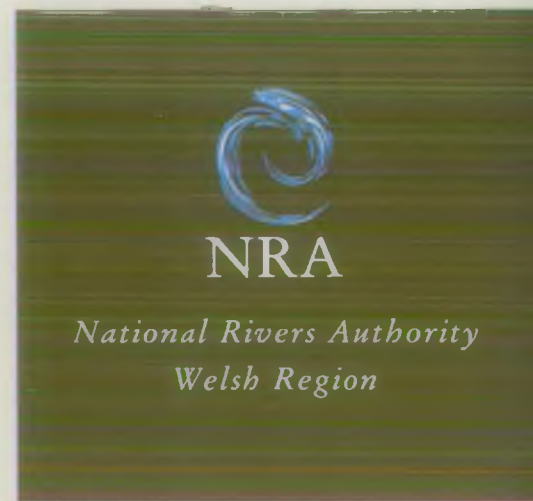
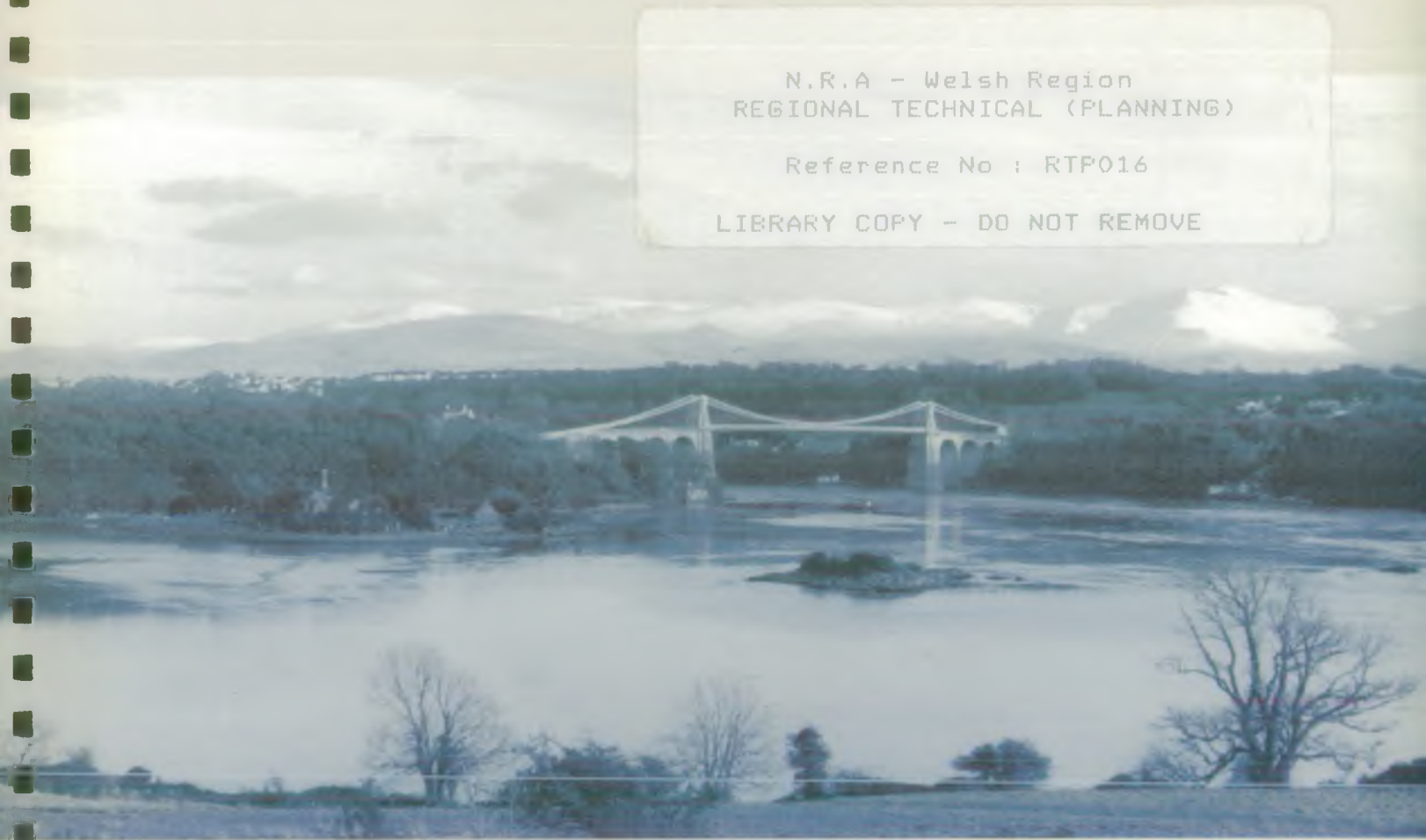


# MENAI STRAIT CATCHMENT MANAGEMENT PLAN CONSULTATION REPORT

N.R.A - Welsh Region  
REGIONAL TECHNICAL (PLANNING)

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NRA Wales 26

**Menai Strait  
Catchment Management Plan  
Consultation Report  
June 1993**

**National Rivers Authority  
Welsh Region  
Rivers House  
St Mellons Business Park  
St Mellons  
Cardiff  
CF3 OLT**

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# MENAI CATCHMENT MANAGEMENT PLAN

## CONTENTS

|  | <u>PAGE No.</u> |
|--|-----------------|
| 1.0 CONCEPT                                    | 3               |
| 2.0 OVERVIEW                                   | 5               |
| 2.1 Introduction                               | 5               |
| 2.2 Population                                 | 5               |
| 2.3 Land Use                                   | 6               |
| 2.4 Infrastructure                             | 6               |
| 2.5 Geography                                  | 6               |
| 2.6 Water Quality                              | 6               |
| 2.7 Ecology                                    | 6               |
| 2.8 Exploitation                               | 6               |
| 2.9 Water Sports                               | 6               |
| Key Details                                    | 7               |
| 3.0 CATCHMENT USES                             | 8               |
| 3.1 Development - housing, industry & commerce | 8               |
| 3.2 Basic Amenity                              | 11              |
| 3.3 Conservation/Marine Ecology                | 12              |
| 3.4 Special Conservation Areas                 | 13              |
| 3.5 Marine Fisheries                           | 15              |
| 3.6 Angling                                    | 17              |
| 3.7 Salmonid Fishery                           | 18              |
| 3.8 Commercial Shellfishery                    | 19              |
| 3.9 Flood Defence                              | 21              |
| 3.10 Immersion Sports                          | 23              |
| 3.11 Boating                                   | 24              |
| 3.12 Water Abstraction                         | 26              |
| 3.13 Effluent Disposal                         | 27              |
| 3.14 Scientific Research                       | 29              |
| 3.15 Navigation                                | 30              |
| 4.0 CATCHMENT TARGETS                          | 31              |
| 4.1 Water Quality Targets                      | 31              |
| 4.2 Water Quantity Targets                     | 33              |
| 4.3 Physical Features Targets                  | 34              |
| 5.0 STATE OF THE CATCHMENT                     | 36              |
| 5.1 Water Quality                              | 36              |
| 5.2 Water Quantity                             | 38              |
| 5.3 Physical Features                          | 39              |

|                        |    |
|------------------------|----|
| 6.0 ISSUES AND OPTIONS | 40 |
| General                | 40 |
| Issues and Options     | 41 |
| 7.0 CONFLICTS          | 45 |
| General                | 45 |

### **Appendices**

|                                  |    |
|----------------------------------|----|
| Appendix 1. Water Quality Suites | 48 |
| Appendix 2. Development          | 66 |
| Appendix 3. Glossary of Terms    | 68 |

### **MAPS**

### **Opposite Page No.**

|  |    |
|--|----|
| MENAI STRAIT CATCHMENT                                   | 6  |
| DEVELOPED AREAS IN THE MENAI CATCHMENT                   | 8  |
| MENAI STRAIT BASIC AMENITY                               | 11 |
| MENAI STRAIT GENERAL ECOSYSTEM CONSERVATION              | 12 |
| MENAI STRAIT SPECIAL CONSERVATION AREAS                  | 13 |
| MENAI STRAIT MARINE FISHERIES                            | 15 |
| ANGLING IN THE MENAI STRAIT                              | 17 |
| MENAI STRAIT SALMONID FISHERY                            | 18 |
| MENAI STRAIT COMMERCIAL SHELLFISHERY                     | 19 |
| MENAI STRAIT SEA DEFENCES                                | 21 |
| IMMERSON SPORTS AND BATHING IN THE MENAI STRAIT          | 23 |
| BOATING IN THE MENAI STRAIT                              | 24 |
| WATER ABSTRACTION IN THE MENAI STRAIT                    | 26 |
| EFFLUENT DISPOSAL IN THE MENAI STRAIT                    | 27 |
| MENAI STRAIT MONITORING AND RESEARCH                     | 29 |
| MENAI STRAIT NAVIGATION                                  | 30 |
| MENAI STRAIT WATER QUALITY TARGETS                       | 31 |
| MENAI STRAIT PHYSICAL FEATURES TARGETS                   | 34 |
| MENAI STRAIT - WATER QUALITY STATE OF THE CATCHMENT      | 36 |
| MENAI STRAIT - PHYSICAL FEATURES STATE OF THE CATCHMENT. | 39 |

## 1.0 CONCEPT

The National Rivers Authority is the major environmental protection agency responsible for safeguarding and improving the natural water environment in England and Wales. The nature of its responsibilities are wide reaching and include:

Control of pollution and improving the quality of rivers, groundwaters and coastal waters.

Flood defence, including the protection of people and property.

Flood warning.

Effective Management of water resources.

Maintenance and improvement of fisheries.

Conservation of the natural water environment.

Promotion of water based recreation.

Promotion of navigation in some locations.

To achieve success in all these areas the NRA works with industry, commerce, farming and the general public to promote environmental awareness and to enforce appropriate environmental standards.

Catchment management assists the NRA to use its authority and work with others to ensure that the rivers, lakes, coastal and underground waters are protected and where possible improved for the benefit of future generations.

River catchments and coastal areas are subject to increasing use by a variety of activities. Many of these interact and some conflicts arise. The competing requirements and interests of users and beneficiaries must be balanced.

The NRA will use its resources to:

- i) Respond promptly to all reported pollution incidents.
- ii) Control pollution by working with dischargers to achieve improvement and monitor effluent compliance with appropriate standards.
- iii) Maintain existing and invest in new assets to provide flood protection, develop water resources and provide other NRA services.

