globally half of all species of birds and mammals could be extinct within the next thirty years.

The conservation and enhancement of biodiversity must be integrated into all our decision-making. Targets need to be set to prevent further loss and guide recovery.

The recently published document 'Biodiversity: the UK Steering Group Report'[6] contains costed targets and actions for the protection and restoration of priority habitats and species up to the years 2000 and 2010. Regional and County Biodiversity Action Plans will give the local focus. 'The Biodiversity of the South West: An Audit of the South West Biological Resource' has been produced by a partnership of organisations - the County Wildlife Trusts, RSPB and the Regional Planning Conference.

The Agency serves on the working group which is developing a Biodiversity plan for Cornwall for a wider Steering Group, covering all environmental interests in the county. For some species and habitats the Environment Agency is identified as being the co-ordinating body (sometimes jointly) for a number of Action Plans. These are all linked to the water environment, reflecting previous involvement and expertise. Additionally, we are identified as having a role to play in the delivery of Action Plans for other habitats and species. Habitats and species which are considered to be under particular threat, or of particular importance found within the plan area include: otters, estuaries, reedbeds and lowland heathland.

Map 8 Conservation Designations



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Environment Agency

Freshwater biology

We monitor the ecological quality of rivers by sampling the benthic aquatic macro invertebrates. These are the small animals that live in river sediments or on stones in the river. They are unable to move far and so are affected by the long term conditions in the river. We use this biological information to classify rivers as follows:

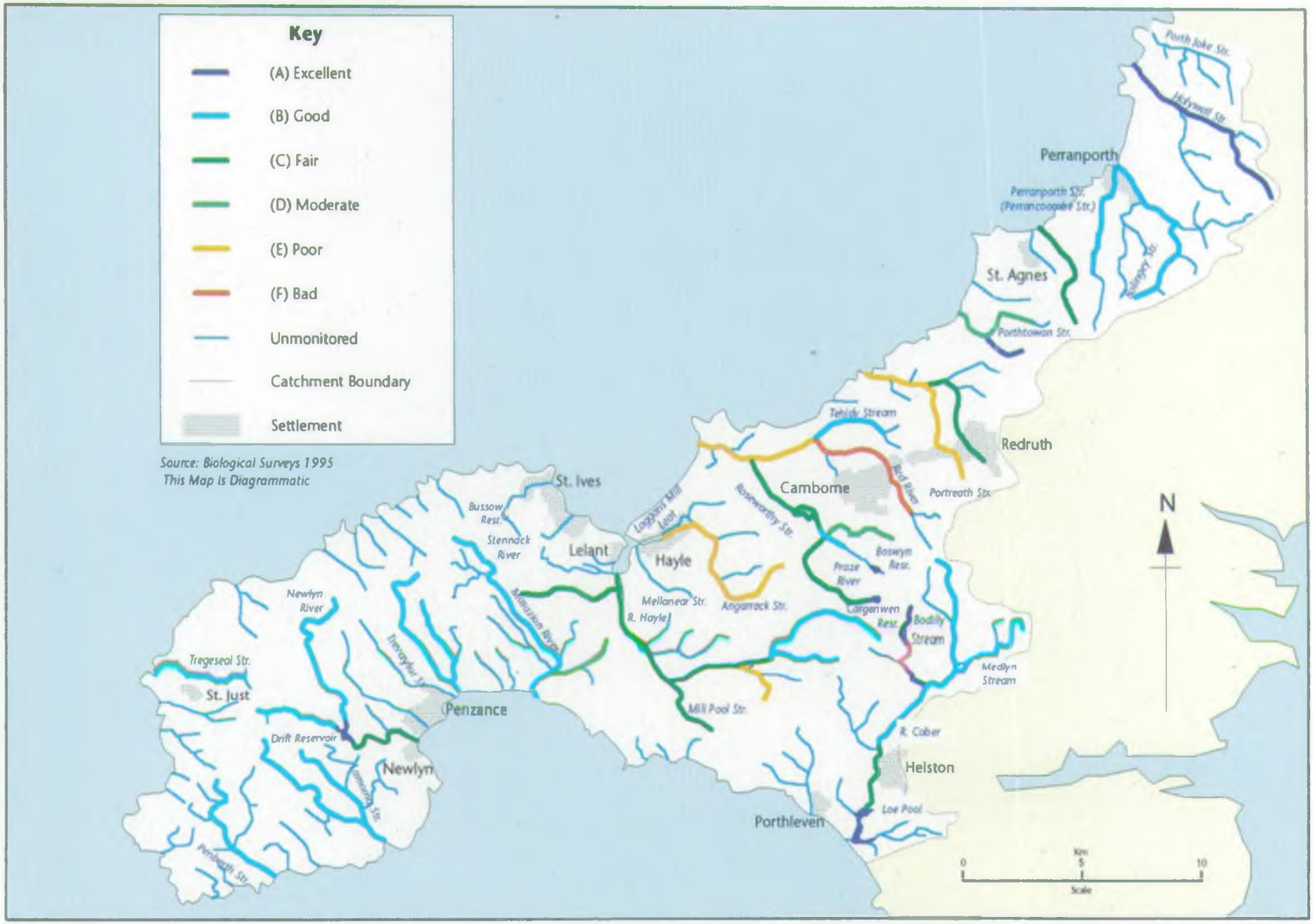
We collect samples from the river during spring, summer and/or autumn and we list the different families or taxa of macro invertebrates found. We then use the Biological Monitoring Working Party (BMWP) system to assign a score to each family. This score reflects the tolerance of a particular family to pollution. We then use this information to calculate the Average Score Per Taxon (ASPT) which varies according to the levels of pollution in the river. We then compare the number of families found and the ASPT value to predicted scores for an unpolluted river using a computer model called the River Invertebrate Prediction and Classification System (RIVPACS) developed by the Institute of Freshwater Ecology. The ratio of observed and predicted ASPT and number of taxa (N-taxa) is called the Environmental Quality Index (EQI) and is used to classify rivers as follows:

Table 5 : Biological classification

Biological Class	Description	River Lengths (km)
a	Excellent	16.9
b	Good	99.5
c	Fair	44.7
d	Moderate	10.2
e	Poor	23.1
f	Bad	5.9

Biological (and fisheries) data generally indicate a high quality water environment, supporting varied invertebrates, game and coarse fish. Localised problems however, particularly metal contamination, have reduced the diversity and abundance of both groups from levels which could be expected.

Map 9 Biological Classification 1995



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Environment Agency

Table 6 : Summary assessment of invertebrate biological surveys

River	Summary
Cober	The invertebrate communities were of better quality in the upper half of the catchment, above Lowertown. Biotic scores were influenced by mild acid metals contamination from historical mining activities and localised agricultural impacts. The effects of nutrient enrichment became more pronounced in the lower part, especially below Helston STW (Issue 11). There has been a general improvement since the farm campaigns of the late 1980s.
Porthleven Stream	Samples taken upstream of the harbour suggested some influence from historical mining activities (see Map 14) or a naturally acid geology.
Marazion Stream	The invertebrate communities of the Marazion Stream were diverse, particularly at the headwater site at Nancledra. The Tregilliowe Stream appeared to be influenced by some localised nutrient enrichment, possibly originating from septic tanks or diffuse agricultural sources. (Issue 13).
Trevaylor/ Rosemorran Stream	Supported a diverse community of invertebrates. Litter had been identified as a problem upstream of the A30 bridge (Issue10).
Chyandour Brook	Suffered from litter contamination (Issue 10). The poor diversity of invertebrates would appear to be due to urban contamination, such as oil (Issue 13).
Larrigan Stream	Supported a diverse fauna.
Newlyn River	Biotic scores above Drift Reservoir were reasonable. Scores were lower below the dam due to the loss of Stonefly larvae, probably as a result of the chemistry of impounded water. The Trereife Stream has a history of pesticide contamination which had effects on invertebrate diversity in the past (Issue 6).
Carn Euny/ Lamorna/ Penberth Streams	A diverse invertebrate assemblage indicated good biological quality in these watercourses.
Tregaseal Stream	Despite a good diversity of fauna, the lack of pollution-sensitive mayfly and stonefly larvae suggested an organic impact. (Issue 13). Significant amounts of litter were recorded in spring 1995 (Issue 10).
Zennor Stream	Good biological quality was recorded at Zennor.
River Hayle	The upper reaches of the main river supported a good diversity of fauna though occasional problems, probably from agriculture, have had an impact. The lower half of the main river was of reasonable biological quality. Biological quality deteriorated due to the influence of disused mines (see Map 14) specifically those draining to the Godolphin Stream (Issue 5). Pesticide problems have also been associated with the catchment in the past.
Angarrack Stream	The invertebrate community of the Angarrack Stream was typical of that associated with chronic metalliferous contamination (see Map 14).
Red River	Biological quality upstream of Brea Tin Works was reasonably good. However, the rest of the watercourse was grossly contaminated with metalliferous contamination with the exception of the reasonable communities recorded in the Cambrose and Mawla Streams (Issue 7).
Roseworthy Stream	Biological quality was good at the top of the catchment. Biological quality deteriorated below the confluence with the Rea Stream and the Praze Stream, due to organic enrichment (Issue 11).
Porthtowan Stream	Biological quality was reasonably good in the upper reaches. A significant deterioration was apparent below Porthtowan STW, indicating chronic impact (Issue 11).
St Agnes Stream	Reasonable biological quality was consistently recorded.
Trevellas Stream	Appeared to be impacted by disused metalliferous mines (see Map 14).
Perranporth Stream	Good biological quality.
Bolingey Stream	Biological quality improved since 1990. Improvements at Goonhavern STW and better farming practices considered to have contributed to the recovery.
Holywell Stream	Although biotic scores show a general improvement, still some evidence of occasional organic enrichment during summer and autumn (Issue 13).
Porth Joke Stream	Good biological quality.

Discrepancies between Chemical and biological monitoring can result as the biological monitoring reveals the impact of long term exposure . This is particularly so in the case of metals, as occurs in this catchment.

Historic environment

The Agency has commissioned a historic audit for the Hayle Estuary and St Ives Bay area which will be available in 1997.

Designated sites

Scheduled Ancient Monuments (SAMs) - There are numerous SAMs within the catchment. SAMs are of national importance, protected in law. English Heritage advises the Secretary of State for the Department of National Heritage on matters relating to SAMs. They are given full consideration by the Agency in any relevant applications. There are also many more unscheduled ancient monuments that can be of national, regional or local importance.

Area of Great Historic Value (AGHV) - Much of the Penwith peninsula and other sites in the plan area are designated as ACHVs by Cornwall County Council, in recognition of the concentration of archaeological interest. One of these, at Carn Brea, has been proposed for designation as a World Heritage Site on account of the concentration of hard rock mining remains. Such designations apply to sites of international importance.

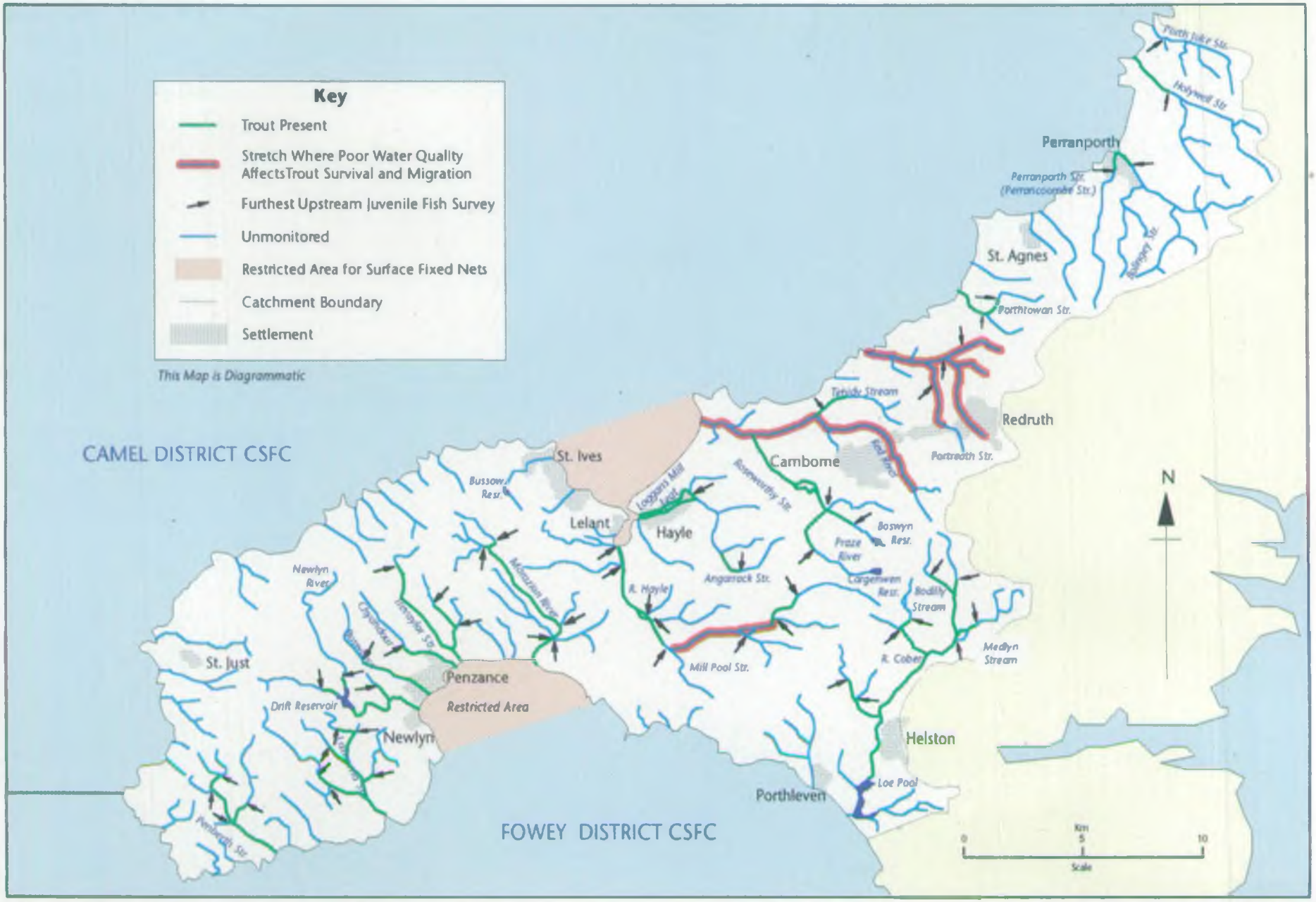
Historic Settlements - These are of county importance for archaeological conservation, both above and below ground. As with AGHVs, these are afforded special protection in the County Structure Plans.

Historic Settlements - There are four Historic Settlements: Helston; St Ives; Marazion and Penzance.

Listed Buildings - There are numerous listed buildings within the catchment which are considered of county importance. Records are kept by District and County Councils and protection is offered through the planning system.

The Environment Agency checks that any "in-house" developments or operations do not impact on listed buildings. Due to the number of listed buildings within the catchment applicants seeking Environment Agency licences to undertake abstractions, discharges or works, are required to carry out their own search.

Map 10 Fisheries



Information correct as of July 1996

Fisheries

This use relates to the conservation of fish species, the maintenance and development of their environment and the exploitation of stocks.

Our Objective:

To maintain, improve and develop fisheries.

The Role of the Environment Agency

We have duties and powers to:

- regulate fishing through a licensing system
- police the illegal taking of fish and the sale and export of wild salmon and trout
- ensure the unobstructed migration of salmon, sea trout and eels
- monitor fish stocks
- control the movement and introduction of fish or spawn into any waters other than fish farms
- control fish disease outside fish farms
- raise income through duties on fishing licences
- ensure adequate levels of water to support fisheries
- ensure suitable water quality through the EC Freshwater Fish Directive and Water Quality Objectives.

Local Perspective

The plan area contains a variety of rivers with fish survey results available for the majority of larger streams and rivers. Species found include migratory trout, brown trout, cyprinids and other coarse fish. Trout have not been recorded on the Portreath and Porth Joke streams.

There were no bullhead or brook lamprey records within this catchment compared to their widespread distribution in many other Cornwall area rivers. These are fish species listed in the European Union Species and Habitats Directive 1992, and protected by the Wildlife and Countryside Act 1981.

In addition to its value as a natural resource, the fishery also generates income for the local economy through being able to support active rod fisheries. We are not aware that the actual importance to the economy has been calculated. National studies however indicate that the value is likely to be significant.

Fisheries surveys

Fisheries surveys have been carried out at various sites in the catchment since 1970. Most of the monitored rivers contain self sustaining populations of fish in addition to trout, most commonly eel. Densities vary within the different river systems. Species recorded in fisheries surveys are listed by subcatchment in Table 7. The latest known distribution of juvenile trout, based on our monitoring sites is shown on Map 10 (Note : The fishery may extend further than indicated, and we have not surveyed unmarked watercourses).

Analysis of historic routine fisheries survey data

In the production of the fisheries issues, text and maps for this report a review of all relevant Agency fisheries records has been made. In order to keep the report short only those stretches where there are problems have been highlighted, in Issue 3, page 15. A copy of the detailed analysis is available from the Bodmin office on application.

Table 7 : Presence of fish species with self sustaining populations

	sea trout	brown trout	eel	minnow	3 spined stickle-back
River Cober		*	*		*
Crowlas (Red River)		*	*	*	*
Trevaylor Stream		*	*		
Chyandour Stream		*	*		
Boswarva Stream		*	*		
Newlyn River		*	*		
Lamorna Stream		*	*		
Penberth Stream		*	*		
River Hayle	*	*	*		*
Holywell Stream	*	*	*		
Angarrack Stream		*	*		*
Portreath Stream					*
Porth Joke Stream			*		*
Roseworthy (Red river)		*	*	*	*

Rod catches

Rod catch records for the rivers are sparse and only cover the River Hayle for a limited number of years. Records were only kept for rivers considered to have runs of sea trout. One sea trout was reported as caught from the Hayle in 1961 with no reported records in 12 other years where data was available (1962-1971, 1986-1987). Although a sea trout run occurs on the Hayle it provides a minimal fishery.

There are no estuarine net fisheries for salmon and sea trout within the plan area.