- iv) Determine, police, enforce and review the conditions in water abstraction licences, discharge consents and land drainage consents to achieve operational objectives. It will at all times carry out its activities in an environmentally sensitive manner.
- v) Develop and regulate fisheries, protect and promote recreation, navigation and conservation.
- vi) Influence planning authorities to control development so as to avoid conflict with NRA objectives and initiatives through Town and Country planning liaison.
- vii) Assess, manage, plan and conserve water resources.

This draft catchment management plan consolidates the policies, objectives and options for the Menai Strait for the overall improvement of the water environment. The plan is drawn up as follows:

1. Uses of the Catchment  
For the identified uses of the water environment up to two pages of text is produced supported by a map indicating where in the catchment each use occurs. Objectives for the use are identified and targets set, where applicable, for Water Quality, Water Quantity and Physical Features.
2. Catchment Targets  
By taking the targets for individual uses, overall targets for Water Quality, Water Quantity and Physical Features are set for catchment.
3. Current State of the Catchment  
Having set targets it is now possible to view the current state of the catchment and identify issues that need addressing to meet future targets.
4. Issues and Options  
It is now possible to identify individual issues and suggest options to resolve these problems. These options identify responsible bodies and suggest advantages and disadvantages.

The plan is now released for public consultation in draft form. Comments on the Objectives/Targets and Issues/Options are invited before the plan is finalised to produce an Action Plan for the Catchment.

The issues and options as presented are the initial thoughts of the Welsh Region of the NRA and do not constitute policy statement. Following the consultation period, all comments will be drawn together and considered in drafting the Action Plan.

## 2.0 OVERVIEW

### 2.1 Introduction

The Menai Strait is a magnificent sea channel, famed for its scenic beauty, ecological importance and wide-ranging recreational opportunities, that separates Ynys Môn (the Isle of Anglesey) from the mainland of Gwynedd in North Wales. It is narrow, varying in width between 180 metres (200 yards) and 3.2 kilometres (2 miles), and extends for some 24 kilometres (15 miles) from Ynys Seiriol (Puffin Island) to Abermenai. The Strait is made up of eastern and western reaches, both running from north-east to south-west, linked by a short central north-south (Llanfairpwll to Felinheli) reach. There are at least three different theories describing the geological evolution, although all agree that the present marine channel was formed in post-glacial times.

The Strait is spanned by two famous 19th century bridges, the Menai suspension road bridge completed by Thomas Telford in 1827 and Robert Stephenson's Britannia tubular railway bridge (1849) which, since rebuilding works after a devastating fire in the 1970s, also carries the A5 Holyhead to London trunk road.

Between the Menai Bridge and Felinheli the Strait is particularly narrow and the consequent swift tidal flows result in a river-like character, which is reflected in the Welsh name of Afon Menai. On either side of this section, the Strait assumes an increasingly estuarine appearance as it widens towards the more open seas of Conwy and Caernarfon Bays respectively.

For the purposes of this Management Plan the boundary is defined as the area from Ynys Seiriol across to Pen y Gogarth (Great Orme's Head) in the north-east and from Ynys Llanddwyn across to Dinas Dinlle in the south-west. This Plan includes all the area below high water together with the coastal strip that influences the Strait. River discharges are treated as inputs, i.e. the catchments of the rivers (principally the Ogwen, Gwyrfai, Cegin, Seiont, Braint and Cefni) which have estuaries into the Strait are not themselves included.

### 2.2 Population

The population associated with the Menai Strait is about 45,000 (see Appendix 2), although this can increase almost ten-fold during the summer tourist season. The two main centres are Caernarfon and Bangor, which account for more than 46% of the population. Academic institutions in the Bangor area (notably the University College of North Wales) contribute to an increase in the resident population of up to 5,000 during term-time.



MAP 1

MENAI STRAIT CATCHMENT



- 2.3 Land Use** Agriculture and tourism are the main industries in the area, the only other significant employers (number of employees greater than 100) being Ferodo at Caernarfon (274), Ferranti at Bangor (360) and Lairds at Beaumaris (130).
- 2.4 Infrastructure** The Strait is not now a merchant seaway although there is a high degree of use by small vessels. The coastal strip carries important trunk road (A55) and rail (Holyhead-London) links which, through crossing the Strait via the Britannia Bridge, provide the main arterial routes for trade between Britain and Eire. There are four centres of administration for the area, Llangefni (Ynys Mon Borough Council), Bangor (Arfon Borough Council), Caernarfon (Arfon Borough Council and Gwynedd County Council) and Conwy (Aberconwy Borough Council).
- 2.5 Geography** The Menai Strait is believed to be the product of the glaciation of two river valleys which flooded as sea level rose following the last ice age, although there are alternative theories on this evolutionary process. Tidal patterns are complicated as flows enter the Strait from both ends, strongly influenced by the currents of the Irish Sea. Tidal range increases clockwise around Anglesey and eastwards through the Strait with a maximum difference of 3 metres. The differences in tidal cycle and range bring about a north-east to south-west residual flow.
- 2.6 Water Quality** Whilst water quality in the Strait is generally good, (Class A in the National Water Council Survey) algal blooms (extensive growths) occur in most years. Their origin is outside the Strait and the resultant decaying algal masses are often mistaken for sewage debris. There are also aesthetic water quality problems arising from discharges of crude sewage, but these are very localised and will be incorporated into a Dwr Cymru Welsh Water sewage treatment and disposal scheme.
- 2.7 Ecology** The Strait provides habitats for an enormous range of marine and associated communities. Consequently a number of Sites of Special Scientific Interest (SSSI) have been designated, and the Countryside Council for Wales (CCW) are undertaking consultation on the designation of the Strait as only the second Marine Nature Reserve (MNR) in Wales.
- 2.8 Exploitation of Resources** The natural resources of the area are exploited commercially and for recreation. In particular there is a commercial fishery for sea fish, shellfish and crustaceans, as well as NRA licensed net fisheries for salmon and sea trout, which migrate through the Strait. It is a popular sea angling venue and organised wildfowling is practised at two estuarial locations.
- 2.9 Water Sports** The Strait supports a wide variety of water sports (principally sailing, diving, water skiing, canoeing) and is the location of the Sport Council for Wales' Water Sports Centre at Plas Menai.

## KEY DETAILS

### Catchment Details

|                                |         |  |
|--------------------------------|---------|--|
| Population                     | Approx. | <u>Existing 1991</u><br>45,000                 |
| Holiday Influx - (peak season) |         | 350,000*(Additional)<br>150,000*(Day Trippers) |
| (peak season = July/August)    |         | * 1980   |

### Topography

Menai Strait Tide Levels (Above Ordnance Datum (Newlyn))

|                        | Beaumaris | Menai Bridge | Port Dinorwic | Caernarfon | Fort Belan |
|------------------------|-----------|--------------|---------------|------------|------------|
| Mean Low Water Spring  | -3.2m     | -3.1m        | -2.25m        | -2.2m      | -2.0m      |
| Mean High Water Spring | 3.7m      | 3.3m         | 2.65m         | 2.25m      | 2.1m       |

### Geography

The Strait is probably the product of the glaciation of two river valleys which flooded as sea level rose following the last ice age.

### Administrative Details

|                             |  |
|-----------------------------|--|
| County Council              | - Gwynedd County Council   |
| District Councils           | - Aberconwy Borough Council<br>Arfon Borough Council<br>Ynys Mon Borough Council |
| National Parks              | - Snowdonia National Park  |
| NRA                         | - Welsh Region - Northern Area   |
| Water Companies             | - Dwr Cymru Welsh Water  |
| Sewage Treatment Works - 11 | Untreated Sewage Outfalls - 28   |

### Main Towns and Populations

|               |          |
|---------------|----------|
| BANGOR (CITY) | - 11,772 |
| CAERNARFON    | - 9,278  |

### Water Quality

December 1990 Survey National Water Council Classification - A (Good)

### Flood Protection

Area at risk of tidal flood 710 Ha

### Fisheries

The Strait is a designated shellfishery under Shellfish Water Directive (79/923/EEC). It also supports migratory salmonids.



MAP 2.

MENAI STRAIT

DEVELOPED AREAS



### 3.0 CATCHMENT USES

---

#### 3.1 DEVELOPMENT - HOUSING, INDUSTRY & COMMERCE

---

##### **General**

In planning the future management of any river, estuary or coastal catchment, the importance of land use planning, and particularly development, cannot be over-emphasised. Existing and future residential, commercial and industrial development has been considered through reference to draft and adopted (approved) county structure and district local plans. These plans identify policies against which the planning authorities consider development proposals.

As a statutory consultee under planning legislation, the NRA advises local authorities on development proposals which may have an impact on matters relevant to its responsibilities.

The NRA is keen to influence properly the strategic level of local authority planning, during the formulation of structure and local plans, through the inclusion of policies in sympathy with its aims. A second opportunity to comment arises during the development control consultation process when individual planning applications are considered. Although the final decision on planning matters rightly rests with the planning authority, government guidelines advise on the need to consider the NRA's concerns in determining proposals.

Irrespective of obtaining planning consent, the NRA may use its relevant powers to control the nature of development proposals.

##### **Local Perspective**

This Menai Strait Plan area (Map 2) lies within the County of Gwynedd and covers parts of the Aberconwy, Arfon and Ynys Mon Borough Council's areas. A very small sector of the catchment falls inside the northern boundary of the Snowdonia National Park.

Development within the Arfon and Ynys Mon areas is currently controlled by the Menai Strait Local Plan, prepared jointly by the Borough Councils and Gwynedd County Council in 1974 (although not formally adopted until 1989). This will, however, be replaced by District Wide Local Plans which are currently in preparation by all three Borough Councils and the National Park. A new draft Structure Plan has been prepared by Gwynedd County Council, which is currently being modified by the Secretary of State for Wales.

There are no development proposals identified in these Plans which could significantly affect the Menai Strait.

---

**3.1 DEVELOPMENT - HOUSING, INDUSTRY & COMMERCE - (CONTINUED)**

---

**MENAI STRAIT CATCHMENT - POPULATION FIGURES (1981 CENSUS)****TOWNS AND MAIN VILLAGES**                      **POPULATION****ARFON BOROUGH COUNCIL**

|            |        |
|------------|--------|
| Caernarfon | 9,278  |
| Felinheli  | 1,766  |
| Bangor     | 11,772 |
| Aber       | 232    |
| Bontnewydd | 1,316  |
| Llanwnda   | 417    |

**ABERCONWY BOROUGH COUNCIL**

|                |       |
|----------------|-------|
| Llanfairfechan | 3,708 |
| Penmaenmawr    | 3,863 |
| Dwygyfylchi    | 1,329 |

**YNYS MON BOROUGH COUNCIL**

|                           |       |
|---------------------------|-------|
| Brynsiencyn               | 886   |
| Llanfairpwll              | 2,884 |
| Menai Bridge              | 2,942 |
| Beaumaris and Llanfaes    | 2,047 |
| Llandegfan and Glyn Garth | 1,947 |
| Llangoed and Penmon       | 1,120 |
| Llaniestyn                | 79    |
| Dwyran                    | 740   |
| Niwbwrch                  | 906   |
| Llangaffo                 | 296   |
| Llansadwrn                | 361   |

---

|                 |        |
|-----------------|--------|
| CATCHMENT TOTAL | 44,827 |
|-----------------|--------|

---

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**3.1 DEVELOPMENT - HOUSING, INDUSTRY & COMMERCE - (CONTINUED)**

---

**Development -  
Objectives**

To ensure new development is not itself at risk from flooding and does not put other areas at risk of flooding which could endanger life and damage property.

To ensure any work which is needed to reduce the risk of flooding created by a new development is paid for by the developer and not the public.

To protect, and where possible, enhance the water environment (inland, coastal and ground waters) in association with any approved development.

To ensure that the pollution risks associated with contaminated land, whether in the dormant state, disturbed through development or within an active industrial site, are minimised.

**Development -  
Policy Summary**

Any development, including the raising of land, which in the opinion of the NRA would be likely to impede the flow of flood water, or increase the risk of flooding elsewhere or increase the number of people or properties at risk, would be contrary to NRA policy.

The conservation and enhancement of wildlife, landscape and archaeological features associated with rivers, ponds, lakes, estuaries will be promoted.

Any development, including changes in land use, which in the opinion of the NRA would pose an unacceptable risk to the quality or quantity of ground and surface water, would be contrary to NRA policy.

The NRA will seek appropriate controls to protect the aquatic environment from pollution associated with contaminated land. Redevelopment of contaminated sites will be controlled within the planning process to achieve this protection.



**MAP 3. MENAI STRAIT BASIC AMENITY**



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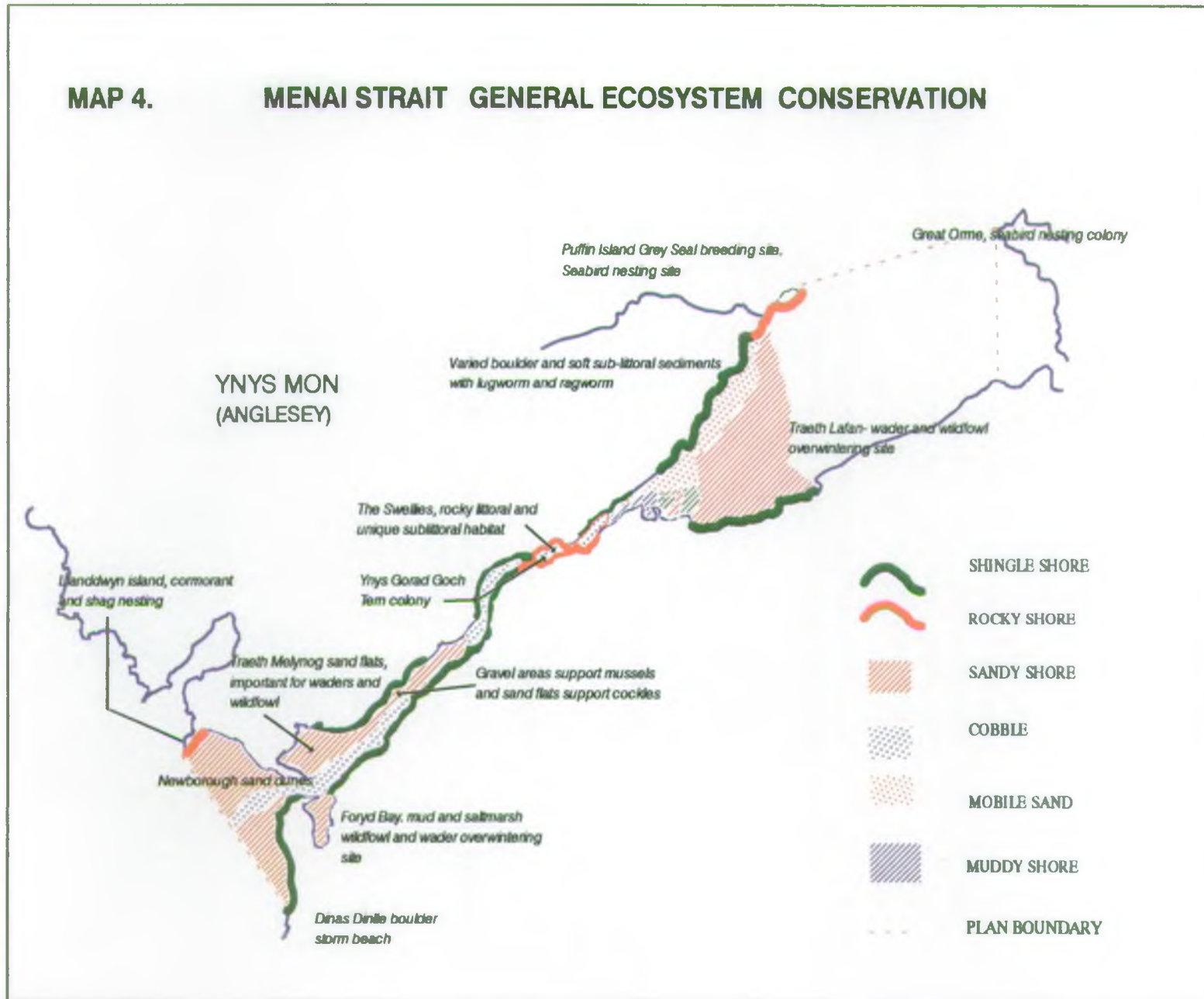
### 3.2 BASIC AMENITY

---

|                                       |  |
|---------------------------------------|--|
| <b>General</b>                        | Basic Amenity relates to aesthetic aspects, primarily the visual appearance, of the water body.  |
| <b>Local Perspective</b>              | The use of the Menai Strait can be traced back through history for over 2000 years and today is of very high amenity value to both residents and visitors (Map 3). The Strait is generally accessible and there are superb sea views along the entire length from both shores, set against the backcloth of Snowdonia on the Ynys Môn side. The wide-ranging recreational opportunities serve as a further attraction to draw thousands more people each year. Thus the visual appearance and colour of the water, upon which first impressions of the Strait are largely based, is a critical component of this Plan. |
| <b>Objective</b>                      | To maintain and improve water quality in order that the amenity value of the Strait may be protected and enhanced.   |
| <b>Water Quality Requirements</b>     | Water should be free from surface films, extraneous floating material, discolouration or unpleasant odour (Water Quality suite 1, Appendix 1).   |
| <b>Water Quantity Requirements</b>    | The existing tidal flow characteristics should be protected.   |
| <b>Physical Features Requirements</b> | Existing footpaths, and rights of access should be maintained.<br><br>The existing physiography of the Strait, in so far as it is practicable, should be maintained.   |

MAP 4.

MENAI STRAIT GENERAL ECOSYSTEM CONSERVATION



### 3.3 CONSERVATION/MARINE ECOLOGY

#### General

This use covers the protection of flora and fauna within and adjacent to the Strait. This includes wildlife which may be totally dependent on the Strait or simply exploits it as a migratory corridor.

The NRA, whilst carrying out its functions or dealing with proposals by others, has the legal duty to further the conservation of flora and fauna.

#### Local Perspective

The Strait is a natural resource of outstanding ecological importance which is considered by the Countryside Council for Wales (CCW) to be worthy of designation as a Marine Nature Reserve. The Strait has provided the site for over a hundred years of research into marine ecology, centred on the University College of North Wales at Bangor.

The narrow "Swellies" area located between the Menai suspension bridge and Britannia bridge provides a biologically-rich area of marine tidal rapids. Throughout the Strait the strong tidal flow maintains a hard bottom in mid-channel which supports a wide fauna including hydroids, bryozoa and serpulids. The shores are formed from sedimentary deposits, ranging from gravel and coarse shell sand to mud with bedrock outcrops in many places. The sediment supports a wide ranging fauna. Small islands located between the two bridges support diverse communities of plants and animals.

Whilst the marine communities in the Strait have evolved within a long history of use and remain relatively natural, there is some evidence that turbidity has increased in the past 30 years which could have affected the distribution of some seaweed species.

#### Objective

To protect and further the conservation value of the Menai Strait.

#### Water Quality Requirements

The whole of the Menai Strait should comply with the standards for protection of aesthetic quality and the protection of marine life. (Water Quality suites 1,2,3 Appendix 1).

#### Water Quantity Requirements

The existing tidal flow characteristics should be protected.