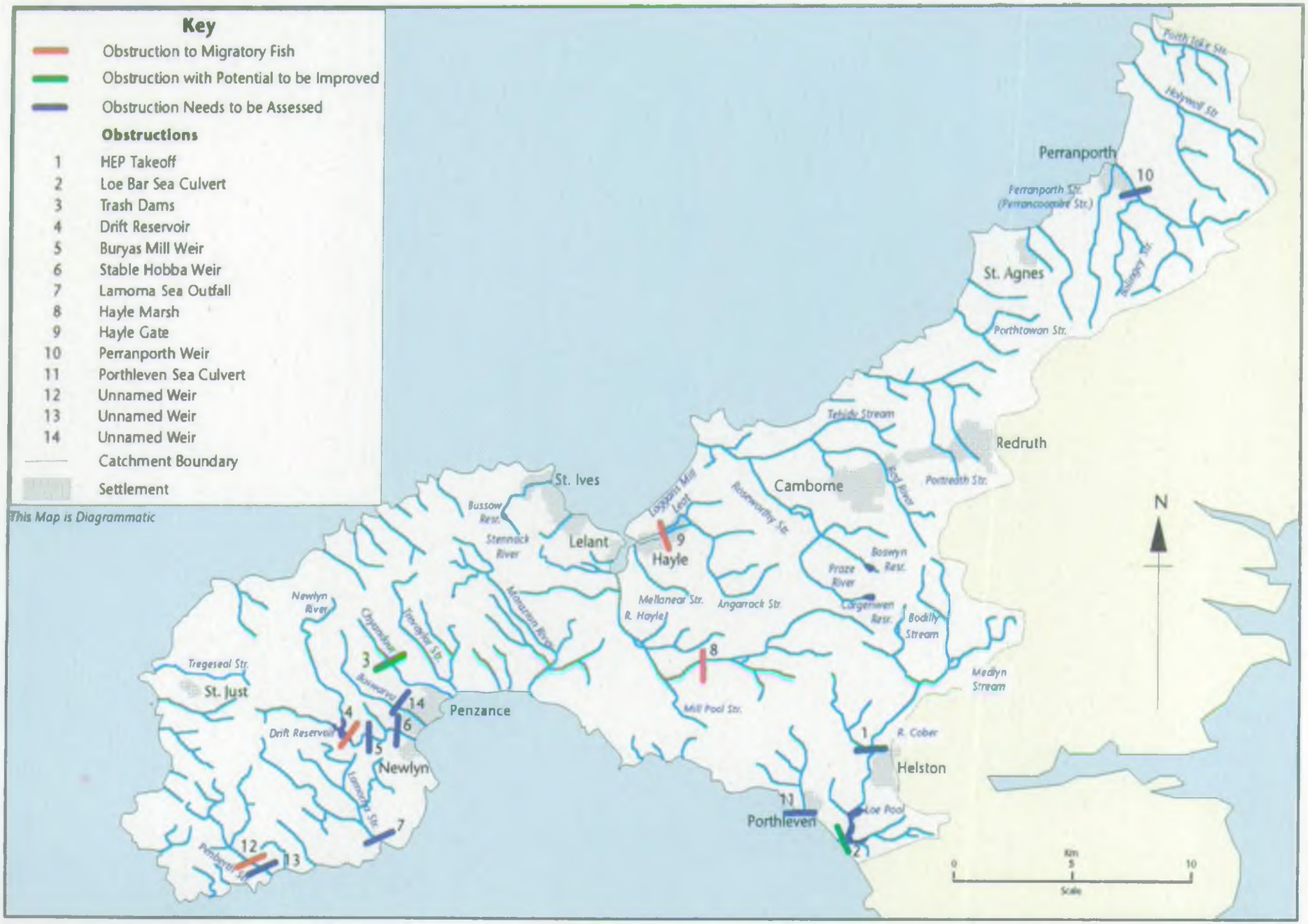
Trends in abundance

No evidence of trends in abundance can be determined from the small data set of sea trout scales currently available. The four sea trout caught and aged within the plan area were all school peal.

Introductions and escapees

Freshwater fish surveys have revealed rudd in the River Cober and rainbow trout in the River Hayle and Crowlas, Trevaylor, Newlyn, Roseworthy Streams. A single rainbow trout fry was found on the Newlyn Stream upstream of Drift Reservoir.

Map 11 Obstructions to Fish



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West Cornwall Local Environment Agency Plan
Environment Agency

Obstructions to migratory fish

Obstructions that are impassable or partially impassable, both natural and man-made are shown in Table 8 and discussed in Issue 3.

Table 8: Obstructions impassable to fish

River	Obstruction name	Type	Passable/ impassable
River Cober	Below Coverack Bridges	Hydro-electric power takeoff	Assessment of level of obstruction and any likely improvements has shown that screens are required.
River Cober	Loe Bar	Sea culvert	Currently impassable. Needs assessment.
Chyandour Stream	Un named	Trash dams	Can be improved
Newlyn River	Drift Reservoir	Impoundment dam	Impassable
Newlyn River	Buryas Mill	Weir	Passable except in low flows. Assessment of level of obstruction and any likely improvements needed
Newlyn River	Stable Hobba	Weir	Passable except in low flows. Assessment of level of obstruction and any likely improvements needed
Lamorna Stream	Sea outfall	Extensive boulders	Assessment of level of obstruction and any likely improvements needed
River Hayle	Hayle Marsh	Marshland	Impassable except to eels
Angarrack Stream	Hayle Gate	Mechanical flood defence gate	Impassable when closed
Bolingey River		Fish pass	Assessment of level of obstruction and any likely improvements needed
Methleigh Stream	Porthleven	Sea culvert	Assessment of level of obstruction and any likely improvements needed
Penberth Stream	Un named	Weir	Assessment of level of obstruction and any likely improvements needed
Penberth Stream	Un named	Weir	Assessment of level of obstruction and any likely improvements needed
Boswarva Stream	Un named	Weir	Assessment of level of obstruction and any likely improvements needed

Legislative Controls

It is a requirement of Section 25 of the Salmon and Freshwater Fisheries Act (1975) that in order to fish for salmon, trout (including migratory trout), freshwater fish and eels in any waters in the South West Region, anglers need an Environment Agency national rod licence* and permission from the owner of the fishery.

* = Except in waters where a General Licence is in.force - please check with the owner of the fishery in advance.

* = There is also an excusal on licensing for rod and line eel fishing in tidal waters.

There are many other legal requirements relating to fisheries matters. Information is available from the Fisheries Department, Environment Agency, Cornwall Area Office, Victoria Square, Bodmin.

Byelaws

The area's fisheries are protected by many byelaws. A full list is available from the Fisheries Department. The rod fishing open seasons i.e. the period when it is permitted to fish in the river are shown in Table 9. Within enclosed still waters there is no close season for coarse fish, eel or rainbow trout unless one is imposed by clubs or fishery owners.

Table 9 : Rod fishing open seasons

Sea Trout	3 March to 30 September
Brown Trout	15 March to 30 September
Rainbow Trout	15 March to 30 September
Coarse fish/ Eels	16 June to 14 March

The Environment Act 1995 allows fisheries regulators to make byelaws to control fisheries for environmental reasons as well as for fisheries management. The duty to have regard to the conservation of marine flora and fauna from the Sea Fisheries (Wildlife Conservation) Act 1992 remains, thus conservation implications must be considered for fisheries management byelaws as well as for environmental ones.

Habitat improvements

Limited trash dam clearance has been carried out at a number of locations throughout the catchment. Ongoing assessment is carried out by routine electric fishing surveys and observation.

Water quality

EC Freshwater Fish Directive 78/659/EEC

The Freshwater Fish Directive 'on the quality of waters needing protection or improvement in order to support fish life' (78/659/EEC) ensures that water quality in designated stretches of water is suitable for supporting certain types of fish.

This Directive contains two sets of quality standards. One set of standards protects cyprinid or coarse fish populations. The other set of standards that are stricter, protects salmonid fish populations for example, salmon and trout.

We are responsible for monitoring the water quality of identified fisheries and reporting the results to the DoE who decide whether the standards in the Directive have been met. Where the requirements of this Directive are not met, we are responsible for identifying sources of pollution and making sure that improvements are made.

Where EC Directives standards, particularly those for metals and/or pH, are not met due to natural causes, we can recommend a derogation, that is these standards will not apply. The imperative standard for zinc was exceeded in the Angarrack Stream in 1993. A derogation for zinc applies to this stretch. A derogation for zinc also applies at Carnegwen Reservoir, though this site did not exceed the imperative standard for zinc between 1993 and 1995.

Bussow Reservoir did not comply with the imperative standard for pH in 1995. The high pH was associated with an early summer algal bloom and prevailing drought low flow conditions.

Map 4 shows the designated stretches.

Estuarine fisheries

The Ministry of Agriculture, Fisheries and Food (MAFF) with the Fisheries Departments for Wales, Scotland and Northern Ireland has responsibility for the conservation of fish stocks and the management of marine fisheries in UK/British waters. The main management tool is the EC Common Fisheries Policy, which applies to fish stocks in coastal as well as offshore waters and endeavours to maintain them as a renewable resource.

Sea fisheries in the estuarine and coastal waters of England and Wales, out to 6 miles, are regulated by Sea Fisheries Committees (SFC) established under the Sea Fisheries Regulation Act 1966 and, in the case of migratory salmonid stocks by the Environment Agency. The Cornwall Sea Fisheries Committee (CSFC) regulates sea fisheries within the coastal areas of this document. All byelaws made by these bodies have to be confirmed by the appropriate Minister. SFCs, in common with other fisheries managers in the UK (including the Environment Agency), may regulate for strict fisheries management purposes as well as for the more general protection of the marine environment.

The Environment Agency is the Sea Fisheries Authority in this plan area above the mean low water mark. This applies to all rivers and streams entering the sea within the LEAP area.

There are no bass nursery areas in the plan area. There have been no official bass surveys carried out in this area although private individuals carry out surveys to provide scientific information on the status of bass stocks.

The Sea Fisheries Authority districts are divided into two areas. The Fowey district encompasses all areas to the south of a line drawn due west from Peal Point (near Land's End). The Camel district encompasses all areas within the plan to the north of this line. Sea fisheries byelaws differ in some respects between the two areas.

We restrict the use of nets with the Salmon and Freshwater Fisheries Act 1975 (SFFA 1975) Section 6(1) as amended by the Salmon Act 1986 (SA 1986) Section 33. These sections restrict the used of fixed engines. Section 27 of SFFA 1975 also prohibits the use of any net to fish for salmon, sea trout or freshwater fish unless licensed. The Agency would not licence a net in these areas.

Coastal legislation

Restricted Areas for surface fixed nets exist to protect salmonids migrating around the coast prior to entering estuaries and rivers. These prohibit the use of any net that is less than 3 metres below the surface at any state of the tide. Restricted areas are shown on Map 10: Fisheries. These regulations are actively policed by the Environment Agency.

Agriculture

Over 80% of the land in England and Wales is farm land. The way this land is used affects the quality of the environment. We are concerned about the pollution of surface and groundwaters from animal wastes, fertilizers and pesticides. Soil erosion, land drainage and stock damage to riverbanks can also be a problem. A sustainable farming system that conserves the soil and minimises and recycles wastes will reduce the risk of damage to the environment.

Our Objectives

- to encourage agricultural practices that improve the water environment
- to protect the environment from farming activities.

The Role of the Environment Agency

There is only a limited range of things we can do to influence the way farmers use land. Other agencies such as MAFF can encourage sensitive farming practices using financial incentives. However we can control and prevent pollution in the same way as we do with any other industry.

We have duties and powers to:

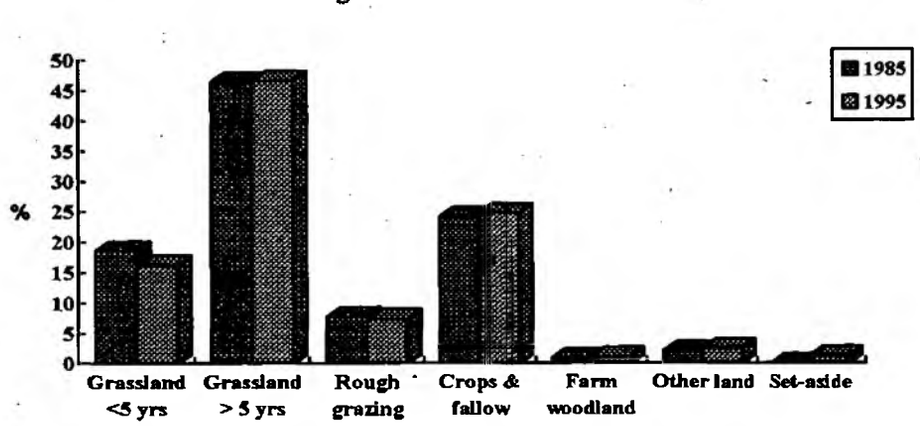
- prevent and control pollution through the enforcement of the Control of Pollution (Silage, Slurry & Agricultural Fuel Oil) Regulations 1991
- deal with pollution incidents
- issue consents to discharge from farms. However we encourage farmers to dispose of farm wastes to land rather than discharging treated waste directly to rivers
- regulate the abstraction of most water for use on farms
- control certain structures in, over or under watercourses through land drainage consents.

Local Perspective

Agricultural land covers approximately 46,400 hectares of the catchment, just over 84% of the total area. The majority of the agricultural land, over 70%, is grass (see Figure 1). The composition of grass types are reflected in all the main river subcatchments. (Source: MAFF, Land Use Planning Unit). Forestry and woodland cover in the catchment is very small. Horticultural crops are important and have increased substantially over the past 10 years.

The climate of this area is mild and moist compared with the rest of the UK. It is a early growing area which also has a long growing season lasting well into the winter months in most years and double and sometimes treble cropping is possible. The area has a high annual rainfall but there is a seasonal need for irrigation, especially for potatoes.

Figure 1: Agricultural Land Use



Farm types

Livestock farming based on grassland is the dominant activity in the plan area, with dairy farms being the major enterprise.

The number of dairy farms has fallen by over 30% whilst cattle and sheep holdings have increased by over 50%. The dairy herd in the catchment has fallen by 23% over ten years to about 18,350 cows but there has been a dramatic increase of 94% of beef cattle. An increase of nearly 10% has been seen in numbers of sheep. The decline in dairy farming is a function of many factors: in addition to milk quotas, there has been an increased level of concern about pollution and a difficult economic climate. Such changes may reduce the use of fertilizers and general pollution load from dairy farming, however a reduction in the total number of dairy units is offset by remaining units getting larger.

Horticultural holdings have increased by nearly 60% reflecting the fact that the West of Cornwall is a suitable area for the growing of such crops. There has been a large drop in top fruit and considerable increases in hardy nursery stock, bulbs and flowers grown in the open. There is a substantial interest in bulb growing at the present time. This can lead to impacts through increased applications for water abstraction and diffuse inputs of chemicals, fertilizers, pesticides and herbicides. Pesticides have been recorded in the catchment and are discussed in Issue 6. The growing of potatoes and brassicas can also lead to increased requirement for irrigation, which is also discussed in Issue 6.

Long term trends

Long term trends indicate that the movement to two types of holding, part time farms and large specialist units, is likely to continue. The smaller holdings are becoming part-time and interest in diversification schemes will increase to maintain employment and incomes. Reforms in the Common Agricultural Policy and milk marketing are likely to exacerbate these trends, in the short term benefits favouring livestock farmers.

Farm diversification can have various impacts on the environment and concerns for us, for example, pond creation. Increased acreage under maize may have implications for pollution loading as this is a crop which requires large quantities of organic manure. Once harvested the soil is often left exposed through the autumn and winter which can result in significant erosion and soil loss from the land. We have produced a leaflet on the environmental considerations of growing maize which is freely available on request from Environment Agency offices.

Grants for installing or improving farm waste facilities have been removed which leaves the full cost of further improvements with farmers. Limited non-chargeable independent pollution advice continues to be available from ADAS and we urge farmers to take advantage of this service. Table 10 shows a continuing decline in the numbers and severity of pollution incidents relating to farming.

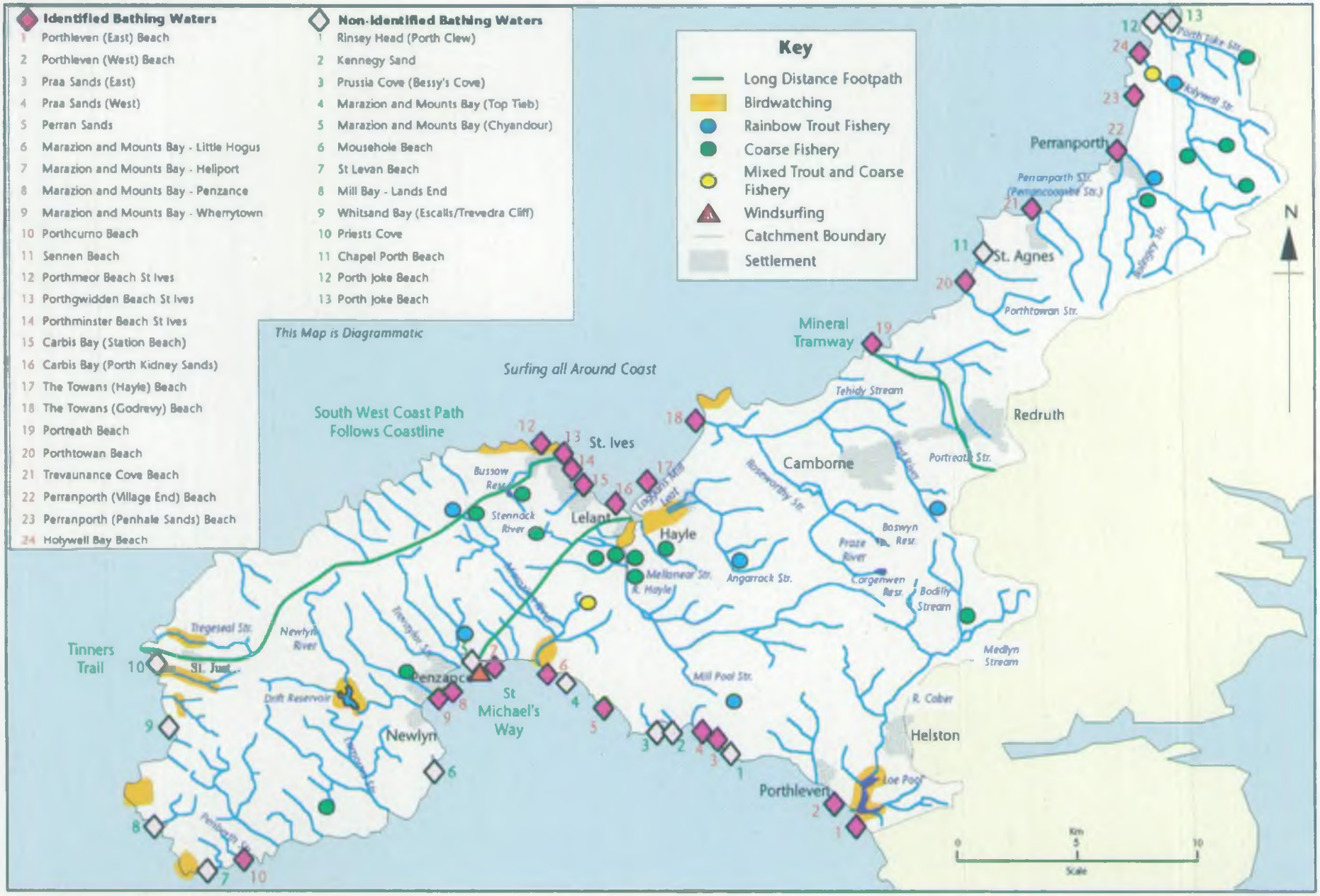
Table 10: Pollution Incidents arising from agricultural activities 1994 to 1996

Pollution Incidents	Major	Significant	Minor
1994	0	3	32
1995	0	4	35
1996	0	1	23

West Penwith Environmentally Sensitive Area (ESA)

The West Penwith ESA aims to protect and where possible, restore the land character through the maintenance and adoption of compatible systems of dairy and livestock farming. Payments are made to landowners by MAFF to manage land in an environmentally sensitive way. The ESA covers 7,176 ha of the northern part of the Land's End peninsula between St Ives and Pendeen. Intensification of farming methods was threatening the traditionally managed grassland and encouraging reclamation of moorland. Four years after the introduction of the scheme 93% of the eligible area is under agreement. This high take up has helped to maintain the historic value and landscape quality of the area and its conservation value. A further 2,360 ha was included in the scheme from April 1 1997.