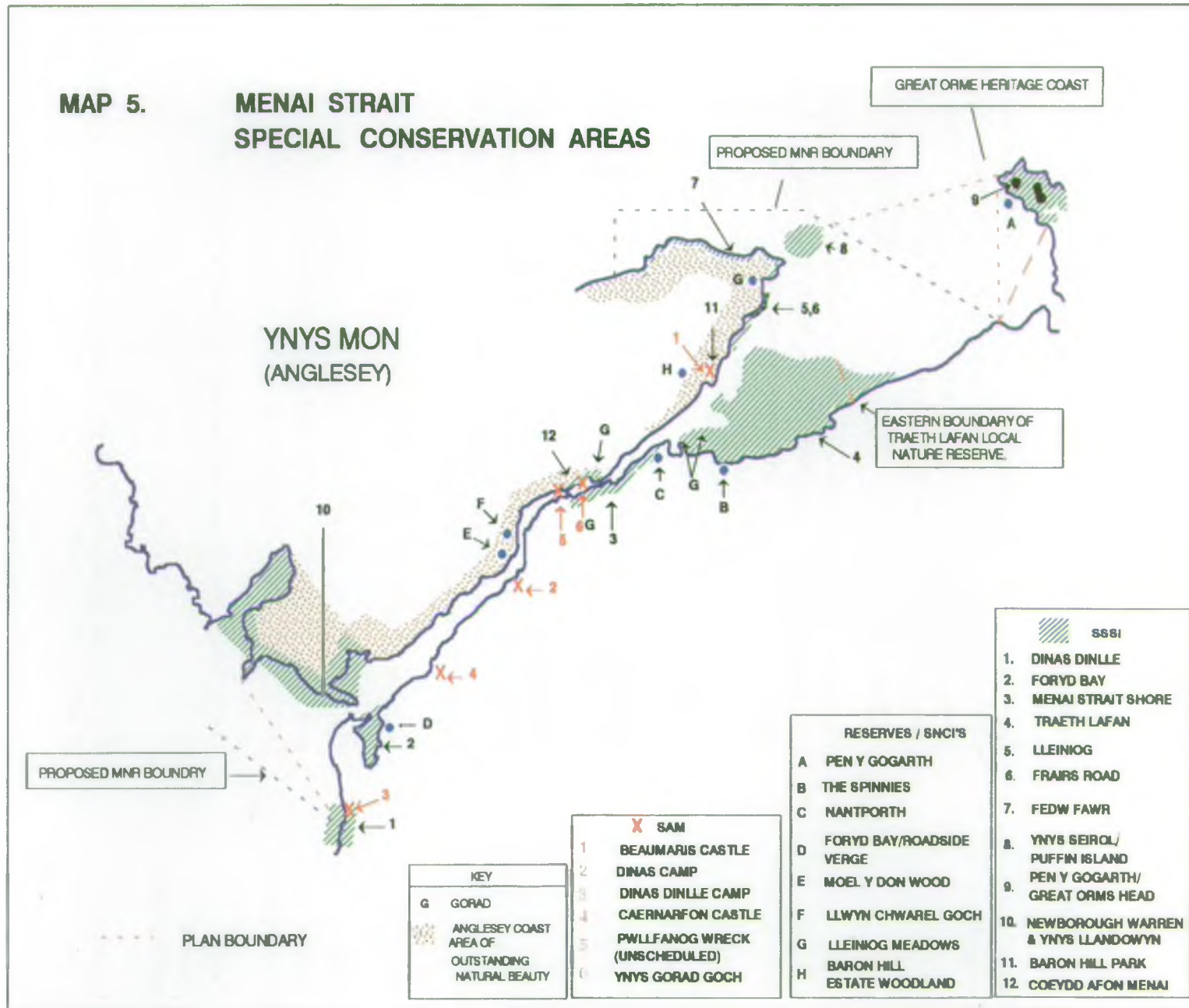
#### Physical Features Requirements

The existing physiography of the Strait, in so far as it is practicable, should be maintained.

Any development proposal must be protective of the natural habitats.

MAP 5.

**MENAI STRAIT  
SPECIAL CONSERVATION AREAS**



### 3.4 SPECIAL CONSERVATION AREAS

|                                       |  |
|---------------------------------------|--|
| <b>General</b>                        | <p>This use relates to the protection of sites formally designated as being of particularly high conservation value, including Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNR), and Scheduled Ancient Monuments (SAM).</p> <p>It also concerns the protection of sites which, although valuable in ecological terms, are not formally protected, e.g. Nature Reserves and County Trust Sites of Nature Conservation Interest (SNCI).</p>   |
| <b>Local Perspective</b>              | <p>In 1947 the Anglesey Coast was designated a Conservation Area, later modified to an Area of Outstanding Natural Beauty (AONB), and Great Orme's Head is a designated Heritage Coast. The conservation needs of these two areas are taken into account by the local planning authorities.</p> <p>Newborough Warren and Ynys Llanddwyn are designated National Nature Reserves. There are also 10 SSSIs and a number of Local Nature Reserves, e.g. Traeth Lafan.</p> <p>The main archaeological interests in the Strait include several stone fish traps (goradau) constructed in the fifteenth century or earlier, the best preserved of these being Gorad Goch and Gorad Ddu in the Swellies. There are many wrecks, particularly in the Swellies, including HMS Conway.</p> <p>Current issues include disturbance, bait digging by anglers, dog walking, horse riding and the impact of hydraulic dredging for cockles.</p> <p>Such is the conservation value of the Strait (Map 5) that CCW has proposed its designation as a Marine Nature Reserve. The original consultation document has recently been revised to account for the comments received, with the intention of soon making a formal submission to the Secretary of State for Wales.</p> |
| <b>Objective</b>                      | To safeguard the special conservation interest of designated sites and other sites of ecological interest and value.   |
| <b>Water Quality Requirements</b>     | Water Quality should be maintained at a level which protects the specific interest of all identified SSSIs, NNRs and other forms of Nature Reserve (Water Quality suite 1, Appendix 1).  |
| <b>Water Quantity Requirements</b>    | The existing tidal flow characteristics should be protected.   |
| <b>Physical Features Requirements</b> | Landscape features which contribute to the Anglesey Coast AONB and the Great Ormes Head Heritage Coast should be maintained.   |

---

3.4 SPECIAL CONSERVATION AREAS - (CONTINUED)

---

**Physical  
Features  
Requirements**

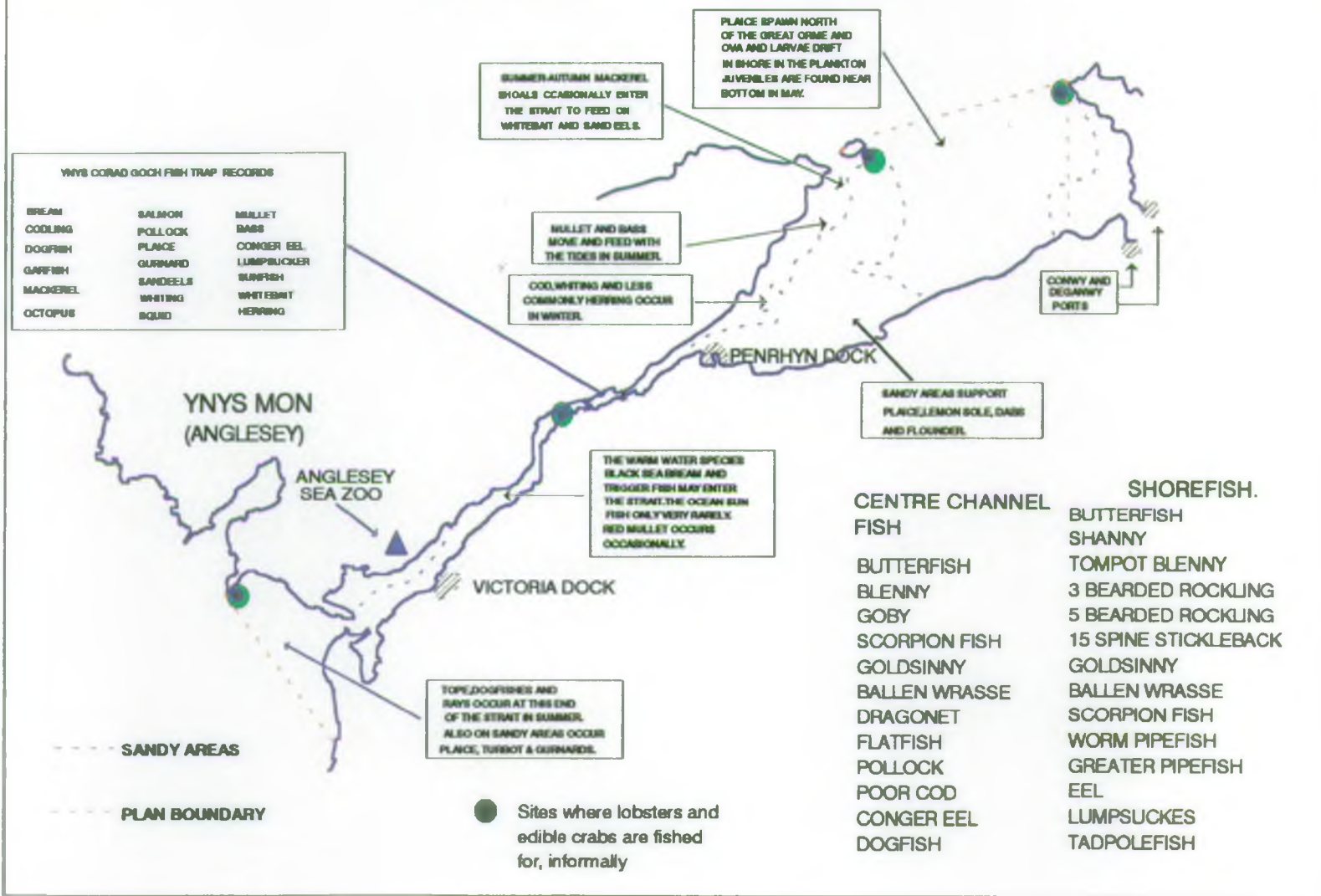
The existing physiography of the Strait, in so far as it is practicable, should be maintained.





MAP 6.

MENAI STRAIT MARINE FISHERIES



---

### 3.5 MARINE FISHERIES

---

|                                    |  |
|------------------------------------|--|
| <b>General</b>                     | Marine Fisheries include all relevant species other than members of the salmon family, freshwater fish or eels.  |
| <b>Local Perspective</b>           | <p>The marine fisheries of the Menai Strait are diverse and important from the point of view of conservation and exploitation, with the CCW having recorded 96 species (Map 6).</p> <p>The resident fish communities of the shore, channel and sand/mud flats are complemented by summer and winter immigration from the Irish Sea. Less common visitors, including rarities such as red mullet, serve to increase the overall diversity of this resource. Both ends of the Menai Strait form a significant nursery area for flatfish, which are recruited into the Irish Sea fisheries. Whilst most of the fish landed at Caernarfon, Bangor and Conwy are caught outside the Strait there is a limited amount of trawling within the area, mainly from small boats east of Port Penrhyn. In summer they catch plaice, flounder, dabs, sole, rays, dogfish, mullet, pollock and gurnard whereas in winter cod, whiting, herring and dogfish are the main species.</p> <p>Management of the marine fishery involves several regulatory bodies:</p> <ul style="list-style-type: none"><li>- North Western and North Wales Sea Fisheries Committee - (NWNWSFC) regulation of the marine fishery.</li><li>- Ministry of Agriculture, Fisheries and Food (in Wales via the Welsh Office) - monitoring of fish stocks and catches, registration of fishery vessels and the enforcement of quotas.</li><li>- Local Authorities - monitoring of the health quality of fish flesh is undertaken by Environmental Health Departments.</li></ul> |
| <b>Objective</b>                   | To protect both the marine fishery and the contribution of the Strait to the Irish Sea Fishery.  |
| <b>Water Quality Requirements</b>  | There should be no deterioration of water quality, which must comply with the standards for protection of aesthetic quality and the protection of marine life (Water Quality suites 1,2,3 Appendix 1).   |
| <b>Water Quantity Requirements</b> | The existing tidal flow characteristics should be protected.   |

---

**3.5 MARINE FISHERIES - (CONTINUED)**

---

**Physical  
Features  
Requirements**

The existing physiography of the Strait, in so far as it is practicable, should be maintained.

Marine fishing must not exploit, or pose any obstruction to, the migration of salmon and sea trout through the Strait.

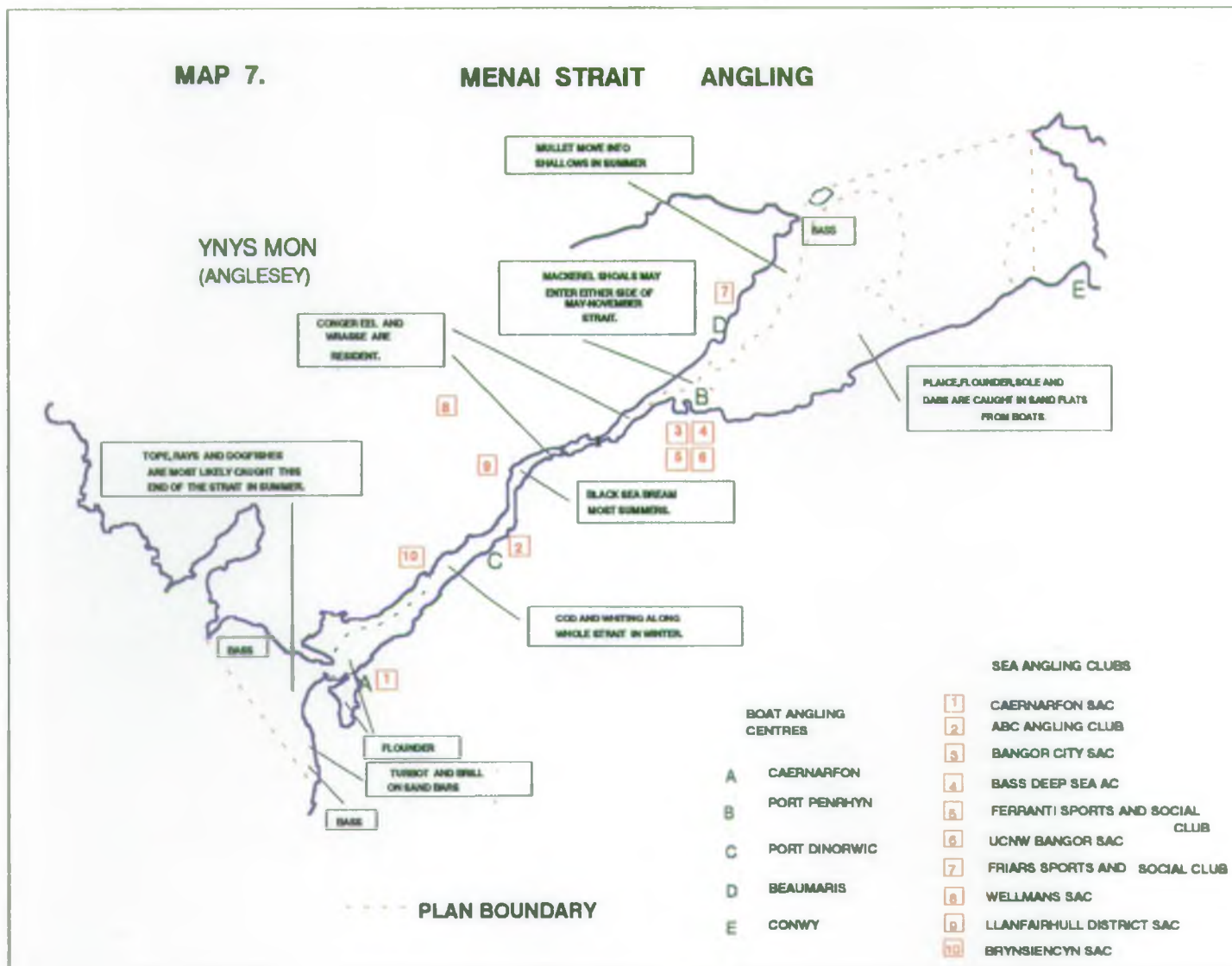
Launching and docking points for sea fishing boats should be protected.

There should be no obstruction to fish movement into and out of the Strait.



MAP 7.

MENAI STRAIT ANGLING

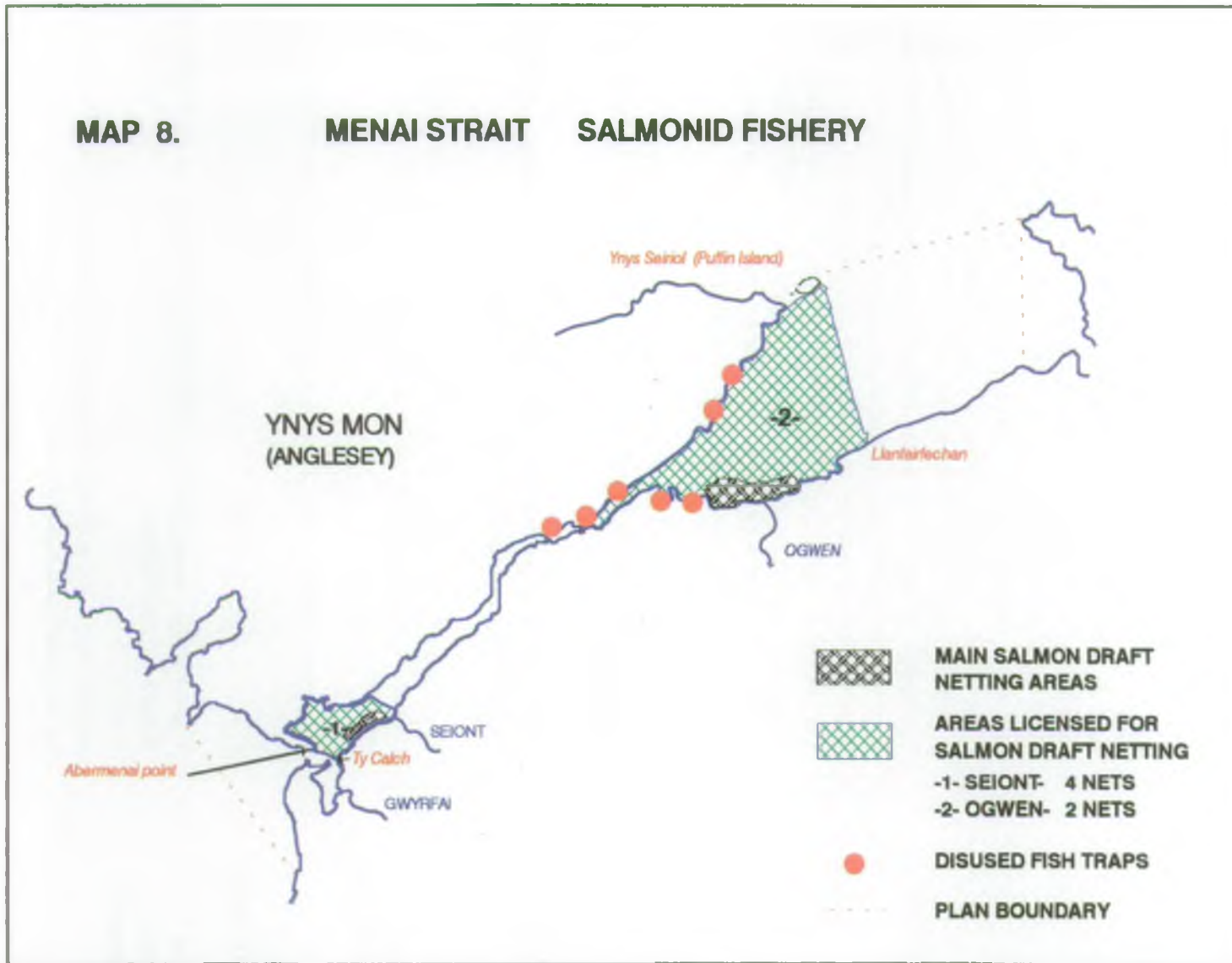


### 3.6 ANGLING

|                                       |   |
|---------------------------------------|---|
| <b>General</b>                        | Angling relates to fishing with rod and line. Generally this is recreational, although some commercial angling takes place.   |
| <b>Local Perspective</b>              | <p>The Menai Strait is a very popular angling venue, as a result of the wide variety of fish species available and the high level of access (Map 7). Virtually the whole length of the Strait is open to angling and about 20 commercial angling boats operate from centres at Caernarfon, Port Penrhyn, Port Dinorwic, Beaumaris and Conwy. In addition, a large number of privately owned small boats are used within the Strait. Over 500 shore anglers may fish over a summer weekend, with a further 200 from boats, and the Strait is also used as a venue for angling competitions. Bass fishing is especially popular although catches, especially of larger fish, have declined since the peak of the early 1960s. In response MAFF have introduced a new size limit of 36cm and other conservation measures, including minimum gill net mesh dimensions. The possible over exploitation of wrasse, bait collection by anglers (lugworm, ragworm and crabs) and discarded nylon fishing line cause concern. With the exception of wrasse, the direct effects of angling on the fish population are thought to be slight.</p> <p>Although salmon and sea trout are present they are not fished for on any regular basis. Anglers fishing for these species must have a current NRA rod fishing licence.</p> |
| <b>Objective</b>                      | To maintain, and enhance where appropriate, conditions which make the Menai Strait a suitable venue for angling.  |
| <b>Water Quality Requirements</b>     | Water quality should be maintained to sustain the fish stock exploited by recreational and commercial anglers. (Water Quality suites 1,2,3 Appendix 1).   |
| <b>Water Quantity Requirements</b>    | The existing tidal flow characteristics should be protected.  |
| <b>Physical Features Requirements</b> | <p>The existing physiography of the Strait, in so far as it is practicable, should be maintained.</p> <p>Access points for angling, launching and docking of angling boats should be protected and maintained.</p>  |

MAP 8.