Map 12 Recreation



Information correct as of July 1996

West Cornwall Local Environment Agency Plan
Environment Agency

Recreation and Amenity

Millions of people spend their spare time enjoying our rivers and coasts. Where we can we try to improve facilities for these people but we must always safeguard the environment from the damage visitor pressure might cause.

Our Objective

We maintain rivers so that they can sustain angling at an appropriate level and seek to develop the amenity and recreational potential of inland and coastal waters and associated land.

The Role of the Environment Agency

We have duties and powers to:

- maintain, improve and develop fisheries allowing for a sustainable harvest of fish by anglers where appropriate
- raise money for fisheries management by issuing rod licences for freshwater angling
- enforce regulations and byelaws to prevent damage to fish stocks
- protect and maintain access to beautiful areas or special sites of interest
- make sure that land and water under our control is made available for recreation and at all times provide for the needs of the chronically sick or disabled
- charge for facilities that we provide for recreation
- make byelaws to regulate recreation.

Local Perspective

Much of this catchment has a high level of water-related recreational use, focused strongly on the coast. We are not aware of any recent comprehensive report on the recreational use of the area, but the following uses are certainly apparent:

Bathing

See Bathing Waters, page 68.

Coastal watersports

Activities such as surfing, snorkelling, water skiing, diving and windsurfing take place along much of the coast. No figures of the number of people taking part in such activities exist, and many people carry out their sport in an informal way.

Surfing takes place at suitable locations all along the coast.

Boating and sailing

This section of coast plays host to the whole range of maritime sailing, from small dinghy sailing right up to major international yacht races. During the summer the bays are alive with different types of sail, and through the winter significant areas are taken up for boat storage and maintenance.

In recent years gig racing has developed as a popular competitive sport in the summer. Most sizeable towns and villages on the coast have a boat or two, and the fleet is still increasing.

Angling

The rivers in the area support game fishing for brown trout. Eel fishing also takes place on many rivers. Fishing for a wide variety of marine species is a popular activity along the coast. Inland a number of coarse and trout fisheries exist. There are 18 coarse, 6 trout fishing and 1 mixed commercial lakes or ponds in the plan area.

Public paths

The very popular South West Coastal Path follows the coast across this whole area. In places heavy use is putting pressure on the fabric of the path and protective measures are needed. The philosophy

of trying to encourage people into the wider countryside is being developed, but undoubtedly the coast will remain a strong magnet. Three themed footpaths have been developed in the catchment (see Map 12).

Birdwatching

This activity takes place across the whole catchment, but is practically impossible to quantify. A number of sites are particularly popular however, such as the Hayle Estuary, Loe Pool, Marazion Marsh, Drift Reservoir and the west Cornwall valleys from Tregeseal to Porthgwarra.

Bathing Waters

The beaches within the plan area are a valuable recreational and economic asset. We monitor and report on the water quality at the most heavily used beaches. The results of our monitoring show where we think improvements need to be made and are used in deciding expenditure by water companies and private dischargers.

EC Bathing Waters Directive (76/160/EEC)

The Bathing Waters Directive 'concerning the quality of bathing water' (76/160/EEC) protects the environment and the health of bathers using identified bathing waters by reducing pollution entering identified bathing areas. The Directive contains standards for nineteen microbiological, physical and chemical parameters to assess bathing water quality. Compliance is assessed mainly by testing against standards for faecal indicator bacteria.

We are responsible for monitoring the quality of identified, popular bathing waters and providing the results to DoE who decide whether the standards in the Directive have been met. Where identified bathing waters fail to meet the Directive, we are responsible for identifying sources of pollution that are causing failures, and making sure that improvements are made.

There are 24 EC Bathing Waters in this catchment. At 15 of the 24 sites we monitor freshwater inputs to the bathing waters. We carry out this additional monitoring to help clarify causes of non compliance where they are not known.

These Bathing Waters are shown in Table 11 along with the year of non-compliance, probable cause and any improvements that have occurred or are planned. For a more detailed review of the causes of non-compliance see page 33.

Table 11 : Compliance against EC Bathing Water Directive as assessed by the Department of Environment

Compliance													
Name	1986	87	88	89	90	91	92	93	94	95	96	Probable Cause(s) of Failure	Improvements
Porthleven (East) Beach	F			No data - too dangerous to sample because of landslide								Porthleven Outfall	Porthleven scheme. Currently due for completion for 1997 Bathing Season
Porthleven (West) Beach	F	F	F		F	F		F	F	F	F	as above	as above
Praa Sands (East)													
Praa Sands (West)													
Perran Sands						F						SWW discharge at Perranurthnoe, 300m from the monitoring point	Scheme planned and designed
Marazion & Mounts Bay - Little Hogus	F	F						F					Penzance/St Ives scheme southern area was completed for 1995 Bathing Season
Marazion & Mounts Bay - Heliport	F		F	F	F	F		F	F				as above
Marazion & Mounts Bay - Penzance	F	F	F	F	F	F		F	F				as above
Marazion & Mounts Bay - Wherrytown	F	F	F	F	F	F	F	F	F				as above
Porthcurno Beach													
Sennen Beach													
Porthmeor Beach, St Ives	F												Penzance/ St Ives scheme. St Ives sewerage completed for 1996 Bathing Season
Porthminster				F					F				as above
Porthgwidden Beach, St Ives	F		F	F	F	F		F	F	F			as above
Carbis Bay (Station Beach)													
Carbis Bay (Porth Kidney Sands)						F							Penzance/ St Ives AMP1 scheme. Completed for 1995 Bathing Season
The Towans (Hayle) Beach													
The Towans (Godrevy) Beach													
Portreath Beach													
Porthtowan Beach													
Trevaunance Cove Beach	F	F				F	F	F	F			Trevaunance Point Outfall	St Agnes scheme completed. We are requiring that SWW install ultraviolet treatment
Perranporth (Village End)		F				F							Perranporth scheme completed. We are negotiating further improvements with SWW
Perranporth (Penhale Sands)													
Holywell Bay Beach													

C - Compliance Not Determined F - Fail

Aquaculture

Here we consider the use of riverside beds or ponds to rear fish. Water used by fish farms is all returned to the river at some point downstream of the abstraction. Impacts arise due to the reduction in river flow in the bypassed reach and from the effluents in the returned water.

Our Objective

To protect rivers from the effects of fish farms.

The Role of the Environment Agency

We have duties and powers to:

- issue abstraction licences to protect the water environment and legal uses. We can put conditions on new licences to achieve this
- issue discharge consents to protect the river from pollution caused by fish food or chemicals used to control pests or diseases
- control the movement of some fish to prevent the spread of diseases. MAFF are responsible for registered fish farms
- ensure safe use of herbicides in accordance with MAFF and Agency Codes of Practice
- ensure that farmed fish cannot escape and compete with native species.

Local Perspective

There are six fish farms in the catchment.

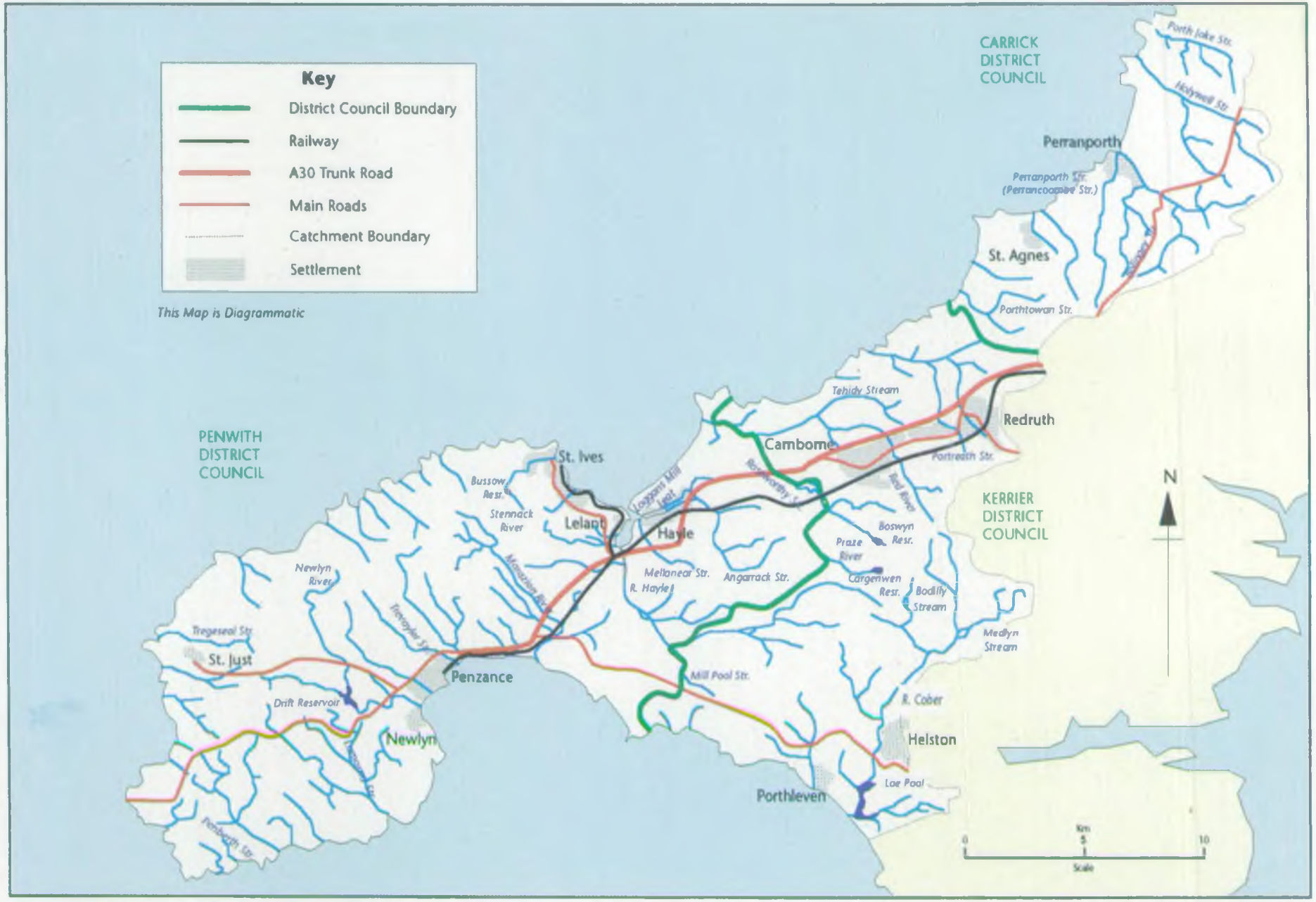
Authorisations of commercial fish farms in the area have been reviewed by a fish farm control group to ensure that fish farms had all relevant permissions for abstractions, discharges and weirs. Changes in licensing following the Water Act 1989[7] had given rise to anomalies that the Group has endeavoured to put right.

Licences of Entitlement (LoE) for the abstraction at Sweetwater Trout Farm and Blue Hills Trout Farm were issued by the NRA. Licences of Entitlement were granted under the Water Resources Act of 1989. The NRA were required by law to issue these types of licence on the basis of established use and could not impose conditions to protect the environment. Where such licences cause significant detrimental impacts on the water environment or downstream uses, the Environment Agency can negotiate agreement with holders of LoEs for a modification of the abstraction to moderate or prevent any impacts.

Table 12 : Fish farm abstractions and discharges

Fish farm	NGR	Abstraction Licence	Discharge Consent
Boscadjack Fisheries	SW 675 309	2,618 m^3/day	2,618 m^3/day
Sweetwater Trout Farm	SW 487 377	907 m^3/day	907 m^3/day
Blue Hills Fish Farm	SW 728 515	2,272 m^3/day	1550 m^3/day
Little Rosemorran	SW 472 320	(i)2,333 m^3/day (ii) 328 m^3/day (April-June)	144 m^3/day
Bolenowe	SW 674 381	98.2 m^3/day	no discharge

Map 13 Built Environment



Information correct as of July 1996

West Cornwall Local Environment Agency Plan
Environment Agency

The Built and Developing Environment

Development is essential to the economic and social well-being of the community. However, its effects on the environment can be detrimental. We liaise with Local Planning Authorities and developers to ensure sympathetic development with the environment.

The Role of the Environment Agency

We have duties and powers to:

- Advise Local Planning Authorities on appropriate policies for the environment in local strategic plans.
- Advise Local Planning Authorities on the effects of specified types of development proposals.
- Regulate new development by authorising land drainage structures, waste storage, transfer and disposal, discharging of effluent and abstraction of water.

The Planning Liaison section of the Agency provides a single point of contact to ensure that all relevant issues relating to the environment are properly addressed by the planning system.

Planning Liaison represents the views and policies of the Environment Agency to a variety of customers, including Local Planning Authorities, Highway Authorities, developers and their Agents and others who have the potential to affect the environment.

Through planning legislation the Agency aims to protect and enhance the environment so as to make a positive contribution towards sustainable development. We are concerned with quality and quantity of development and its general appropriateness in a particular location with respect to our interests.

Sustainable development does not mean environmental protection at all costs. It involves finding ways to encourage environmentally compatible economic activity and discouraging or controlling environmentally damaging activities.

During the course of a year in an area of this size Planning Liaison would expect to evaluate over 2,000 planning applications. 10% would require internal circulation or specialist comment. In addition approximately 130 pre or post planning enquiries would be dealt with.

Local Perspective

Local land use and planning initiatives

The Agency is currently discussing issues with Cornwall County Council for the new Structure Plan, Waste Disposal Plan and Minerals Local Plan. We are also involved in the emerging Districts' Local Plans. The Environment Agency will seek to influence the allocation of land to ensure that adequate infrastructure exists prior to development and, furthermore, that development does not damage conservation interests or be at risk from, or result in, flooding. All local plans covering the catchment area have incorporated a number of policies for positively protecting the water environment as a result of early discussions with the former National Rivers Authority. Table 13 sets out a number of development proposals and our interest in them.

Table 13: Examples of recent/ongoing development proposals within the catchment in which the Agency has an interest

Location	Description	Environment Agency Involvement/Concerns
St Ives Parc-an-creet	Residential development	Conditions were put on planning permission to overcome flooding problem.
Lelant Saltings	Supermarket	Site adjacent to old landfill. Site investigation required.
Tuckingmill, Tolgarrick	Regeneration study	Agency is seeking environmental improvements without aggravating flooding and safe removal and disposal of contaminated soils.
Loggans Mill	Retail development	The Agency seeks conditions to prevent flooding.
Ponsanooth	Change of use from Cornwall County Council depot to travellers site	Agency concern over disposal of foul drainage.
Land's End Aerodrome	Firming of runways	Agency asked for an environmental assessment to ensure protection of conservation interests and to ensure that the surface water runoff will not cause contamination problems.
Trereife, Penzance	New University for Cornwall	There will be significant demands on the infrastructure, both in Penzance and on the road and rail links serving the site.

Transport and road schemes

The main-line London to Penzance railway runs through the catchment and there is a branch line to St Ives. Land's End Aerodrome and Penzance Heliport provide scheduled air services to the Scilly Isles. Newlyn is a major Cornish port in terms of volume of cargo handled. There are smaller ports at Hayle and Penzance.

The Agency is a statutory consultee to the Department of Transport for new trunk roads and advises County and District Councils on their own road schemes. The Agency are involved throughout the process, from route choice and design to construction.

Particular areas of concern from road developments are:

- pollution risks from spillage of oil and chemicals
- flood risk from surface water runoff
- damage to the amenity and wildlife value of rivers and wetland
- possible pollution and flood risk during construction
- effect on water resources through alteration or barriers to groundwater flow
- disposal of excavated soil and rock

The Agency has worked with the Highways Agencies on the design of new roads and during bridge repairs to provide for protected species such as bats, otters and dippers.

Industry

Fishing port - Newlyn

In addition to industrial estates in major towns a number of small industrial sites are scattered throughout the catchment. Assessment of risk to the water environment by these sites is undertaken by the Environment Agency during its winter Task Force operations.

Tourism

Most of the area is heavily visited and tourism is an important part of the local economy. Seasonal population increases have implications for infrastructure and service provision.

Table 1.4: Development Restraints

Settlement	Reason
Camborne Barripper Penponds Rosewarne Treswithian Town	Storm sewage overflow at Reskadinnick surcharges prematurely, outside its consent conditions and causes pollution.
Goonbell	Unsatisfactory sewage outfall contributes to EC Bathing Water failure. Existing flooding will be exacerbated by any significant development which increases surface water runoff.
Hayle (Copperhouse)	Existing flooding in the catchment of the stream adjacent to Guildford Road will be exacerbated by any significant development which increases surface water runoff.
Helston	Current environmental effect caused by effluent discharge, any further increase in flow will cause deterioration of water quality in Loe Pool. Development limited to single plots or similar.
Perrancoombe Penwartha Coombe Perranporth	Existing flooding will be exacerbated by any significant development which increases surface water runoff.
Carnkie	Drains to Ponsanooth/Stithians STW where the discharge causes a deterioration in water quality and has contributed to the EC Freshwater Fish Directive failure.
Praa Sands	At present this settlement has no mains drainage system.
St Agnes	Existing flooding will be exacerbated by any significant development which increases surface water runoff.
St Buryan	Further development may overload the exisiting SWW sewerage and/or sewage treatment works.
St Ives - Stennack River	Existing flooding will be exacerbated by any significant development which increases surface water runoff.
Troon	Storm sewage overflow causes pollution.

Flood Defence

River flows vary widely and are affected by the weather, geology and land use. We manage flood risk from rivers and the sea using Flood Defence and Land Drainage powers.

Today we manage flood defences and land drainage to balance the needs of all river users with the needs of the environment.

Our Objectives

To provide effective defence for people and property against flooding from rivers and the sea; and to provide adequate arrangements for flood forecasting and warning.

The Role of the Environment Agency

Our statutory flood defence committees make decisions on flood defence. All rivers are classified as either 'main rivers' or 'ordinary watercourses' (sometimes referred to as 'non-main rivers'). We control work (through land drainage consents) and supervise flood defence matters on all watercourses, but have special powers to carry out work on main rivers and sea defences. Local authorities have the same special powers for flood defence on ordinary watercourses and can also promote sea defence schemes.

We have duties and powers to:

- control certain works and advise planning authorities on flood defence
- maintain and improve the flood defence system which is under our control
- provide flood forecasts and warnings so that risk to life and damage to property is reduced during river and sea floods.

Local Perspective

In general all the river systems in this catchment give a rapid response to heavy rainfall. Few of the rivers in this catchment are still in their natural physical state, having been altered during past human activity (largely mining) and more recently through flood alleviation schemes. There are 34.38 kms of designated main river. Map 6 shows main river and existing and proposed flood defence schemes.

Flooding

In recent years much has been done to protect Helston, Hayle and Perranporth, see Table 15.

Historic records show that there has been minor flooding in a number of other locations around the catchment the bulk of which affect highways or a very few properties. Most occur on ordinary watercourses where the local authorities have powers to carry out work.

Flood problems will be reviewed as part of the Section 105 survey - Development and Flood Risk. Indicative floodplain information will be available for all main river in the catchment by Summer 1997. Where significant numbers of properties are shown to be at risk further work will be undertaken to see if an improvement scheme may be justified on cost benefit grounds. If justification is indicated then the scheme is considered for placement on the Long Term Needs Programme for future work.