MENAI STRAIT SALMONID FISHERY



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**3.7 SALMONID FISHERY**

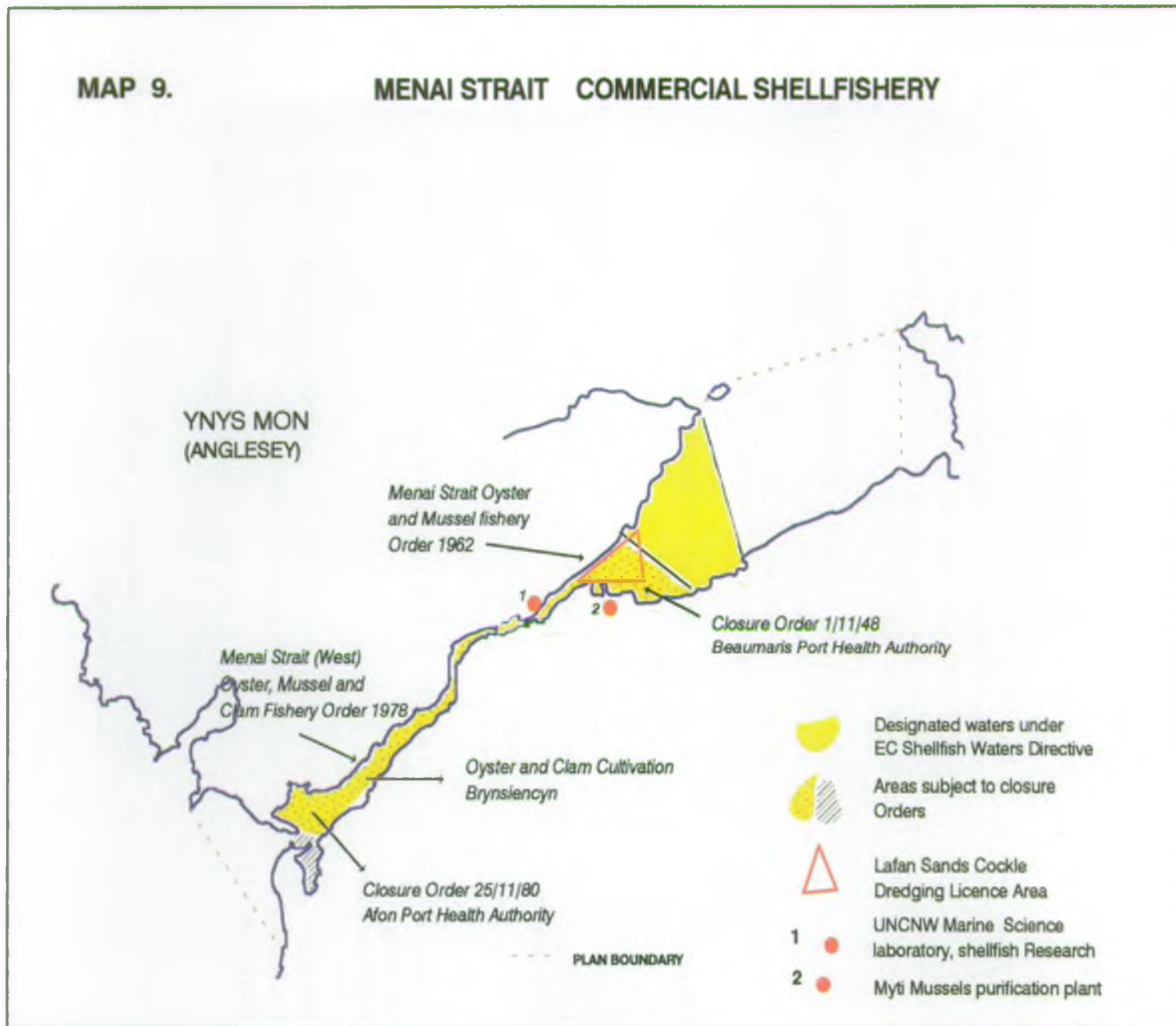
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|                                       |  |
|---------------------------------------|--|
| <b>General</b>                        | This use relates to licensed salmon and sea trout exploitation, which is predominantly by commercial nets.   |
| <b>Local Perspective</b>              | <p>The Strait is an important route for migrating salmon and sea trout either returning to rivers to spawn, returning to the sea after spawning or going to sea for the first time as smolts.</p> <p>It is illegal to fish for, take, or intend to fish for salmon or sea trout without a licence. The NRA licences 6 commercial seine (draft) nets in the Strait which must be fished within defined areas using approved methods and only during stipulated time periods (Map 8). Anglers require an NRA rod licence.</p> <p>The NRA has a major enforcement problem in the Strait as there is considerable illegal netting of salmon and sea trout, often under the guise of fishing for marine species. In conjunction with the NWNWSFC, new bye-laws to control this illegal fishing are being drafted.</p> |
| <b>Objective</b>                      | To protect, maintain and where possible enhance the salmonid fishery within the Menai Strait.  |
| <b>Water Quality Requirements</b>     | <p>Water quality should be maintained in order to permit the migration of salmon and sea trout (Water Quality suites 2,4 Appendix 1).</p> <p>Water quality should be maintained to protect the basic amenity use. (Water quality suite 1 applies, Appendix 1).</p>   |
| <b>Water Quantity Requirements</b>    | The existing tidal flow characteristics should be protected.   |
| <b>Physical Features Requirements</b> | <p>The Strait must be able to support the migration of salmon and sea trout without obstruction or delay.</p> <p>The access points for licensed fishermen should be protected by the responsible bodies.</p> <p>The existing physiography of the Strait, in so far as it is practicable, should be maintained.</p>   |



MAP 9.

MENAI STRAIT COMMERCIAL SHELLFISHERY



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### 3.8 COMMERCIAL SHELLFISHERY

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**General**

This relates to the commercial cultivation and harvesting of shellfish, predominantly mussels, winkles, whelks, and scallops. Crustaceans, including edible crabs, lobsters, crayfish, prawn and shrimp are also included here.

**Local  
Perspective**

The sheltered waters of the Menai Strait support important shellfisheries (Map 9). The Sea Fisheries Committee promote the fishery, which is regulated via bye-laws. Mussel production is important and, in the early 1970s, was about 3000 tonnes per year by the now defunct Severnside Oyster Company. Myti Mussels currently operates the fishery, with an annual production target of 2000 tonnes. Hydraulic dredging for cockles is practised at Traeth Lafan although there is growing concern about the environmental impact of this technique. In 1989 265 tonnes of cockles were landed in the summer months, and 500 tonnes in the months of winter. At Talyfoel, Pacific oysters (6 tonne per year), flat oysters (1 tonne per year), and Manila clams (<1 tonne per year) are cultured, and about 10 tonnes per year of mussels are landed.

Other shellfish are of minor importance although common whelks are collected at Ynys Seiriol and Caernarfon Bar, and periwinkles from Penmon and Y Foryd.

In 1983 the Menai Strait was notified as a designated area under the EC Shellfish Directive. The NRA is the responsible authority and regularly monitors water quality in the shellfisheries. The discharge of sewage effluent into the Strait has resulted in Closure Orders, which require shellfish to be cleaned by a defined process before sale to the public, being applied to two areas. These are implemented by the local authorities.

New hygiene regulations relating to the quality of shellfish, and administered by environmental health departments, are to be introduced in 1993 and implemented fully by 1996 under recent EC Directives (91/492/EEC, and 91/493/EEC). The Fisheries Closure Orders which currently apply will be revoked and the suitability of shellfish for human consumption will then be assessed against the standards of those directives.

**Objectives**

To ensure that water quality is compatible with both the survival of shellfish and their commercial harvesting.

To achieve a minimum classification of category B for all shellfish beds under Directive 91/492/EEC, with a long term objective of category A for all areas.

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**3.8 COMMERCIAL SHELLFISHERY - (CONTINUED)**

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**Water  
Quality  
Requirements**

Water quality above shellfish beds should comply with the EC Shellfish Waters Directive (79/923/EEC). (Water Quality suites 2,3, Appendix 1, also apply).

Water quality should be maintained to enable the commercial harvesting of shellfish (Water Quality suite 1, Appendix 1).

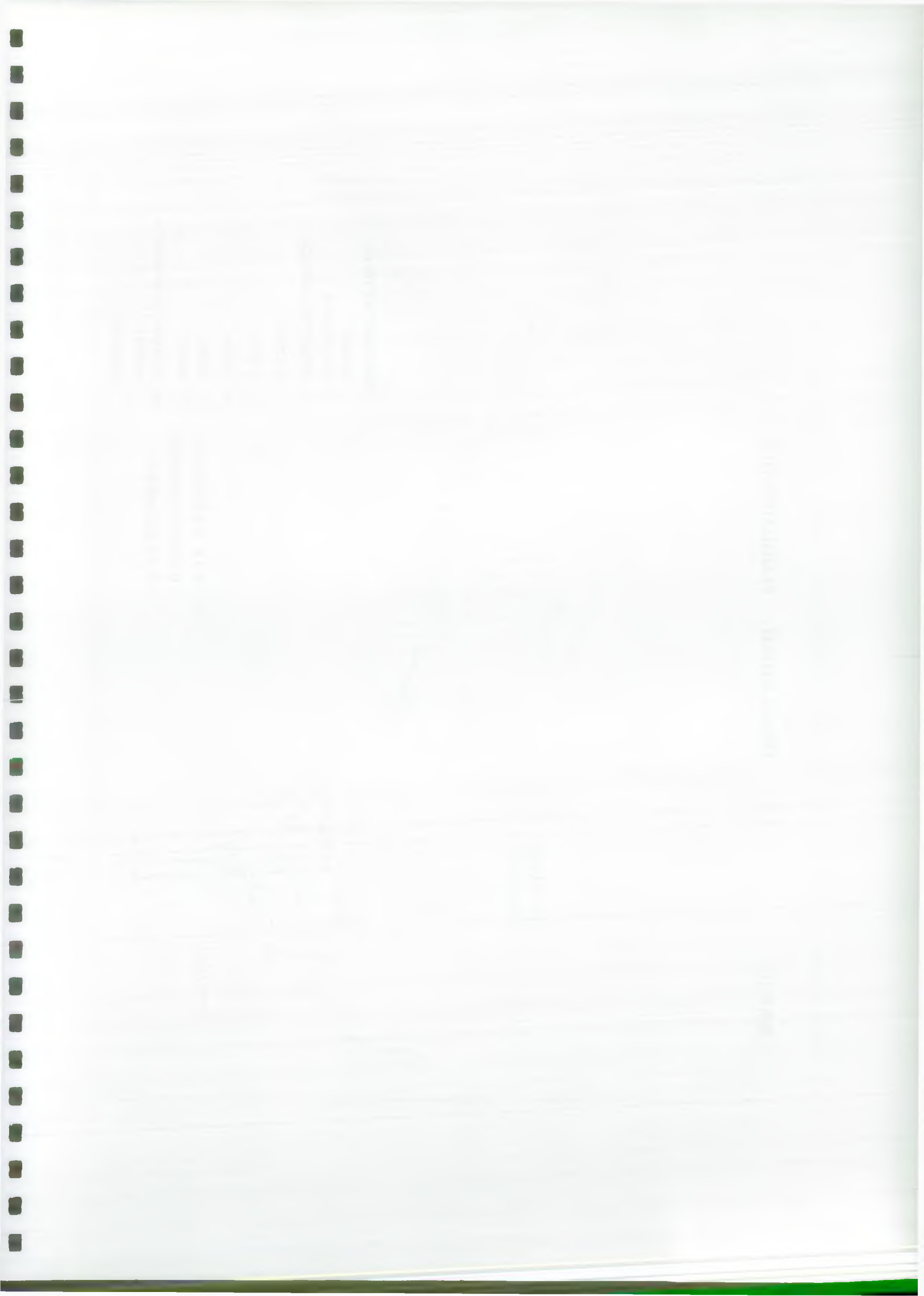
**Water  
Quantity  
Requirements**

The existing tidal flow characteristics should be protected.

**Physical  
Features  
Requirements**

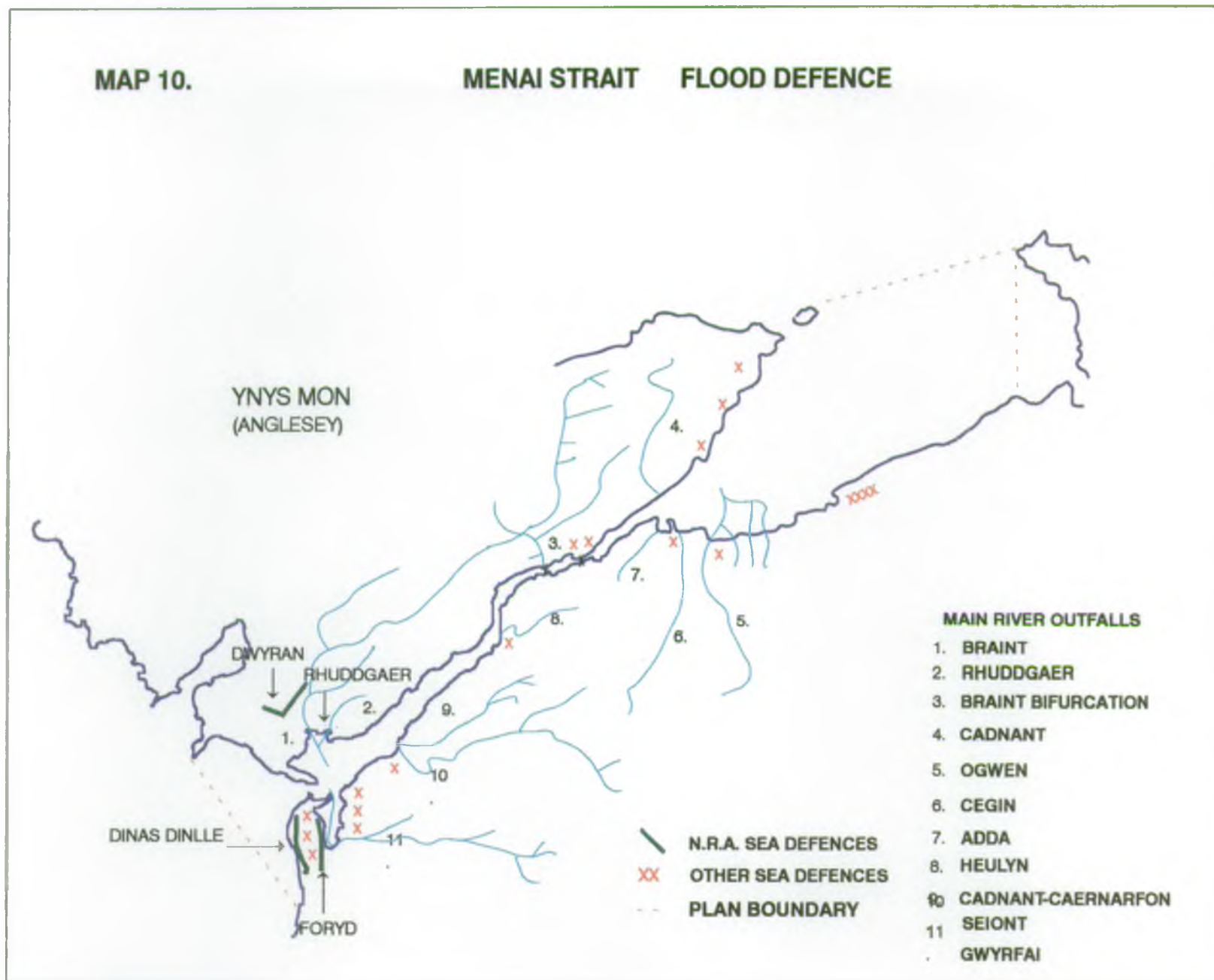
The existing physiography of the Strait, in so far as it is practicable, should be maintained.

Sites suitable for shellfish culture should be identified, and any future relevant development proposal should be assessed as to the likely impact on these sites.



MAP 10.

MENAI STRAIT FLOOD DEFENCE



### 3.9 FLOOD DEFENCE

#### General

This use deals with the provision of effective defence for people and property against flooding from rivers and the sea.

The NRA has the power to maintain or improve certain rivers (which are designated as main rivers) and some sea defence structures. Other sea defences are the responsibility of a variety of public and private bodies.

The need for the NRA to have information regarding the position, condition and effectiveness of these defences, together with details of ownership and responsibility, was highlighted by the flooding incident at Towyn in February 1990. Consequently a sea defence survey was undertaken during 1990/91 to provide that information.

Flooding is normally a result of extreme weather conditions, high tides or a combination of these factors. Flood events are described in terms of the frequency with which on average a certain severity of flood is exceeded. This frequency is usually expressed as a return period in years, e.g. 1 in 50 years.

The effectiveness of flood defences can be measured in terms of the return period up to which they prevent flooding. It is clear that different types of land use require different levels of protection and, in the case of NRA flood defences, these differences are reflected in the NRA's Standards of Service.

#### Local Perspective

##### Main Rivers

Several designated main rivers discharge to the Menai Strait, most of which are subject to periodic maintenance operations by the NRA to ensure adequate drainage. Particular attention is paid to those outfalls which are protected by tidal doors.

##### NRA Sea Defences

The NRA is currently responsible for the maintenance of coastal defences (Foryd Embankment, Dwyran Embankment and Rhuddgaer Sea Wall) which the Sea Defence Survey Report 1992 notes are in a generally good condition.

##### Other Sea Defences

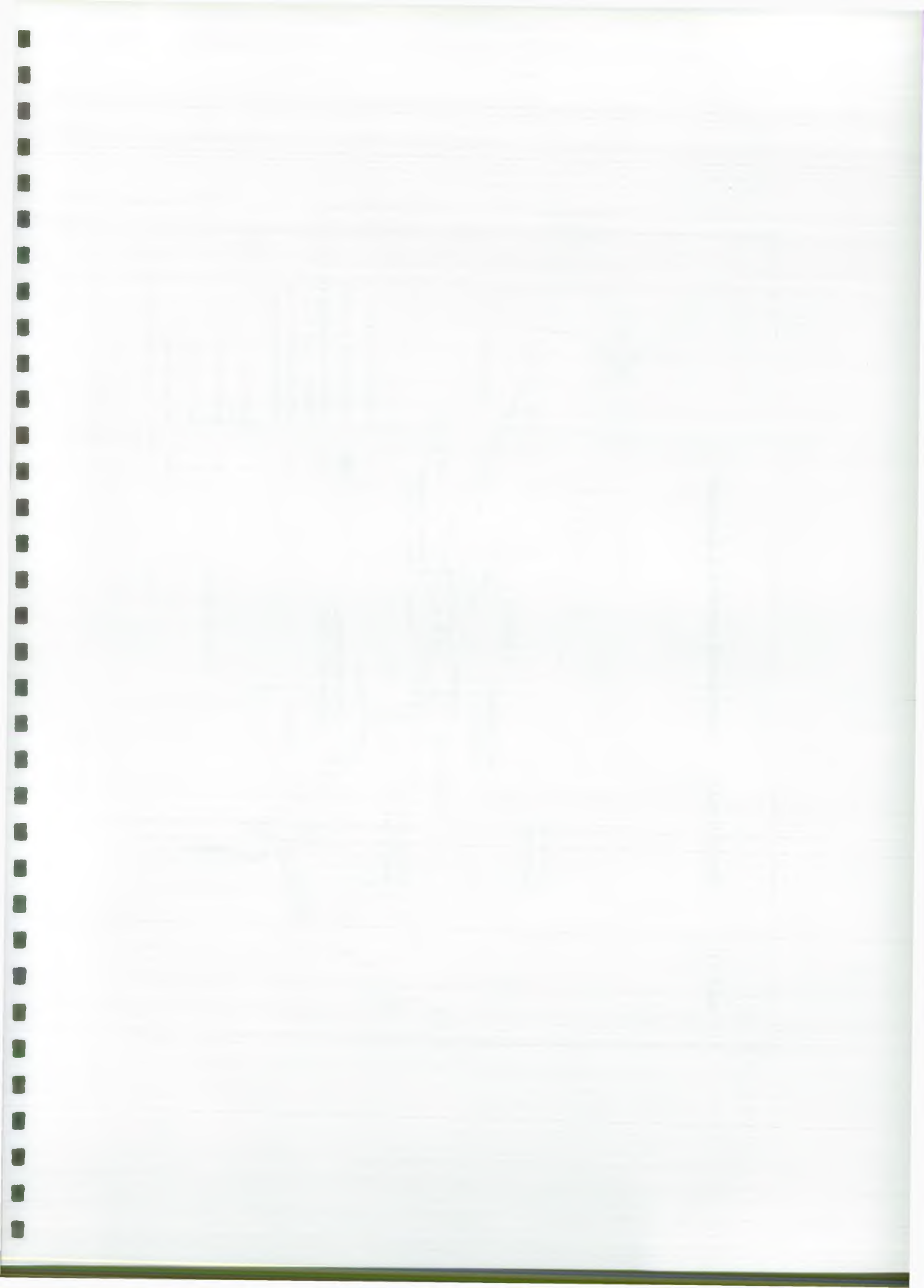
There are many defences within the area, outside the responsibility of the NRA (Map 10), against which the Sea Defence Survey reports a widely varied degree of protection. This information is being made available to relevant public or private bodies so that appropriate action can be taken where necessary.