Table 15 : Flood defence structures

River	Location	Protection for
Cober	Helston	Numerous properties in the St Johns area and Porthleven Road. The site of many flooding events over the past century, the last major flood event from the River Cober being in January 1988. Following this a comprehensive flood alleviation scheme has been undertaken to improve the Cober point of discharge to the sea through the Loe Bar Tunnel. Extensive channel improvements have been made from the Loe Pool through the Loe Valley and St Johns area of Helston. Flooding in June 1993 was caused mainly by lack of capacity in the town leat.
Mellanear Stream	Hayle	The Mellanear Stream was mained following a period of regular fluvial and tidal flooding in the Foundry Square area in the 1980s. The nineteenth century culvert through Foundry Hill has been replaced with a pressure pipeline capable of discharging flows from the Mellanear Stream into the harbour during all states of the tide. Improvements were also carried out to the Mellanear Stream channel upstream of Millpond Gardens and new screening arrangements were provided. These works were completed in 1990.
Hayle	St Erth to Godolphin	The Hayle river channel between the Causeway and Godolphin was substantially improved during the 1960s. by the former Cornwall River Authority.
Angarrack Stream/ Copperhouse Pool Tidal Gate	Angarrack/ Hayle	The area around the Copperhouse Pool and Penmore is protected from tidal flooding by the tidal gate constructed across East Quay in 1984. A comprehensive flood protection scheme was also undertaken through Penmore to a point upstream of Angarrack. This included a bypass pipeline through Angarrack to relieve flooding in the village.
Chyandour Stream		A short length of main river has been improved beneath the link roads to Penzance.
Newlyn River	Newlyn	Rock armour protecting the mouth to Newlyn River.
Bolingey	Perranporth	Extensive channel improvements were made to the Bolingey River in the early 1980s. The scheme included a new flood channel through Bolingey.

Regulation

Several of the towns and villages in this area have benefited from flood alleviation schemes built by our predecessors or local authorities which have alleviated flooding and meant we have not raised objections on flood defence grounds to limited development higher up the catchment.

Proposals to develop in certain catchments give us cause for concern and often results in us recommending refusal of planning permission because of the extra runoff the development will add to the watercourse. As examples, the potential for flooding at Perranporth from the Perrancoombe Stream and St Ives from the Stennack Stream mean we object to development in the catchments upstream if it will aggravate the flooding problems. There are also problems at Heamoor, Penzance; Praze-an-Beeble, Helston and several other places.

The area is predominantly rural but the expansion of existing towns and villages and individual developments could increase the flood risk in some cases to an unacceptable level if the watercourse that receives the runoff has insufficient capacity to cope with the extra flow. Our aim is to identify these problems before they occur and either object to the development or request that compensation works are carried out in advance of the development.

Most development proposals in a watercourse such as culverting, bridging, sewer outfalls etc. require the formal consent of the Agency under the Land Drainage or Water Resources Acts.

Maintenance

We are currently developing a Flood Defence Management Manual. This will bring together information relating to the management of flood defences, addressing differences between targets and actual standards of service. The manual is expected to be in place in 1997.

At present the maintenance work to mained watercourses falls into the following five categories:

- Routine maintenance on flood schemes consisting of grass cutting, vegetation trimming, tree management, servicing flap values and clearing weed screens.
- Infrequent dredging or shoal removal, carried out every 2-10 years depending on need. Generally where flood schemes are located.
- Infrequent repairs and minor enhancements to flood schemes .
- Clearance of fallen trees and debris dams in main rivers anywhere within catchment where likely to cause blockage or flooding nuisance.
- Infrequent clearance work where necessary, approximately every 10 years along watercourses to avoid loss of design flood capacity and reduce risk of trees being washed into rivers and causing debris dams, particularly at river crossings during flood events.

The annual cost of maintenance varies depending on need each year, generally it is of the order of £150,000. Annual conservation liaison meetings are held to outline our maintenance programme to external conservation bodies. Each year within this programme some conservation enhancements and recreational improvements are carried out.

The main elements of work detailed in the categories above are included within informal contracts known as Service Level Agreements. Anyone who has a specific interest regarding such work can make a formal request to the Agency to review the maps within these documents.

Standards of Service for Maintenance

A system was developed by the Agency to assess the standard of service needed for Flood Defence maintenance. The system uses the term 'House Equivalents' (HEs) to equate the value of all types of land for different land use features. This methodology is contained in the Flood Defence Management Manual.

The system splits the river into reaches and defines typical land use on either side of the river. It then uses a combination of historic flood data and analysed flood data to determine the number of HEs affected per km per year. The higher the score the greater the need for maintenance or a capital scheme.

A review has shown that current levels of maintenance along river stretches are appropriate.

Improvements

On sections of 'main river' we can build new flood defences if the benefits exceed the costs. Nowadays we usually only build new defences to protect built up areas from flooding. All schemes must be technically, economically and environmentally sound. We undertake a programme of capital works shown on our Medium Term Plan which is derived from long term flood defence needs.

Different types of land and property need different levels of protection. We use indicative standards, based on the nature of the land use to design schemes. Once a problem is identified consideration will be given to carrying out improvements. The benefit of such improvements should generally exceed the cost of the work. In deciding whether a scheme is justifiable both environmental and economic benefits are considered.

Within the plan area much of the required flood defence work has been undertaken and only the improvements listed below are planned. However, sea level rise might require a review of this position.

Flood defence schemes are planned for a number of locations in the catchment, see Table 16.

Table 16: Flood Defence Improvements

River	Location	Protection for
Methleigh Stream	Porthleven	The Methleigh Bottoms area suffered a major flood in June 1993. Following this event the Methleigh Stream was designated main river and a scheme is currently planned in the Medium Term Capital Programme. Many minor improvements have been carried out prior to the forthcoming flood defence scheme. A scheme is presently planned in the Medium Term Plan for 1998/99.
River Hayle	Hayle Estuary	In Hayle, replacement of the existing timber tidal flaps is planned with construction of a new tidal barrier structure to be sited immediately inland of the Hayle Causeway. This is currently planned for completion in 1999/2000.
Portreath Stream	Portreath	The stream passes through the village of Portreath and up to 150 properties are at risk of flooding due to the inadequate channel capacity and restrictions. This is currently planned for construction in 2000/2001
Perrancoombe Stream	Perranporth	This watercourse was mained in 1994 following many occurences of flooding in recent years. Many minor improvements have been carried out prior to the forthcoming flood defence scheme. A scheme is planned in the Medium Term Plan for 1997/98.

Shoreline Management Plans

The aims in producing shoreline management plans are to improve understanding of coastal processes, predict the likely future evolution of the coast, identify assets at risk (including conservation and recreation) and improve consultation between organisations with an interest in the shoreline. The plans will consider options and detail preferred approaches, recommend monitoring programmes and identify environmental enhancements. Each study will be carried out in the following stages:

- Stage 1 Scoping Study
- Stage 2 Detailed study of Coastal Processes and evaluation of strategic options
- Stage 3 Adoption of plan

The Lizard to Land's End plan has now completed stage 2, with reports[8] raising a number of issues having been presented to the steering group. Issues will be promoted through the established mechanisms of Local Plans and the local planning system. Stage 3 is on hold pending the development of a Geographical Information System. The Land's End to Hartland Point plan has completed Stage 1.

Flood Warning

Absolute flood protection is not possible. Because of this we need to warn people when there is a danger of flooding. We took over the role of warning the public and other organisations of likely flooding from the Devon and Cornwall Police on 1 September 1996. We have developed communication systems aimed at providing flood warnings to those members of the public most at risk. We have a strategy which details how the procedures operate and which we use to improve our emergency response. Where possible we aim to issue a warning at least 2 hours in advance of flooding.

Rainfall information is available from the Meteorological Office and Agency rain-gauges and the passage of flood flows can be monitored by the telemetry in gauging stations shown on Map 6.

Flood warnings are issued for the rivers shown in Table 17.

Table 17 : Flood warning

River	Location	Warnings issued
Angarrack Stream	Angarrack to Hayle	Amber, Red
Cober	Wendron to Loe Pool At Helston	Yellow, Amber, Red Red
Hayle	Relubbus to St Erth	Yellow, Amber, Red
Perrancombe Stream	At Perranporth	Amber, Red
Tidal	South Cornwall Coast North Cornwall Coast	Yellow, Amber, Red Yellow, Amber, Red

Warnings are issued by direct contact and via local radio. Recorded information on current flood warnings is also provided. Leaflets are available from Agency offices which fully explain the flood warning service[9].

North and South Coast Tidal warnings are issued when conditions are expected to cause problems; local action is taken on receipt of these warnings. Information on tide levels is available from gauges at Devonport Dockyard, Sutton Harbour, Truro Tidal Barrier, Newlyn, Hayle and Padstow.

A study into the level of Service for Flood Warning is currently being carried out to determine whether the required standard is being met: it is expected to be completed in this study area by the end of 1998. The results will identify additions and other changes to the Flood Warning network.

Flood Emergency Response

We aim to prepare and keep up-to-date a plan for responding to flooding and operating flood defence structures within specified time limits, depending on location and potential impacts. During a flood event our prime role is to ensure that the flood capacity of each river is maximised. This is achieved by actioning response levels A and B, defined as follows:

A Checking operational flood defence systems are working properly. This includes operating barriers, closure of flood gates, positioning stop logs, ensuring pumping stations are operating, adjusting sluice gates/ penstocks etc. ensuring flood storage areas are utilised properly.

B Check river reaches to avoid obstruction of watercourses and monitor river levels. This includes clearance of trash screens, inspecting sensitive locations where blockages may occur, checking flood defences to ensure they are functioning properly, reporting on river levels to assist with flood warning.

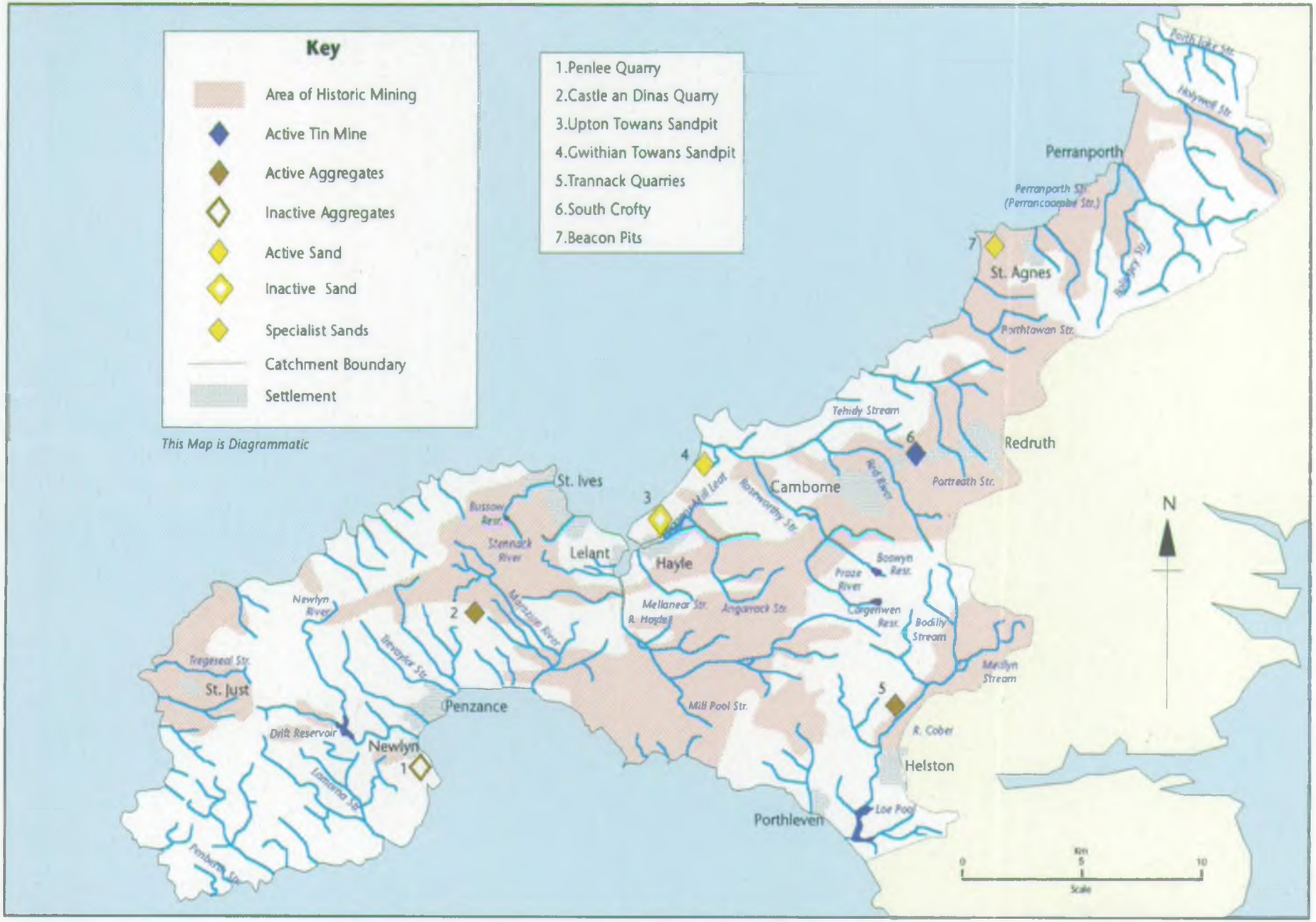
Operational response to Levels A and B in this catchment would include the following:

A Operation of tidal gates at Copperhouse Pool, Hayle. Checks on the control structures at Loe Bar, Mellanear Stream and Angarrack.

B Clearance of screens in Loe Bar, Porthleven, Millpond Gardens in Hayle and Angarrack. Checks on major river crossings throughout the catchment and inspection of flood defence schemes where warnings are in force, particularly on the River Cober in Helston and the Perrancoombe Stream in Perranporth.

The appropriate action to take during a flood event is decided by the Area Base Controller who uses up-to-date telemetry information, radar data, experience and judgement of need considering the situation across the area and the available resources. The Base Controller's handbook contains specific information about flood defence schemes and sensitive locations in each catchment; this handbook is regularly updated.

Map 14 Mineral Workings



Information correct as of July 1996

West Cornwall Local Environment Agency Plan
Environment Agency

Mining and Quarrying

The Environment Agency recognises the economic importance of quarrying, mining, gravel and mineral extraction to the region, however, exploration and extraction can significantly affect surface and groundwaters locally and across catchments.

Abandonment of mines and after use of quarries may also pose threats to the water environment.

Our Objectives

To minimise the damage that mineral extraction can do to water purity and to reserves of water held in the ground. Where possible we will steer mining and quarrying operations away from important aquifers.

The Role of the Environment Agency

We have duties and powers to:

- control the quality of water discharged from (active) mineral workings
- prosecute offenders if they cause pollution
- issue Conservation Notices where mining/quarrying activities could have a negative impact on water resources.

The EC Dangerous Substances is relevant to mining and quarrying in the plan area. For further detail see page 98.

Local Perspective

There are approximately 700 mines identified in the catchment. Historically, the most important mining area was the Camborne-Redruth area around Carn Brea, which was one of the most extensively mined areas in the South West. The other important mining area was the Land's End Granite, in particular around St Just and Pendeen Watch.

Active mineral workings

Cornwall County Council is the mineral planning authority for the plan area. We work with the planning authorities to obtain better standards and working practices and advise them on the effects that proposals for new quarries and workings will have on the environment. We recognise the economic importance of quarrying and mineral extraction to the area, however, exploration and extraction can significantly affect surface and groundwaters locally and across river catchments.

Tin mining

South Crofty, the last working tin mine in Cornwall, is situated at Pool. At present South Crofty is operating to a depth of more than 800m below the surface. The ore is currently processed at the Wheal Jane mill and the tailings disposed of in the Clemmows Valley Tailings Dam. The dam will have reached capacity by about 2001 and the mining company has indicated the intention to relocate the mill to South Crofty with disposal of the tailings within the mine itself. The consented discharges of drainage from the mine make up a significant proportion of the flow in the Red River. The long term management and quality of flows is therefore of great importance.

Following our experience of mine closure at Wheal Jane we have undertaken an exercise to assess the implications of any mine closure and possible options for action.

Silica sand and specialist clays

A small deposit of high quality silica sand is situated at Beacon Pits near St Agnes. A rare deposit of clays is also extracted from Beacon Pits. There are also two sandpits near Hayle, one active and one intermittently working.

Stone quarries

There are two active quarries in the catchment (aggregates and dimension stone) and an inactive stone quarry at Penlee.

Historic mining activity

The NRA South Western Region completed the 'Mines Database' project in 1995, set up to compile a systematic database on mines, adits and associated infrastructure. It is an attempt to collate information on the nature and drainage of specific workings. This should help the Environment Agency be more pro-active and forward plan for potential impacts on the water environment as surveying of the internal workings of old mines is impracticable.

Information has been gathered largely as a desktop exercise. Given the extent and historic nature of mining in the catchment, work to date cannot be considered totally comprehensive or accurate, but rather as a first step. Further development of the project could result in 'ground truthing' and adding to existing data. Responsibility for the physical dangers posed by shafts and adits lies with the landowner, however, where there is public access and a perceived threat to public health the District council may intervene.

Mining impact on the catchment

The area is honeycombed with old shafts and adits. The presence of underground mine workings and drainage adits has a significantly altered the local hydrology, concentrating groundwater flows along drainage adits, producing major discharge points. Any collapse or blockage within the mine system may alter flow paths, discharge points and quality of water. Surface waters have been altered by mining activities through many centuries, for example, the Red River runs through an engineered embankment higher than the surrounding floodplain.

The shaft caps and internal mine structures are now reaching the end of their useful life and collapses have occurred. The exact locations of many of the old shafts, adits and trial workings are not known. Parts of the catchment that have been home to historic mining activity are identified as areas of Unstable (or potentially unstable) Land where any proposed development is subject to a Mining Search.

High metal levels in water in the catchment drain from old mines via adits.

Most of the spoil heaps and adits have been abandoned for approximately 100 years and have stabilised and are re-vegetating. Proposals that involve disturbing the ground can have an adverse impact on water quality in the watercourses.

Disposal of mineral waste

Control over the disposal and tipping of mineral waste lies with the Mineral Planning Authority and is addressed through appropriate planning conditions being put upon mineral workings. The Environment Agency does not licence mineral waste tips under waste regulations.

Contaminated Land

Contaminated land is defined as any land which appears to a local authority to be in such a condition, because of the substances it contains, that water pollution or significant harm is being, or is likely to be caused. This interpretation is subject to guidance yet to be issued by the Secretary of State under the new provisions of the Environment Act (1995). Some sites will be designated by the same guidance as 'special sites' and these will become the responsibility of the Environment Agency. The process of identifying contaminated land across England and Wales is in its very early stages. The Department of the Environment has now consulted on its draft contaminated land. The likely date for implementation, subject to Parliamentary approval, is autumn 1997.

Derelict land is land which is considered to be so damaged by industrial or other developments that it is incapable of beneficial use without treatment. Such land includes for example, closed and disused waste tips or disused factory sites.

Dealing with contaminated land is complicated. Often a lot of work has to be done to understand the problem fully. Before any action is taken we have to be sure that what is recommended (which can be very costly) will have worthwhile and lasting benefits. Some of the Environment Agency's priorities are given in the NRA's 'Contaminated Land and the Water Environment Report'[10] where we also describe some things we can do to tackle the problem. Planning authorities also have powers that they can use.

Our Objective

To prevent the pollution of ground and surface water or environmental harm arising from contaminated land.

The Role of the Environment Agency

We can:

- comment on planning applications and give advice on the need for contaminated land assessment and design objectives for site remediation
- take enforcement action if contaminated land is causing pollution
- advise local authorities when they undertake surveys to identify contaminated land
- After the implementation of the new provisions we will be able to:
- ensure that 'special sites' are dealt with in the most appropriate manner; left undisturbed, targeted for redevelopment or clean up plans prepared
- once the process of identifying sites is well underway we have a duty to prepare and publish a report on the state of contaminated land from time to time, or if specifically requested to do so by the Secretary of State.

The Environment Act 1995 provides a new legal framework for dealing with problems of contaminated land. Part II of the 1995 Act imports a new Part IIA into the Environmental Protection Act 1990. The new provisions do not replace the current system for achieving the clean up of contaminated land through the planning process as part of normal development schemes.

Whilst the regulation of waste under Part II of the 1990 Act is the responsibility of the Environment Agency, primary responsibility for identifying and assessing contaminated land is placed on local authorities.

Local Perspective

The precise nature and full extent of contaminated land within any catchment is difficult to accurately define since the contamination of many sites is only realised when they are developed or when pollution

occurs. However, a clearer indication will be available when the local authorities have completed the surveys required under the new guidance. At this stage, priorities for remediation can be determined and remediation plans prepared.

Within the catchment, widespread contamination of ground may have occurred from the former operation of metalliferous mineworkings in the area. Elevated concentrations of heavy metals, compared to background levels, are often encountered in ground that has been previously backfilled with mining waste or spoil, or along river banks where long term accumulation of metals can occur. Leaching of heavy metals from such ground, or the interception of minewater drainage, may subsequently impact upon both local ground and surface water quality.

Assessment of impact and risks to local water interests may show any of the following mitigation measures to be necessary:

- minimise ground disturbance,
- avoid soakaways in mine waste materials,
- seal the surface and other measures to limit rainwater infiltration,
- remove mine wastes to an appropriately licensed landfill site,
- avoid direct discharge down mine shafts,
- encourage plant cover to stabilise mine spoil dumps, and
- treat mine discharge waters.

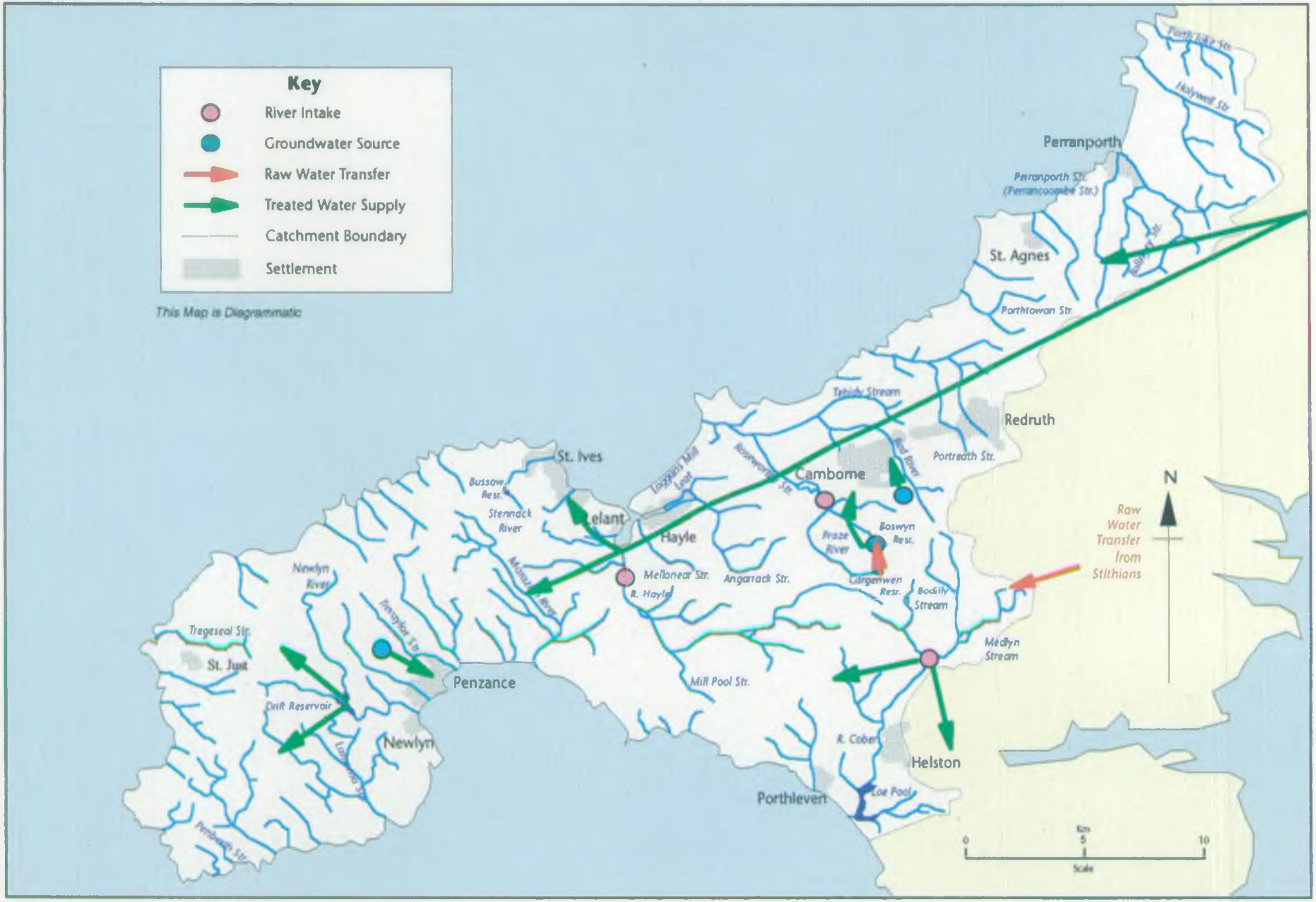
All waste management activities have the potential to cause contamination of land (see page 99).

The other main potential cause of contamination within the catchment is current or former industrial use, which due to the rural nature of much of the catchment is concentrated in Redruth, Camborne and Hayle. However it should not be forgotten that a larger number of activities have the potential to cause contamination; for example agriculture, petrol filling stations or domestic heating oil tanks. The size of the contamination source is not necessarily a guide to the risk that is posed.

Contaminated sediments

Contamination of the sediments of the Red River is widespread but variable in degree. Before the undertaking of any activity likely to disturb and mobilise the sediments in this area the Environment Agency would require the nature and severity of contamination to be established such that appropriate mitigating measures could be taken. Ministry of Agriculture, Fisheries and Food have an interest in activities requiring Food and Environmental Protection Act licences, particularly those where disposal of sediment to sea was proposed.

Map 15 Public Water Supply



Information correct as of July 1996

West Cornwall Local Environment Agency Plan
Environment Agency

Abstraction and Water Supply

Here we consider the abstraction of water from the surface or below the ground for public water supply, industry and other uses such as spray irrigation. Our document 'Regional Water Resources Development Strategy - Tomorrow's Water' has provided much of the technical water resources information provided in this plan.

Our Objective

To manage water resources to achieve the right balance between the needs of the environment and those of the abstractors.

The Role of the Environment Agency

Our management of water resources is guided by the European Union and UK legislation. We have duties and powers to:

- ensure that water is used properly, regulating abstractions using licences;
- conserve water supplies and protect them from over use.

The Role of South West Water

Public water supplies are provided by water companies such as South West Water (SWW). They have duties to:

- provide mains water
- ensure water is of suitable quality
- meet demand

Environment Agency Policies and Activities

We have adopted a range of key policies in order to fulfil our statutory duties. Foremost amongst these are:

- Sustainable Development: Ensuring that there will be no long-term deterioration in the water environment due to water resources development and use
- Precautionary Principle: Making sure that decisions made and measures implemented err on the safe side of caution if significant environmental damage may occur, or if knowledge on the matter is incomplete
- Demand Management and Better Use: Ensuring due attention has been given to the management and conservation of water resources by measures to control waste and manage demand and to make best use of existing resources, before licensing the development of additional sources.

Local Perspective

In the catchment there are currently 484 licensed surface water and 80 licensed groundwater abstractions for public water supply and for private water use. The latter includes the supply of water for some private dwellings, industrial use, agriculture, fish farming and amenity purposes. The authorised annual total of water which can be abstracted from the catchment is 39,414,894 Megalitres/year (Ml/y), 36,699,576 Ml from surface waters and 2,715,318 Ml from groundwater sources (1Ml = 1 million litres).

The theoretical available resource in the catchment is the proportion of rainfall not evaporated or taken up by plants. The authorised total of water which can be abstracted from the catchment amounts to 13% of the theoretical available resource. We are not aware of any widespread environmental damage caused as a result of this level of abstraction although there may be localised impacts.

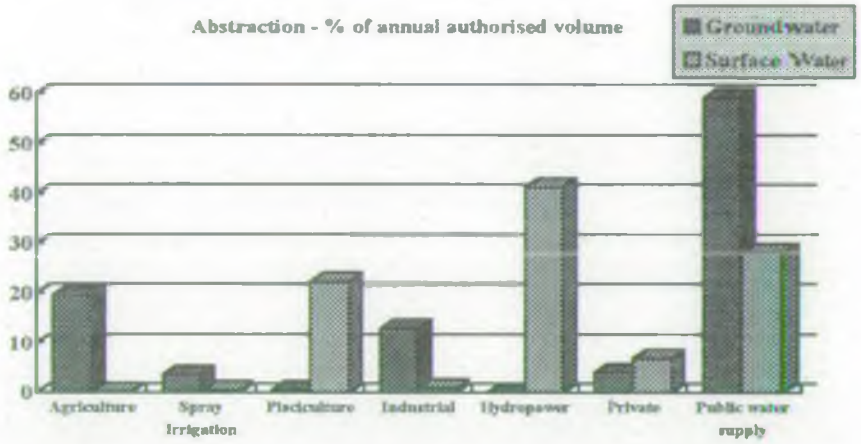
Map 16 Surface Water Abstractions

Information correct as of July 1996

West Cornwall Local Environment Agency Plan
Environment Agency

Public water supply accounts for the greatest proportion of surface water resources. The number of licences for each use and volume abstracted are summarised on bar charts shown as Figure 2.

Figure 2: Annual Licensed Abstraction



Licensed abstractions can either be consumptive or non-consumptive. Consumptive abstractions use most of the abstracted water with little returned to the original point of abstraction. Examples are public water supply, industrial processing and spray irrigation. Non-consumptive abstractions use only a small proportion of the abstracted water and return the remainder to the vicinity of the abstraction point. Examples include fish farming, hydropower generation and amenity features such as ornamental lakes.

Consumptive uses have potentially more impact on rivers than non-consumptive, though the latter can have local impacts depending on the rate of abstraction and local conditions.

Consumptive uses account for approximately 99% of the groundwater and 30% of the surface water annual authorised abstraction volume. The majority of licensed consumptive use, other than public water supply, is accounted for by the abstractions for industrial purposes.

Public water supply

Abstractions for public water supply represent 32% of the total annual licensed volume in this catchment. South West Water (SWW) are the water company responsible for maintaining this supply.

Supplying this water demand

To supply its customers within the plan area SWW abstract water from a combination of surface water and groundwater sources. Within the area the company operate one reservoir scheme at Drift. This is an isolated reservoir source that provides supplies to the far west of Cornwall but is limited in its eastern extent to partly meeting demand in the Penzance district.

The local supplies which consist of a combination of borehole and shaft/adit and stream abstractions are supported from the east by imports to the area. The river abstraction on the Cober is supported throughout the summer months by a transfer of water from Stithians reservoir.

There is a strategic link from the abstraction from the River Fowey at Restormel, which itself is supported from Colliford Reservoir, via the Cornwall Spine Main. Whilst this source is outside the plan area together they form part of the Colliford Strategic Supply Zone (see Map 15). Water from this strategic source can not reach every part of the area therefore some areas of demand depend solely on local sources such as Drift Reservoir and the abstraction from the River Cober at Wendron.

The licences to abstract water from sources within the plan area operated by SWW are described in Table 18. These authorise a total maximum abstraction of over 49 Mld.

Given the strategic use of Colliford Lake it is appropriate to describe the current resource-demand balance at the strategic supply zone level. In this zone SWW currently has available resources totalling 166 Mld. With average demand in the early 1990s of 151 Mld this supply zone enjoys a surplus of some 15 Mld.

Table 18: Public water supply abstractions

Source	Daily Licensed Quantity (Ml)	Annual Licensed Quantity (Ml)	Comments
River Cober	12.5	3000	Abstraction supported by transfer from Stithians Reservoir during times of low flow.
Drift Reservoir	12.274	3982.36	Compensation release of 1.38 Ml/d.
Polteggan Well	1.963	227.3	
River Hayle	3.64	454.6	Prescribed flow of 19.18 Ml/d.
Cargenwyn Reservoir (stream and springs)	2.181	454	
Carwynnen Stream	3.409	600	Prescribed flow of 0.6 Ml/d and no more than 3/4 of flow to be taken when flow is < 4.6 Ml/d.
Roseworthy Stream	3.273	1186.52	No more than 3/4 of flow to be taken when flow is < 3.2 Ml/d.
Boswyn Stream/Shaft and Copper Hill Adit	6.546	1363.82	Two licences with aggregate maximum quantities.
Fortescue Shaft	3.5	700	

Future Demand

The extent to which demand for potable water supply will increase over the next 30 years will depend upon a number of factors including population growth, numbers of new dwellings, personal use of water, level of economic activity, measures to reduce demand and climate change.

We have produced demand forecasts for the area served by SWW's Colliford Strategic Supply Zone (Tomorrow's Water[4]) looking at two scenarios. The 'high' and 'low' demand forecasts for the Colliford Zone are shown in Table 19 for 2001 , 2011 and 2021.

Map 17 Groundwater Abstractions

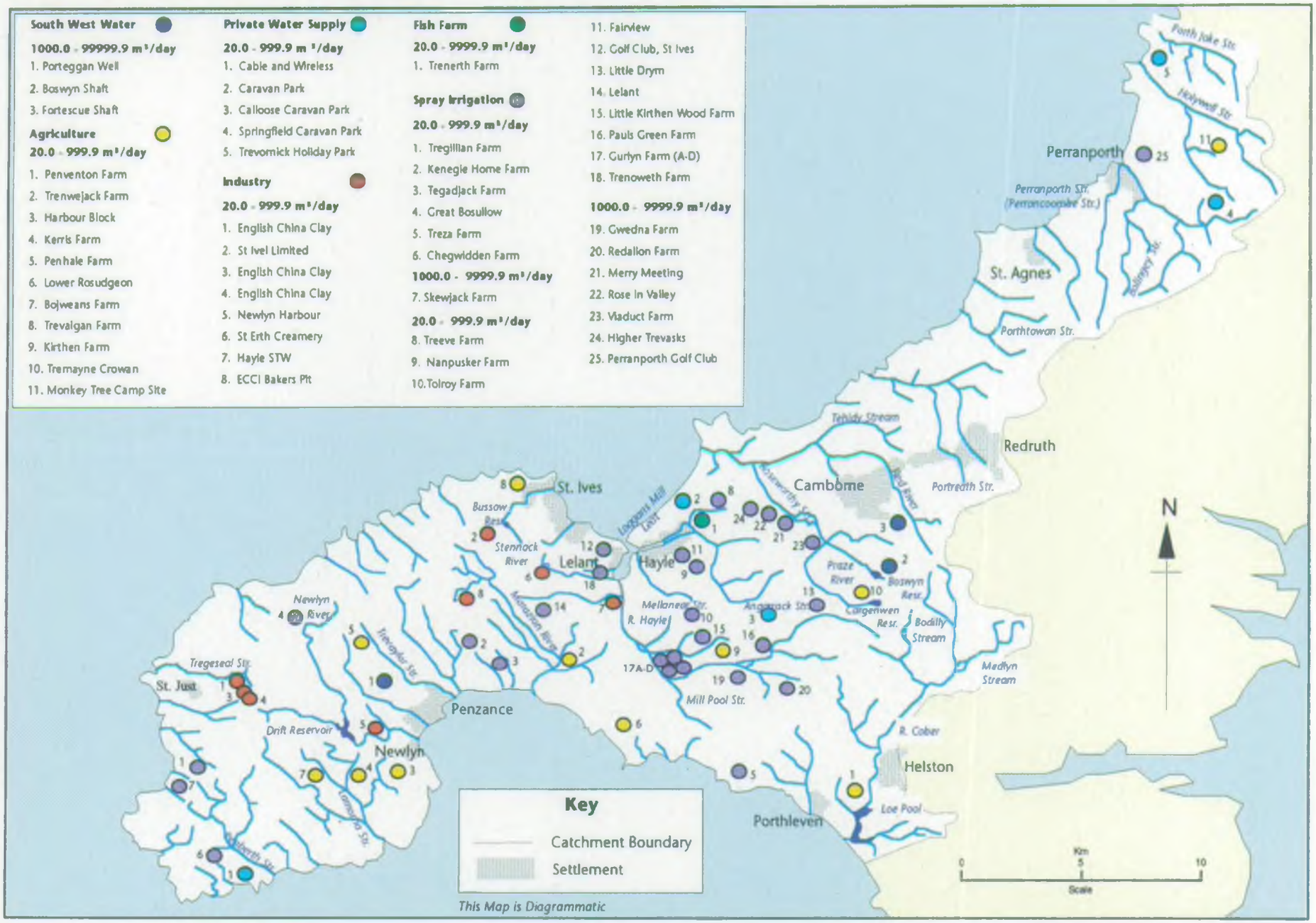


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Table 19: Future demand forecasts for SWW's Colliford Strategic Supply Zone

Strategic Supply Zone	Demand Forecast Scenario	Forecast Average Demand (Ml/day) 2001	2011	2021
Colliford	High	169	195	222
	Low	148	164	183

Comparing these forecasts to the current drought reliable yield of 166 Ml/d shows that in 2021 under the high scenario there will be a deficit of 57Ml/d whilst under the low scenario there will be a deficit of 17Ml/d.

Future Options

We have a duty to secure the best use of developed water resources whilst also having regard for the statutory obligations of SWW to provide a reliable supply of potable water to their customers. Whatever the precise pattern of future demand growth the Environment Agency will adopt a staged approach whereby we would ensure that all appropriate demand management, leakage control and resource management options are exhausted before considering the development of new resources (see Tomorrow's Water[4] for more details).

Demand management and leakage control

We will encourage the use of demand management measures including metering of all new properties, selective metering in areas where resources are under stress and the promotion of efficient water use through water saving appliances.

Before considering applications for additional public water supply licences, we expect the water company to set economic leakage targets. We will audit these targets and expect SWW to demonstrate to us that they are being achieved.

Resource Management

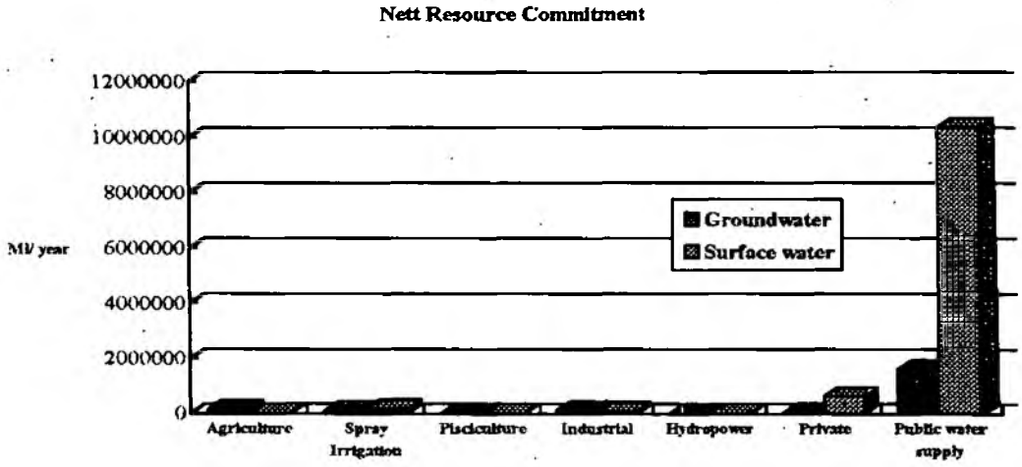
We will also require the water company to show us that all existing sources are being managed properly and that where feasible, water will be transferred from areas of surplus to areas of deficit. The aim is to ensure optimal conjunctive use of the various sources within the Zones, whilst taking into account environmental considerations. We will ensure that Operating Agreements are reviewed at regular intervals to ensure that the operation of the Colliford Zone keeps pace with growth in demand, in particular the peak demands associated with drought. Improvements to SWW's infrastructure would help to alleviate the problems of meeting peak demands in parts of west Cornwall and thus maximise the potential of using Colliford Lake conjunctively with local sources.

Resource Development

If, despite these measures, new resources are required, the Environment Agency would consider a pumped storage scheme for the strategic Colliford reservoir. Such a scheme would involve the pumping of water from rivers at times of high flow. This would be attractive to the Environment Agency because best use would be made of an existing reservoir and it would probably delay the need for any major new water resource development beyond the planning horizon of 2021.

Private water use

Figure 3: Nett resource commitment



1. A site may have a number of licensed uses covered by just one issued licence.

2. Nett Resource Commitment = Authorised Quantity x Proportion Of Abstraction Not Returned.

Predictions of future growth in non-public water supplies are more difficult to assess than those for public water supply. Water use is greatly influenced by numerous and differing political, economic and environmental factors and any predictions are always likely to be subject to the unpredictable influences of commercial markets.

Industry

The National forecast growth rate for industry to 2021 is 0.75% per year. However, the growth rate is dependent on a number of factors, so in reality future growth in industrial water use in the catchment will probably be limited to currently established industries. This could largely be met by the increased uptake within already licensed quantities.

Although industrial abstractions appear high for what is perceived as an agricultural catchment. This is because of four quite large abstractions which take over 90% of the licensed industrial) daily quantity. These are:

Site	Amount(cum/day)
Kerrier DC for Helston Gully Cleaning	796
ECCI-Bakers Pit	1236
St Ivel Creamery, St Erth	900
Tescan Ltd., Tannery etc. Redruth	1136

The Creamery at St Erth is closing in 1997 but it is not yet known if the abstraction will be continued.

Domestic Water Supply

Private water supply abstractions for domestic purposes tend to be very small and to be dispersed across the catchment, in contrast to the more concentrated point sources for public water supply. A large increase in this type of abstraction is not anticipated.

Hydropower on the River Cober

Recently a 'winter only' abstraction licence for Hydropower was granted on the River Cober. Operating conditions have been put on the licence as we have concerns regarding possible long term adverse effects on the water environment such as the propensity for eutrophication, sedimentation / siltation and the effects on the character of the flora. In addition to fairly onerous operating conditions, the licence is also time limited. Thus there will be an opportunity to reassess the situation in 2005 when the licence is reviewed.

Drought Orders

On 29 July 1995 SWW imposed a hosepipe ban in most of the LEAP area. Later in the year they were granted drought orders to abstract water from Leswidden Pit, to increase the abstraction volume from Colliford Reservoir, to reduce the prescribed flow at St Erth on the River Hayle and to reduce the compensation flow from Drift Reservoir.

Protection of water quality

EC Surface Water Abstraction Directive 75/440/EEC

The Directive 'concerning the quality required of surface water intended for the abstraction of drinking water in the Member States' (75/440/EEC), protects the quality of surface water used for public supply. This Directive ensures that water abstracted for public supply meets certain quality standards and is given adequate treatment before entering public water supplies.

The Directive sets out imperative standards that must be achieved, and guideline standards that Member States should aim to achieve, for water for public supply which is to be given different levels of treatment.

We are responsible for monitoring the quality of designated surface water abstractions and reporting the results to DoE who decide whether the standards in the Directive have been met. Where standards are not met, we are responsible for identifying sources of pollution and making sure that improvements are made.

There are four identified surface water abstraction points in the plan area. These are shown on Map 4.

Where EC Directives standards, particularly those for metals and/or pH, are not met due to natural causes, we can recommend a derogation, that is these standards will not apply. The imperative standard for coloration was exceeded at Boswyn Reservoir in 1993 and at Drift Reservoir in 1993 and 1994. A derogation for coloration has been applied at both reservoirs since 1993.

Drift Reservoir, Boswyn Reservoir and River Hayle Intake, St Erth exceeded the standards for phenols and/or dissolved and emulsified hydrocarbons in the period 1993 to 1994. We are currently concerned about the suitability of the methods for analysis of phenols and dissolved and emulsified hydrocarbons as specified in the EC Surface Water Abstraction Directive. Exceedences of the Directive's Standards cannot always be attributed to polluting discharges, and the Environment Agency suspects that some exceedences may be due to natural compounds resulting from the breakdown of vegetation. We are involved in discussions with the Department of the Environment, with a view to reviewing the analytical methods used.

The Environment Agency will continue to report exceedences of the EC Surface Water Abstraction Directive standards. However, as there are no obvious sources of these compounds we are not planning to undertake any further studies until we receive direction from the DoE.

Groundwater Protection

The **EC Groundwater Directive** (80/68/EEC) controls the release of certain substances to groundwater. There are two lists of substances; those in List 1 should not be released, while those in List 2 can only be released in limited amounts. We ensure that the principles of the Groundwater Directive are implemented through our waste licensing activities and through our work to control the discharge of effluents to soakaways.

There are no statutory standards for the quality of groundwater and because of the difficulties in obtaining and interpreting information we have only a limited understanding of groundwater quality. However in drought conditions most of the flow in rivers is derived from groundwater and our river monitoring data indicate that throughout most of the South West region there are no known major areas of contaminated groundwater. However, in this catchment, mine drainage is known to have contaminated groundwater - see page 82 for main areas of metalliferous mining.

Groundwater Protection Policy

In 1992 the NRA published its Policy and Practice for the Protection of Groundwater. This document, which we fully endorse, explains why we must safeguard the quality and flow of water in aquifers and outlines how we and other organisations can respond to the threats posed to groundwater by the way we use and develop land.

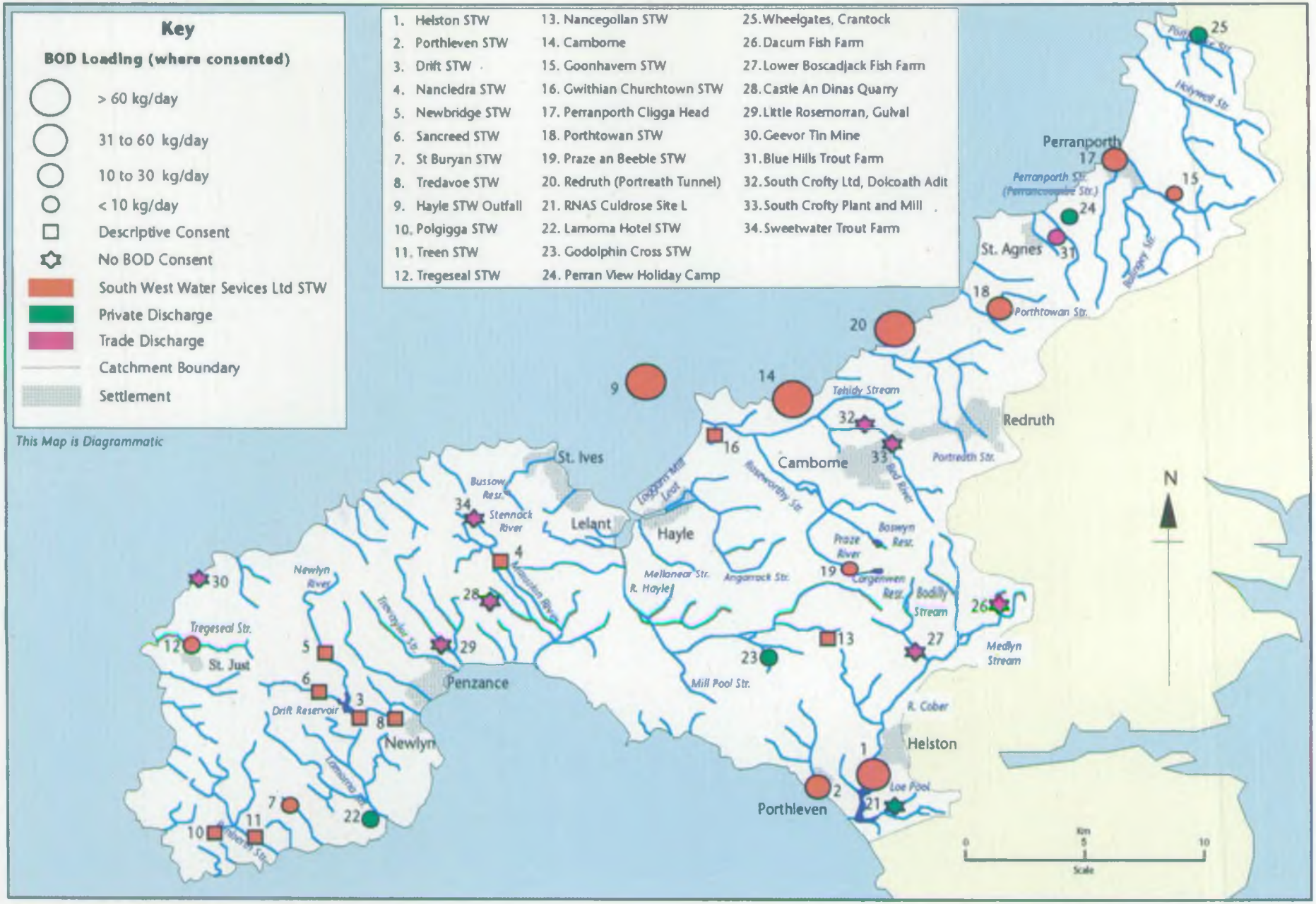
Our document contains policy statements in the following areas:

- physical disturbance of aquifers affecting quality and quantity
- waste disposal to land
- contaminated land
- disposal of sludges and slurry to land
- discharges to underground strata
- diffuse pollution
- other activities affecting groundwater quality

We are presently mapping the vulnerability of groundwaters in England and Wales and are working on a classification of all areas at 1:10,000 scale. The results of this work for Cornwall will be published in 1997.

We work with Planning authorities to minimise the risks posed to groundwater from development and land use changes. The greatest protection is given to the most vulnerable areas around water supply boreholes.

Map 18 Effluent Disposal



Information correct as of July 1996

West Cornwall Local Environment Agency Plan
Environment Agency

Effluent Disposal

Here we consider the disposal of effluent directly to rivers, estuaries, the sea or into the ground. Effluent includes sewage, industrial and farm wastes. We regulate the disposal of effluent by issuing consents to control discharges and by taking action if a river is accidentally polluted.

Our Objective

To protect the water environment from harm caused by the disposal of effluent and allow the widest possible use to be made of rivers.

The Role of the Environment Agency

We have duties and powers to:

- authorize discharges through a system of consents. It is illegal to discharge sewage effluent or trade waste without the consent of the Environment Agency. Before making a discharge it is necessary to apply for a consent. We look at the circumstances in each case. We can refuse a consent if a discharge will cause an unacceptable deterioration in water quality
- monitor discharges to see if they comply with consent standards. We may prosecute dischargers if they exceed consent conditions
- prevent illegal discharges
- direct investment in sewerage and sewage treatment by the water companies in line with AMP2 guidelines (see section below on Improvements to South West Water (SWW) Discharges).

Improvements to South West Water (SWW) Discharges

Improvements to SWW's discharges over the next 10 to 15 years are subject to available funding approved by OFWAT, the water industry's economic regulator. A Strategic Business Plan, (Asset Management Plan 2 (AMP2)), for these schemes was developed based on guidelines agreed between the NRA, Department of the Environment (DoE), Water Services Companies and OFWAT. The plan was submitted to OFWAT early in 1994.

In order of priority, schemes included are:

- schemes required to meet and maintain **current** EC and domestic statutory obligations
- schemes required to meet and maintain **new** EC and domestic statutory obligations
- schemes which already have been separately justified, required to maintain river quality relative to the 1990 NRA survey of water quality or to achieve river or marine improvements.

OFWAT declared the associated customer charging base in July 1994. This was subsequently reviewed by the Monopolies and Mergers Commission at SWW request. We have agreed a programme and timetable for improvement schemes in the catchment and these are given on page 99.

Local Perspective

There are two types of consented discharges in the catchment:

- **Continuous** from sewage and trade wastes.
- **Intermittent** from storm sewer overflows and emergency overflows.

These are either discharges to ground or surface waters.

Continuous Discharges

Within the catchment there are 20 SWW sewage treatment works (see Map 18) of which 8 are small works which receive no trade effluent and have descriptive consents, where no numerical quality standards are imposed and 3 are deemed consents to sea outfalls.

There are 5 consented private sewage treatment works and 9 consented trade discharges of greater than $5m^3$/day volume (see Map 18).

The past, current and projected proportion of population on mains sewerage systems are given below (Source: SWW, Forward Planning Dept.).

Table 20 : Percentage of population on mains sewerage

	% of population on mains sewerage - 1992	Forecasts of % population connected to mains sewerage - 2011 Low	High
Cober	75.5	78.8	80.3
Hayle and West Cornwall streams	81.6	83.0	83.6
Red	88.9	90.0	90.5
TOTAL	84.1	85.6	86.2

Table 20 shows there are, and will continue to be, a significant proportion of private discharges.

Our national policy is to discourage the proliferation of small private treatment plants in favour of mains connections. We will refuse consent applications where people on mains sewerage wish to change to private discharges.

There are currently 17 recommended areas of development restraint in the catchment of which 11 are for water quality reasons (see Table 14). Restraints may be in place where sewage treatment works (STWs) are not complying with their consents, are having an environmental impact on receiving waters or are causing EC Directive failure. Development restraints are requests by the NRA to planning authorities to prevent development which would require connections to mains sewerage systems where this would make an existing problem worse.

Deemed consents

During SWW's Clean Sweep schemes in Penzance and St Ives Bay the numerous deemed consents discharging to the estuary or tidal waters were intercepted and are now treated at Hayle STW. Deemed consents are historic consents (covering usually basic effluent systems or crude discharges) where there has not been legislation to ensure improvements. Many will have to make improvements to comply with EC Directive compliance dates. In advance of this we are involved in negotiating improvements for the discharges, and much progress has already been made.

Intermittent discharges

There are numerous intermittent discharges in the catchment, for example storm sewer overflows. The Storm Sewer Overflows in Redruth are known to cause water quality problems and are discussed in Issue 11.

Pollution events

Table 21 : Pollution incidents arising from industrial and sewage effluents 1994 to 1996

Pollution Incidents	Major	Significant	Minor
Industrial			
1994	0	0	16
1995	0	1	11
1996	0	0	9
Waste Water Treatment			
1994	0	3	53
1995	0	3	65
1996	0	1	36

Wastes spread to farmland

Some wastes are spread on farmland to improve the soil. If this is not done in accordance with current codes of practice however, there is a potential for the waste to cause pollution to water and harm to wildlife. This activity is exempted from formal waste management licensing but is subject to a pre-notification and registration system with the Environment Agency which monitors such activities to ensure protection of the environment.

EC Dangerous Substances Directive 76/464/EEC

The Dangerous Substances Directive 'on pollution caused by certain substances discharged in the aquatic environment of the community '(76/464/EEC) protects the water environment by controlling discharges that contain harmful substances to rivers, estuaries and coastal waters.

This Directive describes two lists of compounds. List I contains substances regarded as particularly dangerous because they are toxic, they persist in the environment and they bioaccumulate. Discharges containing List I substances must be controlled by Environmental Quality Standards (EQSs) issued through Daughter Directives. List II contains substances which are considered to be less dangerous but which can still have a harmful effect on the water environment. Discharges of List II substances are controlled by EQSs set by the individual Member States.

We are responsible for authorising, limiting and monitoring dangerous substances in discharges. We are also responsible for monitoring the quality of waters which receive discharges containing Dangerous Substances and reporting the results to DoE who decide whether the standards in the Directive have been met. Where the requirements of this Directive are not met, we are responsible for identifying sources of pollution and making sure that improvements are made.

We monitor for List I and List II substances at eight sites. The receiving water for Camborne (North Cliffs outfall) exceeded the EQS standard for copper in 1995. The receiving water for Redruth outfall exceeded the EQS standard for copper in 1994. The site was compliant in 1995. Exceedences of Environmental Quality Standards are discussed in Issues 7 and 11

Operational monitoring

High levels of Dangerous Substances have been found in the effluent from Camborne Outfall and Redruth Outfall. A wastewater treatment scheme is planned for the Camborne/Redruth Area which will receive

secondary treatment. Treatment is likely to result in a reduction in the levels of Dangerous Substances in the discharge. We will monitor the new discharge for Dangerous Substances and these will be specified in the consent conditions if necessary.

Sewerage improvements

There are planned improvements to various sewage systems and treatment works by SWW in the next few years shown in Table 22.

Table 22: Planned improvements in the catchment, Continuous Discharges

Site	Receiving waters	Investment driver	Treatment level	End date
Camborne/Redruth Outfalls	Sea	UWWTD	Primary	2000
Perranuthnoe Outfall	Sea	BWD	Secondary	2005
St Buryan STW	Trevedran Stream	UWWTD - Appropriate Treatment	Secondary (Improved)	2005
Botallack Outfall	Sea	UWWTD - Appropriate Treatment	Fine Screening (i.e. Preliminary)	2005
Cot Valley (St Just)	Sea	UWWTD - Appropriate Treatment	Primary	2005
Porthcurno	Sea	UWWTD - Appropriate Treatment	Secondary	2005
Porthgwarra	Sea	UWWTD - Appropriate Treatment	Fine Screening (i.e. Preliminary)	2005
Sennen	Sea	UWWTD -Appropriate Treatment	Secondary	2005

There are also planned improvements to intermittent discharges at:

Lelant, Sewers Storm Overflows,

Lelant and North Quay Hayle pumping stations storm overflows,

Knave Go By, Reskadinnick, Sunnyside and Tolvadden combined sewer overflows.

EC Urban Waste Water Treatment Directive

The EC Directive *concerning urban wastewater treatment* (91/271/EEC) specifies minimum standards for sewage treatment and sewage collection systems. This Directive specifies secondary treatment for all discharges serving population equivalents greater than 2,000 to inland waters and estuaries, and greater than 10,000 to coastal waters. Discharges below these population equivalents receive appropriate treatment as defined in the AMP2 guidance note.

We are responsible for making sure that discharges receive the level of treatment specified in this Directive. This Directive also requires higher standards of treatment for discharges to *sensitive* areas, and/or lower standards of treatment to *less sensitive* areas. Sensitive areas are those waters that receive discharges from population equivalents of greater than 10,000, and are or may become eutrophic in the future. The DoE decide if a watercourse is sensitive. We carry out monitoring and provide information to the DoE and also ensure that discharges to sensitive areas receive a higher level of treatment.

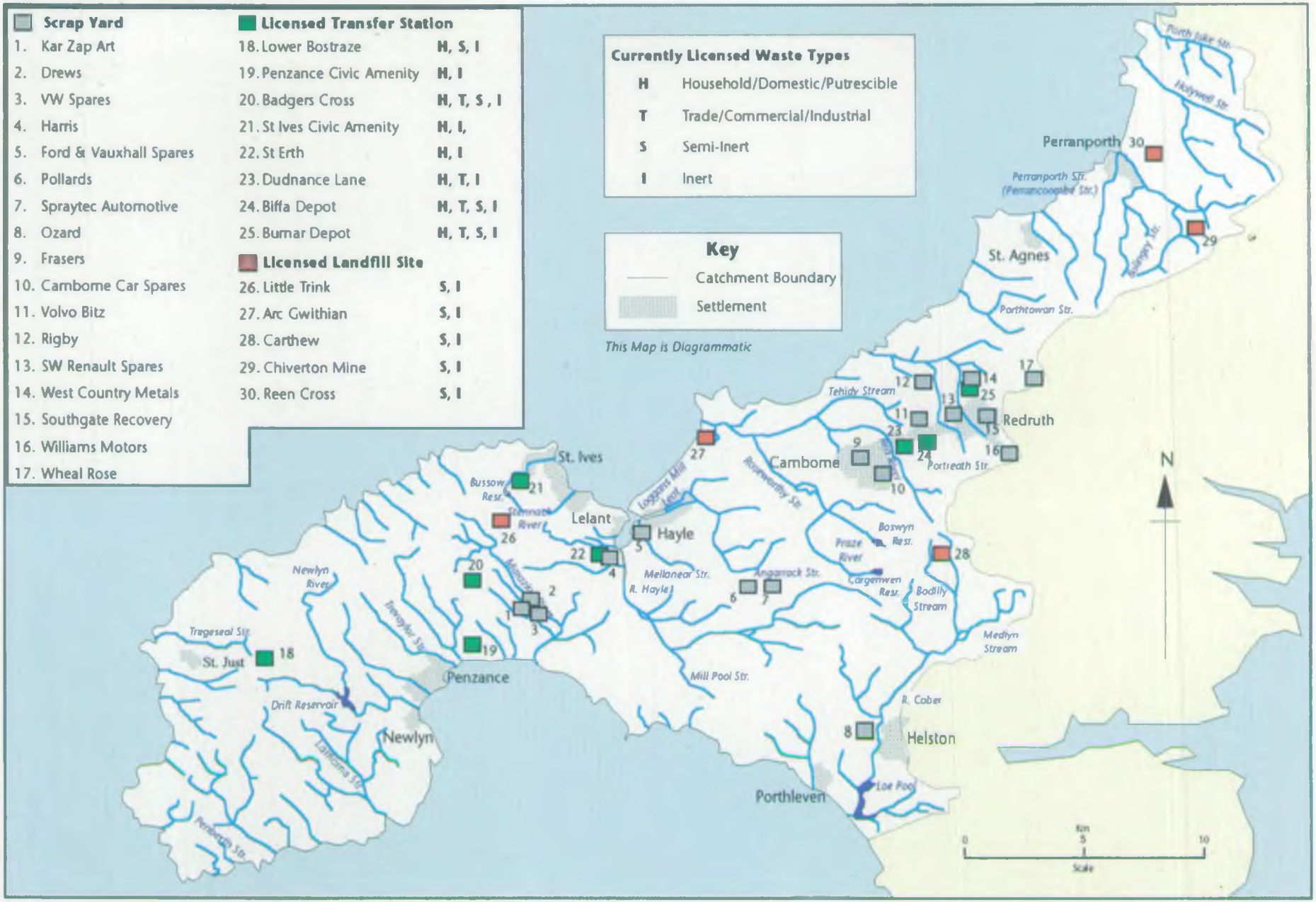
Less Sensitive Areas or *High Natural Dispersion Areas* (HNDAs) are those estuarine or coastal waters which are naturally very dispersive. In these areas a lower level of sewage treatment is required. However, dischargers must demonstrate that no harm will be caused to the environment by the lower level of treatment. We are responsible for ensuring that these studies are carried out correctly.

Loe Pool has been proposed as a Sensitive Area (Eutrophic). Helston STW, the qualifying discharge, has a population equivalent of 11 000.

Discharges below the specified population equivalents for inland and estuaries and coastal waters must also receive "appropriate" treatment as defined in the AMP2 guidance note. There is one STW identified under the "appropriate" treatment provision of the Directive, St Buryan STW, which has a population equivalent of 1700 and has been identified to receive secondary treatment by 2005.

Discharges which have been identified as requiring improvement under the Directive are shown in Table 22.

Map 19 Waste Disposal



Information correct as of July 1996

West Cornwall Local Environment Agency Plan
Environment Agency

Waste Management

Our Objective

To prevent environmental pollution through the management of wastes.

The Role of the Environment Agency

We have duties and powers to:

- Licence waste management sites
- Ensure that new facilities have minimal adverse environmental impact by including conditions of operation within Waste Management Licences
- Ensure that site operators make plans to monitor for changes in the quality of ground and surface waters and for the presence of landfill gas in and outside of landfills
- Ensure that sites are maintained and operated properly by means of regular inspections
- Take enforcement action to prevent or control pollution occurring from a licensed site or where waste has been handled or disposed of illegally
- Undertake surveys of wastes arising to assist in the planning of waste management.

The management of controlled wastes may include storage, treatment, processing or disposal facilities. Each type of operation may impact on the catchment but landfill disposal in particular can result in the formation of a highly polluting liquid known as leachate, or landfill gas containing methane, which is potentially dangerous and also a 'greenhouse gas'. Leachate is produced as wastes break down and decompose and the quantity is multiplied by any ingress of water into the waste. Any escape of this pollutant from a landfill site would have a serious impact on the catchment as leachate can pollute surface and ground waters. Operation of waste sites can also generate noise, dust, odour and unsightliness, and vehicle movement may cause a highway nuisance. It is therefore important that the potential impact on the proposed locations for new facilities is given careful consideration.

The NRA previously published its views on landfill in its 'Position Statement on Landfill and the Water Environment'[11]. In this statement the concepts of waste minimisation and recycling are stressed. These concepts have been further stressed in the Government White Paper 'Making Waste Work'[12] which sets out the draft Government strategy for the sustainable management of waste. The Environment Agency will itself be forming a Regional Waste Strategy based on the recommendations of the White Paper.

Government strategies

In December 1995 the DoE produced the strategy for sustainable waste management based on a hierarchy of waste reduction, reuse, recovery and, lastly, disposal. In it they have set two primary targets; to reduce the proportion of controlled waste going to landfill to 60% by 2005 and to recover 40% of municipal waste by 2005. They have also made a commitment to a third target; by the end of 1998, to set a target for overall waste reduction. These primary targets are supported by a number of more detailed targets.

On 1st April 1996, we became responsible, under the Environment Act 1995, for an enlarged system of waste regulation and control. We have a duty to undertake a detailed national survey of waste arisings as part of the formative work leading towards the publication of a statutory National Waste Strategy due in 1998. This work will, it is hoped, substantially improve the quality of waste arisings statistics and assist greatly in the preparation of waste local plans.

Landfill tax

The introduction of the Government Landfill Tax in October 1996 is expected to have a significant impact on waste management. The charges made to landfill operators are likely to be passed on to their

customers by raising the "gate fee". The principle behind the tax is to provide a financial incentive to waste producers to minimise the waste they produce or to use methods of disposal which have less of an environmental impact. It is possible that some waste producers will simply dispose of the waste at unauthorised sites to avoid the rise in costs. Illegal waste disposal activities can cause pollution and we treat them very seriously. Regulation officers examine all such activities and enforcement action is taken where necessary. Within Cornwall the number of licensed landfill sites has remained fairly static since a number were surrendered at the time Fees and Charges were introduced about two years ago. More recently, during the period leading up to the introduction of the Landfill Tax, a number of operators have expressed their intention to set up waste recycling or recovery plants. Some schemes are currently in the planning stages and this indicates there will be an increase in the number of such licensed activities rather than landfill operations.

Local Perspective
Waste production

The following text and figures on estimated waste produced in Cornwall comes from the Cornwall County Council waste planning strategy, which is in production.

The accurate calculation and estimation of current arisings for individual waste streams in Cornwall is at best, fraught with difficulty. Owing to difficulties in the collection of the information and known shortcomings, the statistics for waste arisings indicated below are acknowledged to be of variable degrees of reliability and must therefore be treated in most instances with caution. The figures given for household and special waste arisings are, however, dependable, but for all other types of waste a "best estimate" has been made in consultation with the appropriate agencies and private sector operators.

Current estimates of Cornwall's annual waste production, as set out below, is around 30 million tonnes.

Table 23: Annual estimated waste production in Cornwall

Waste Type	Quantities (million tonnes)	%
Construction and demolition	0.2	0.6
Other industrial	0.6	2.4
Household & commercial	0.28	0.9
Sewage sludge	0.13	0.45
Mining & quarrying	22	75
Agriculture	6	20
Dredged spoils	-	
Others	0.073	0.02
Total	29.28	100

Mining and quarrying wastes dominate by volume. Agricultural wastes are the next most important by volume, approximately 20%. The majority of this is organic matter, such as manure, which is normally applied back onto fields. Whilst the method of application can cause water pollution, it is perhaps better to think of such material as a useful by-product rather than a waste. Farms also do generate real wastes, such as plastics, metals and tyres, the majority of which currently fall outside the legal definitions of waste. The government has indicated that it will look at changing the legislation so that these will become classified as "controlled waste", and therefore be subject to regulation and control.

Whilst only small by volume, household, commercial and industrial (non construction and demolition waste) can be some of the most potentially polluting. These are mostly taken to landfill sites, with the exception of special or hazardous wastes, 90% of which are "exported" from the County.

Waste disposal facilities

Household, commercial and industrial waste generated within the plan area is disposed of to the United Mines landfill site at St Day. This site is just outside the eastern boundary of the plan area. Waste collection contractors for Carrick and Kerrier Districts discharge direct to United Downs landfill. The contractor for Penwith discharges to a waste transfer station at St Erth where waste is compacted into large containers which are carried by large vehicles to United Downs. This avoids excessively long journeys by refuse collection vehicles which have a limited load carrying capacity.

Map 19 shows the licensed waste facilities in the plan area. The landfills are relatively small operations licensed to receive only inert or semi-inert materials. A number of transfer stations facilitate the economic temporary storage, sorting and bulking of loads prior to transportation to further recovery operations or disposal of residues.

Recycling

Within the plan area there are a number of initiatives by local authorities to promote the reduction and re-use of waste, including recycling points. Current levels of achievement by Local Planning Authorities (Audit Commission figures) for the recycling of domestic waste for 1994/95 are:

Table 24: Recycling of domestic waste 1994/5

Local Authority	%
Kerrier District Council	8.0
Carrick District Council	6.5
Penwith District Council	2.3

Current proposals for new waste disposal sites in the plan area

The United Downs landfill serves the western part of the county comprising the District Council areas of Penwith, Kerrier, Carrick and parts of Restormel. There are no current proposals for new waste disposal sites within the plan area although a feasibility study on a waste-to-energy facility at St Erth is currently underway.

Further proposals for future capacity are expected. These might be for extensions to existing sites, or more likely, new sites, which may or may not be within the plan area. Planning applications will be accompanied by environmental impact assessments which identify catchment issues. New putrescible landfill sites will require the use of engineered liners to contain potential pollutants.

Oil Pollution Prevention

The Lord Donaldson Inquiry Report highlighted the high level of vulnerability of our southern coast line and its estuaries. During 1993 and 1994 there were 34 maritime incidents in the UK coastal waters with 17 incidents that could have had serious implications for our regions coastline. The report also highlighted the need for improved levels of strategy by all agencies involved with major oil spills.

A previous NRA Policy Implementation Guidance note stated that we should be responsible in preventing, where practicable, the spread of oil inland from estuaries on incoming tides. We need to prepare action plans in consultation with Local Authorities, MAFF, English Nature etc., to protect wherever feasible sensitive areas of coastline and estuaries. All of these bodies are consulted during the survey.

In order to carry this forward we have started a process of sensitivity mapping and oil spill protection surveys. Details of these projects are given below.

Sensitivity mapping

This work is essentially geographical and results in the production of maps for each of the Estuaries specified, these maps contain a high level of data relating to the location / area of all the environmental issues currently found in the Estuary, such as: Areas of commercial shellfish harvesting (including periods of greatest environmental sensitivity), Ornithological sensitivity, Amenity value, EC Bathing Waters, Sailing marinas and moorings, Areas of Conservation value, SSSIs, Nature reserves, Heritage coastline, Geological features, Marine conservation importance and Habitat vulnerability along with basic tidal range information.

Oil spill protection surveys

This next phase includes the assessment of practical booming points from the mouth of the Estuary up into the higher tidal reaches, with these boom emplacements being prioritised, access points and other logistical points such as: access, boom types to be used, current and other tidal information, rendezvous points, the report and its accompanying plans are extremely useful should a marine oil pollution occur.

Local Perspective

Sensitivity maps for the Hayle have been completed in detail. However, they may require updating regarding the habitat sensitivity, location and type of sensitivity i.e. SSSI or SAC and Marine Conservation Areas. Logistic plans of booming points and priorities have also been completed for the estuary.

All this work is submitted by ourselves to the County Emergency Plan. This plan is headed by the County Council and should provide a joint response to major pollution emergencies.

Controlled Processes

In 1863 the Alkali Act was the first legislation to be introduced to control releases to air from industrial sources in the United Kingdom. Over the years it has been added to but changed little in concept. There have been several changes in the regulations and legislation to separately regulate releases to water and to land. Part I of the Environmental Protection Act 1990 (EPA90)was a significant change in that the releases to all three media (air, land and water) have to be considered in the context of the impact on the environment as a whole, a concept known as Integrated Pollution Control, rather than considering single media releases only.

The Role of the Environment Agency

The Environment Agency is the statutory authority in England and Wales for regulating the largest and most complex industrial processes which discharge harmful non-radioactive and radioactive waste to air, water and land. To do this we use a system known as Integrated Pollution Control (IPC). Operators of these controlled processes are required to have an authorisation to discharge waste. The Agency also regulates the release of radioactive substances.

We have duties and powers to:

- regulate processes and stipulate minimum technical specifications for processes following principles of Best Available Techniques Not Entailing Excessive Cost (BATNEEC) to minimise releases whilst having regard to the Best Practicable Environmental Option (BPEO)
- review authorisations every four years.

Two lists of processes have been prescribed by regulations for control:

Part A processes are potentially the most polluting processes and releases to air, water and land are controlled under Integrated Pollution Control (IPC) by the Agency

Part B processes are potentially less polluting and releases to air from Part B processes are controlled at a local level under a system of Local Authority Air Pollution Control. The Environment Agency may be involved with releases to water and land

Part A and Part B processes are defined in The Environmental Protection (Prescribed Processes and Substances) Regulations[13].

We also have a responsibility to supervise and regulate the spreading of sewage sludges on agricultural land.

Integrated Pollution Control (IPC)

Authorisations are issued under Section 6 of the Environmental Protection Act 1990 to operate a particular manufacturing process. The authorisation comprises of six parts including the operation of the process and keeping records, improvement programmes and releases to air, water and land.

Aspects of the process not regulated by those conditions are subject to a general condition that the person carrying it on must use Best Available Techniques Not Entailing Excessive Cost (BATNEEC);

a for preventing the release of substances prescribed for any environmental medium into that medium or, where that is not practicable by such means, for reducing the release of such substances; and

b for rendering harmless any other substances which might cause harm if released into any environmental medium.

Techniques include (in addition to technical means and technology) the number, qualifications, training and supervision of persons employed in the process and the design, construction, layout and maintenance of the buildings in which the process is carried on. The key part of controlling IPC processes is to try to prevent the release in the first place.

Once an IPC authorisation is issued, the Environment Agency ensures that operators comply with the pollution prevention and control standards laid down in the authorisation. At least every 4 years the Environment Agency reviews these conditions, in consultation with the operator, in case they require updating in the light of experience or new knowledge.

Conditions set out in authorisations included provisions requiring operators to manage, supervise and control their own sites and the process they operate, monitor their release, measure their performance against these parameters and report to the Agency. The Agency examines this feedback at regular intervals and inspectors make subsequent site visits and spot checks to ensure the IPC authorisation is being complied with. The frequency of inspection depends on the operator's performance in terms of compliance and the pollution potential of the process. Any complaint about a particular site is promptly investigated and serious pollution events receive immediate attention.

Sometimes conditions set out in an authorisation are not complied with and standards required by inspectors are not maintained. In most cases we deal with breaches of authorisation requirements by supporting operator's efforts to remedy their own failings. In cases where this approach does not succeed, the Agency has powers to halt a process if a serious pollution risk is imminent or to revoke an authorisation. The Agency aims to help operators put matters right but will use its powers to issue enforcement and probation notices and will prosecute if necessary. Prosecution is sometimes resorted to in cases where operators show persistent or flagrant disregard for public health and safety or cause obvious environmental damage or nuisance.

Table 25 : Controlled Processes in the plan area

Operator	Type of Business	Legislation covering regulation
Penzance Dry Dock	Ship repair	Being determined.

Information is made available to the public via the public register, annual reports and an annual Chemical Release Inventory (CRI). Statutory monitoring information is also held on the public register. The confidentiality of some processes and discharge information can significantly affect the commercial interests of a company if they were made public. We have discretion to withhold such information. Some Government sites, such as Ministry of Defence sites, can also be exempt from the register.

Radioactive Substances

The Environment Agency is the principal regulator in England and Wales under the Radioactive Substances Act 1993. This statute is concerned with the storage, use and disposal of radioactive substances, and in particular, the regulation of radioactive waste. Each site is assessed by the Agency and permission granted on the basis that the use of radioactive substances is justified and that operators are prepared to abide by conditions to safeguard human health and protect the environment. The permissions take the form of:

certificates of registration for keeping and using radioactive materials; and,

certificates of authorisation for the accumulation and disposal of radioactive waste.

There are no authorisations in the plan area.

Air quality

Air quality is an indicator of environmental quality. Air pollution can damage plants and animals, buildings and have significant effects on soils and water. It can also cause serious problems for those with asthma, bronchitis and other respiratory diseases.

The Role of the Environment Agency

The Environment Agency has wide powers, but will need to work closely with others if environmental improvements are to be achieved. We will need to work in partnership with national and local government, business, industry, and environmental and conservation groups to maximise securing environmental improvements. This is particularly important with regard to local air quality, where the Agency is only one of a number of regulatory bodies.

Local Authorities have primary responsibility for local air quality. The Agency has powers to regulate air quality principally by operating a system called Intergrated Pollution Control (IPC) for certain industrial processes. The processes that are regulated are potentially most polluting industrial processes including large combustion plant, iron, and steel making, the chemical industry, solvent recovery and incineration plants. (See Controlled Processes, page 106).

The Agency also regulates landfill sites and in particular, landfill gas produced from the chemical and biological breakdown of waste at sites. This gas is principally a mixture of methane, a greenhouse gas which is flammable/explosive when mixed with air, and carbon dioxide, which is an asphyxiant.

The Roles of other organisations

The County Council Structure Plan contains polices on the need to control pollution and the County Analyst provides an analytical service for district Council Environmental Health Officers (EHO's). District Councils' Environmental Health departments regulate air pollution from thousands of industrial premises generally with a lesser potential to pollute than those the Agency regulates. The processes concerned are known as Part B process and only the releases to the air are controlled. District Councils also deal with a wide range of non-industrial and other forms of pollution, such as smells from domestic and agricultural premises, Smoke from outdoor cable burning and noise pollution. Many local authorities monitor air quality in their area.

The Health and Safety Executive monitors the nuclear industry and issues site licences etc. The Department of Transport (DTp) enforces controls on vehicle manufacturers. The Police are responsible for controlling emissions from vehicles.

National Air Quality Strategy

Under Part 4 of the Environment Act 1995 the Government is required to publish a national strategy for air quality including:

- a framework of standards and objectives for the pollutants of most concern
- a timetable for achieving objectives
- the steps the Government is taking and the measures it expects others to take to see that objectives are met.

The strategy was published for consultation in August 1996. We will be working closely with local authorities to help achieve the objectives of the National Air Quality Strategy.

Pilot studies, to review and assess these national guidelines have been set up in 14 areas of the UK. A pilot study is taking place in Cornwall from 1996. Actions that come out of the pilot study, the Cornwall Air Quality Forum, may show the way forward to dealing with air quality issues in the catchment and the county.

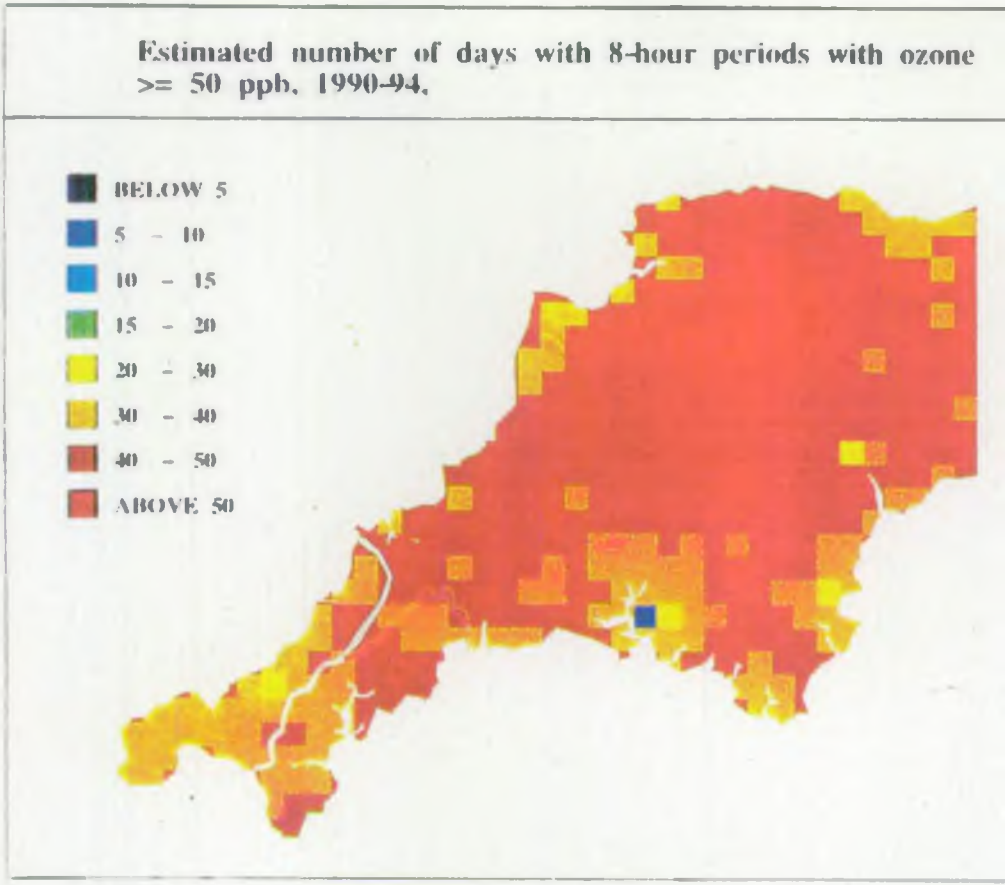
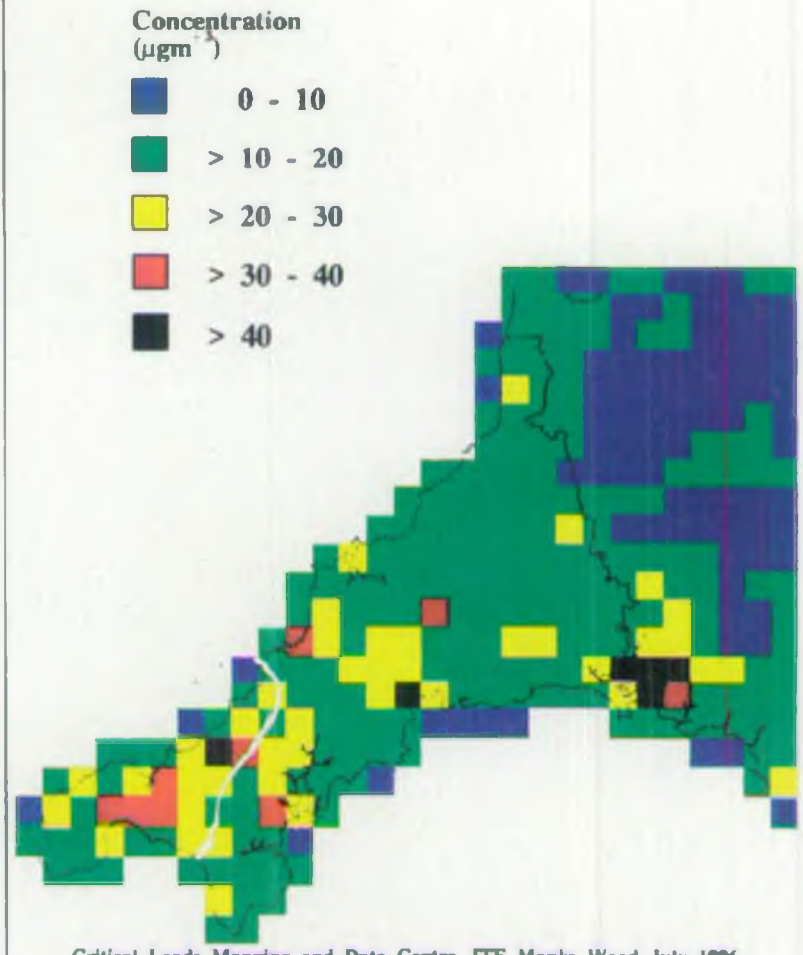


Figure 4: Ground Level Ozone

Figure 5: Estimated Annual NOx concentrations for 1994

Urban corrected annual NO_x concentrations for 1994



Critical Loads Mapping and Data Centre, ITE Monks Wood July 1996

Data acknowledgement: AEA Technology

Local air quality management areas

Local authorities will be required to review present and future air quality against air quality standards and objectives shortly to be prescribed by the Government. The standards are likely to reflect advice from the Expert Panel of Air Quality Standards (EPAQS), the European Community and the World Health Organisation and will take into account potential risks, costs, and technical feasibility. The Government will set Air Quality targets which should be achieved throughout the UK by 2005. Local authorities will have to carry out periodic reviews of air quality in their areas. This may build upon existing records and reports.

Where standards are not being met or are not likely to be met an air quality management area should be declared (known as a "Designated Area"), and an action plan produced to improve air quality. This will require objective assessments together with appropriate monitoring and modelling studies. The Agency will liaise fully with Local Authorities and agree any maps or quotients representing air quality.

Cornwall air quality forum

The forum has been formed as one of 14 pilot areas nationwide. It is led by Carrick District Council, and has representation from all local authorities in the county and the Agency. The Forum has been funded by the government to:

- review and assess government guidance on air quality strategy, its appropriateness, requirements and applicability.
- carry out an assessment of monitoring techniques for PM10s (dust) at a china clay quarry site.

A contract has been let to complete this work by September 1997.

Air quality information exists for Cornwall but there is not full knowledge of what is available. Information is held in different places and is not easily accessible as a whole. Members of the Air Quality Forum are working together to identify all available information.

Ground level ozone

Ozone in the upper atmosphere shields the earth from harmful UV radiation. At ground level however, ozone can be a harmful pollutant damaging crops and building materials and causing respiratory difficulties amongst sensitive people. Ozone is not emitted directly from any man-made source in any significant quantities, but arises from complicated chemical reactions in the atmosphere driven by sunlight. In these reactions, oxides of nitrogen and hydrocarbons (derived mainly from vehicle exhausts) react in the atmosphere to produce ozone. These chemical reactions do not take place instantaneously, but over several hours or even days, and once ozone is produced it may persist for several days. In consequence, ozone produced at one site may be carried for considerable distances in the air, and maximum concentrations usually occur away from the source of the primary pollutants. The highest concentrations of ozone generally occur during hot, sunny and relatively windless days in summer.

In common with other parts of Southern England, ozone levels in the catchment are generally above those at which damage to vegetation may occur[14]. The Expert Panel of Air Quality Standards (EPAQS) recommend an Air Quality Standard for ozone in the UK of 50 parts per billion (ppb) as a running 8-hour average. Figure 4 shows the estimated number of days in the South West over which this recommendation would be exceeded.

The Department of Environment has published a UK strategy on the reduction of emissions that can produce ozone[15]. Nationally the Environment Agency will have an input into the reduction of volatile organic compounds (VOCs) and oxides of nitrogen (NOx), both of which are precursors in the formation of ground level ozone. VOC and NOx releases from IPC processes are controlled by limits in authorisations. These limits will be reduced over time as operators move towards new plant standards.

Nitrogen oxides

The World Health Organisation (WHO) and United Nations Economic Commission for Europe have recommended an air quality guideline of 30 micrograms/m^3 (15.7 ppb) for effects of nitrogen oxides (NO_2 and NO) on vegetation. Figure 5 indicates that this value is exceeded in one or two localities.

A map based on national monitoring data is not able to indicate specific sources which might lead to local exceedences, for example, alongside busy roads or industrial sources. These could only be identified through local monitoring.

It is anticipated that exceedences of air pollutants recorded within the catchment will be reviewed as part of national and local initiatives previously described.

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APPENDIX A

SSSI Designations

The 34 SSSIs within the catchment can be grouped as follows:

Treen Cliff, Portkgwarra to Pordenack Point, Aire Point to Carrick Du, Godrevy Head to St Agnes, Cligga Head and **Kelsey Head** SSSIs are designated mainly for the extensive tracts of maritime heathland they support. Other habitats present include maritime grassland, scrub and wet flushes. A number of rare plant species are present in some places, some of which are listed in the Red Data Book (RDB). Invertebrate populations, particularly Lepidoptera, are significant in some sites. Much of the coastline within these sites is an important staging post for migrating birds.

Silverwell Moor, Ventongimps Moor and **Carnkief Pond** contain wet heathland, noted for the presence of the rare Dorset Heath as well as important Odonata communities.

Penhale Dunes and**Gwithian to Mexico Towans** are the largest and second largest sand dune systems in Cornwall. These illustrate a range of erosional and depositional coastal processes, but are most noted for their species-rich vegetation. A number of RDB and Nationally Scarce species occur, and Penhale is one of the richest moss sites in Cornwall. Lepidoptera communities are also extremely rich at both sites.

Loe Pool SSSI contains the largest natural freshwater lake in Cornwall, and the shingle feature of Loe Bar is a unique coastal feature in Cornwall. Several rare plant species occur on the bar and in the site, and the bar holds the only known British population of the Cornish subspecies of the Sandhill Rustic Moth. Significant numbers of waterfowl overwinter on the pool.

Tregonning Hill is a small area of heath and scrub that supports the only known British population of the RDB liverwort Western Rustwort.

Marazion Marsh holds the largest reedbed in Cornwall. Three Nationally Rare plants occur here, and the site is an important fuelling point for migratory birds and for breeding Odonata.

Hayle Estuary & Carrick Gladden contains the most south-westerly estuary in Britain. This is of great significance to migratory and wintering birds. Sand dune, salt marsh and maritime heathland occurs, and several rare plant species grow here.

Chyenhal Moor is a small area of wet heath and willow carr.The site has a long recording history, which includes several rare species.

Loggans Moor is the most species-rich meadow in west Cornwall. It contains damp and calcareous grassland and tall herbs which include several rare species.

Nance Wood is an area of semi-natural oak woodland which supports one of only two populations of the RDB Irish Spurge.

The remaining 16 SSSIs - **Porthleven Cliffs, Porthleven Cliffs East,Wheal Penrose, Tremearne Par, Great Wheal Fortune, Porthcew, Folly Rocks, Cudden Point to Prussia Cove, St. Michael's Mount, Penberthy Croft Mine, Penlee Point, Tater-du, St. Erth Sand Pits, Wheal Alfred, St. Agnes Beacon Pits** and **Trevaunance Cove** are listed primarily for a wide range of significant geological reasons, although a few have biological interest as well. Many reflect the district's rich mining and mineralogical heritage, as well as the unusual conditions created by the igneous granitic intrusions contacting with the existing 'country rock'.

Appendix B Table 1 : Standards for the Five River Ecosystem Use Classes

Use Class	DO % sat 10%ile	BOD (ATU) mg/l 90%ile	Total Ammonia mgN/l 90%ile	Un-ionised Ammonia mgN/l 95%ile	pH 5%ile & 95%ile	Hardness mg/l $CaCO_3$	Dissolved Copper µg/l 95%ile	Total Zinc µg/l 95%ile	Class Description
1	80	2.5	0.25	0.021	6.0 - 9.0	≤10 >10 and ≤50 >50 and ≤100 >100	5 22 40 112	30 200 300 500	Water of very good quality suitable for all fish species
2	70	4.0	0.6	0.021	6.0 - 9.0	≤10 >10 and ≤50 >50 and ≤100 >100	5 22 40 112	30 200 300 500	Water of good quality suitable for all fish species
3	60	6.0	1.3	0.021	6.0 - 9.0	≤10 >10 and ≤50 >50 and ≤100 >100	5 22 40 112	300 700 1000 2000	Water of fair quality suitable for high class coarse fish populations
4	50	8.0	2.5	-	6.0 - 9.0	≤10 >10 and ≤50 >50 and ≤100 >100	5 22 40 112	300 700 1000 2000	Water of fair quality suitable for coarse fish populations
5	20	15.0	9.0	-	-	-	-	-	Water of poor quality which is likely to limit coarse fish populations

Appendix B Table 2: Stretches with 'Set Aside' data

River	Stretch Name	Set aside	
Cober	Source-Trenear Bridge		
Medlyn Stream	Source-Cober Confluence	Copper	Zinc
Tregilliowe Stream	Source-Marazion River Confluence	Zinc	
River Hayle	Binner Bridge-Godolphin Bridge	Copper	Zinc
River Hayle	Godolphin Bridge-Normal Tidal Limit	Zinc	
Godolphin Stream	Source-Hayle Confluence	Copper	Zinc
Red River	Above Brea Works-Above South Crofty Mine	Copper	
Roseworthy Stream	Penponds-Red River Confluence	Zinc	
Praze River	Praze-Roseworthy Stream Confluence	Copper	
Reen Stream	Source-Roseworthy Stream Confluence	Copper	
Portreath Stream	Source-Mean High Water	Copper	Zinc
Redruth Stream	Source-Portreath Stream Confluence	Copper	Zinc
Porthtowan Stream	Mount Hawke-Downstream STW	Copper	Zinc
Porthtowan Stream	Downstream STW-Normal Tidal Limit	Copper	Zinc
Trevellas Stream	Source-Mean High Water	Zinc	
Bolingey Stream	Source-Perranwell	Zinc	
Bolingey Stream	Perranwell-Normal Tidal Limit	Zinc	

Appendix B Table 3: River Quality Objective proposals for the West Cornwall LEAP

River	Stretch Name	Proposals	
		RQO	LTRQO
Cober	Source-Trenear Bridge	1	
	Trenear Bridge-Lowertown Bridge	1	
	Lowertown Br-Loe Pool Inflow	2	
Bodilly Stream	Source-Cober Confluence	2	
Medlyn Stream	Source-Cober Confluence	1	
Marazion River	Source-Nancledra	1	
	Nancledra-Cucurrian Mill	1	
	Cucurrian Mill-Mean High Water	1	
Tregilliowe Stream	Source-Marazion River Confluence	3	
Trevaylor Stream	Source-Mean High Water	1	
Rosemorran Stream	Source-Trevaylor Stream Confluence	1	
Newlyn River	Source-Drift Reservoir Inflow	1	
	Drift Reservoir-Buryas Bridge	1	
	Buryas Bridge-Stable Hobba	1	
	Stable Hobba-Normal Tidal Limit	1	
Sancreed Brook	Source-Drift Reservoir Inflow	1	
Lamorna Stream	Source-Mean High Water	1	
Carn Euny Stream	Source-Lamorna Stream Confluence	1	
Penberth Stream	Source-Mean High Water	1	
Tregeseal Stream	Source-Tregeseal Bridge	1	
	Tregeseal Bridge-Mean High Water	1	
Hayle	Source-B3303 Bridge Crowan	1	
	B3303 Bridge Crowan-Drym Farm	1	
	Drym Farm-Binner Bridge	1	
	Binner Bridge-Godolphin Bridge	1	
	Godolphin Bridge-Normal Tidal Limit	1	
St. Erth Stream	Source-Normal Tidal Limit	1	
Millpool Stream	Source-Hayle Confluence	1	
Godolphin Stream	Source-Hayle Confluence	1	
Nancegollan Stream	Source-Hayle Confluence	1	
Angarrack Stream	Source-Normal Tidal Limit	1	
Red River	Above Brea Works-Above South Crofty Mine	1	
	Above South Crofty Mine-Roscroggan Br	5	2
	Roscroggan Bridge-Kieve Bridge	5	2
	Kieve Bridge-Mean High Water	5	1
Roseworthy Stream	Botetoe Bridge-Penponds	1	
	Penponds-Red River Confluence	1	
Praze River	Cargenwen No.1 Reservoir-Praze	1	
	Praze-Roseworthy Stream Confluence	2	
Reen Stream	Source-Roseworthy Stream Confluence	1	
Tehidy Stream	Tolvaddon Bridge-Red River Confluence	1	
Portreath Stream	Source-Mean High Water	1	
Redruth Stream	Source-Portreath Stream Confluence	2	
Porthtowan Stream	Source-Upstream STW	2	
	Upstream STW-Upstream Menagissey Confluence	5	3
	Menagissey Confluence - Normal Tidal Limit	4	3
Menagissey Stream	Source-Porthtowan Stream Confluence	1	
Trevellas Stream	Source-Mean High Water	1	
Perranporth Stream	Mithian-Normal Tidal Limit	1	
Bolingey Stream	Source-Perranwell	1	
	Perranwell-Normal Tidal Limit	1	
Holywell Stream	Source-Trelaske	1	
	Trelaske-Normal Tidal Limit	1	

MANAGEMENT AND CONTACTS:

The Environment Agency delivers a service to its customers, with the emphasis on authority and accountability at the most local level possible. It aims to be cost-effective and efficient and to offer the best service and value for money.

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