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**3.9 FLOOD DEFENCE - (CONTINUED)**

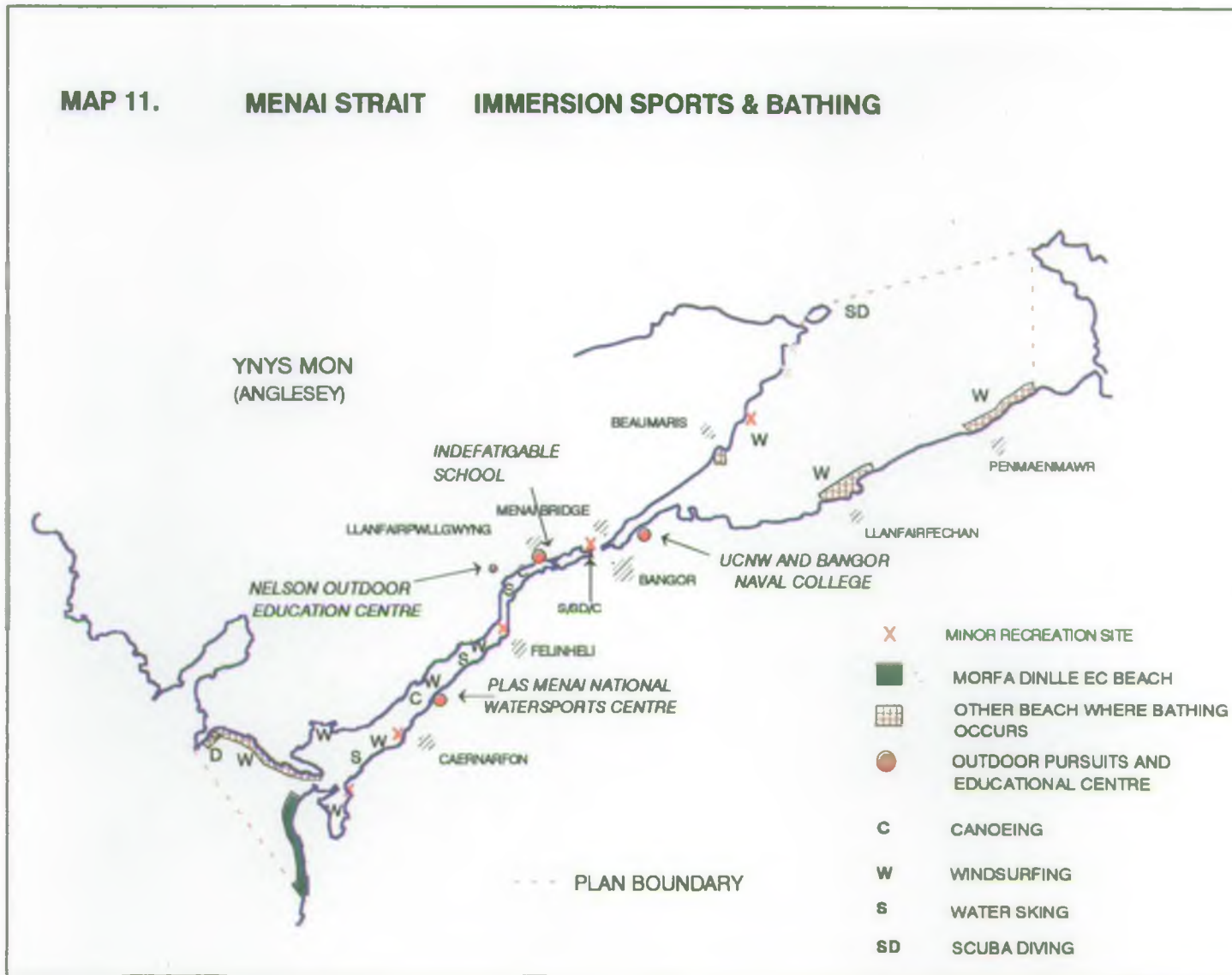
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|                                       |   |
|---------------------------------------|---|
| <b>Other Sea Defences</b>             | Coastal defences at Dinas Dinlle are at present the responsibility of Arfon Borough Council and have been severely damaged by the storm conditions of recent winters. Arfon Borough Council and the NRA are currently involved in the promotion of a scheme to re-establish an adequate level of defence for the area.  |
| <b>Objectives</b>                     | To provide effective defences for people and property against flooding from rivers and the sea, including where practicable consideration of any effects due to changes in climate.   |
| <b>Physical Features Requirements</b> | <p>The existing physiography of the Strait, in so far as it is practicable, should be maintained.</p> <p>NRA sea defences, main rivers and outfall sluices shall be maintained and improved to provide protection in accordance with the NRA's Standards of Service.</p> <p>Flood defence works will be designed and implemented in a way that protects and enhances the natural water environment.</p> |





**MAP 11. MENAI STRAIT IMMERSION SPORTS & BATHING**

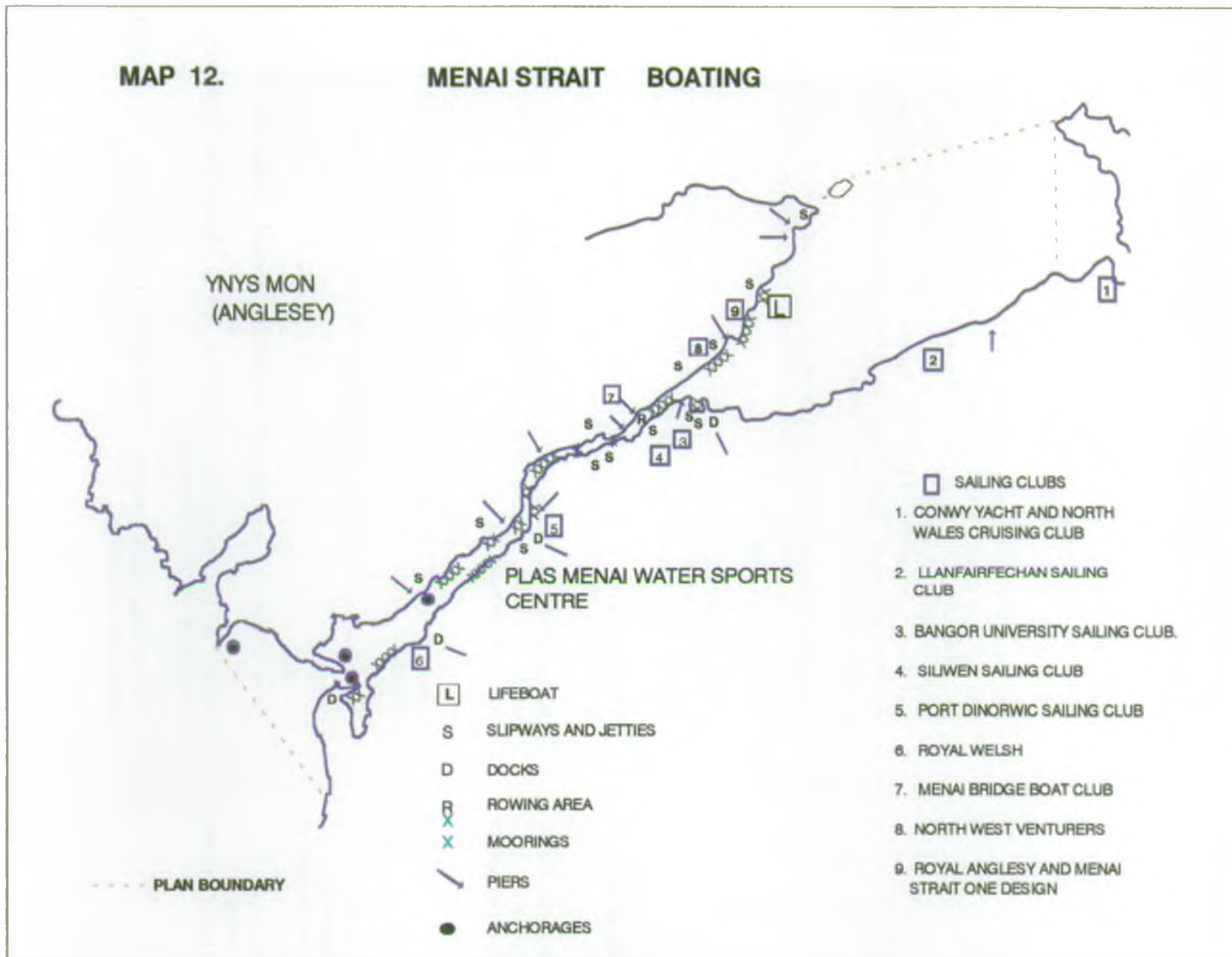


### 3.10 IMMERSION SPORTS

|                                       |   |
|---------------------------------------|---|
| <b>General</b>                        | Those sports where total immersion is an essential or common occurrence are considered in this section, such as bathing, canoeing, scuba diving, windsurfing etc.   |
| <b>Local Perspective</b>              | <p>The Strait is intensively used for water sports (Map 11) and is the site of the Sports Council for Wales' National Watersports Centre at Plas Menai, where 16,000 days of tuition are provided each year. In addition, there are several other outdoor pursuits centres.</p> <p>The most common immersion sports are canoeing, wind surfing, water and jet skiing and scuba diving. Virtually the whole of the Strait is accessible for bathing, although the rocky shore limits significant use to a few locations (Morfa Dinlle/Dinas Dinlle, Llanfairfechan, Llanddwyn and Penmaenmawr). Only the Morfa Dinlle is identified under EC directive although Llanddwyn (as Newborough) features in the Marine Conservation Society's Good Beach Guide.</p> <p>The NRA monitors water quality in the centre channel of the Strait on 4 occasions each year, and also at the identified bathing beach at Morfa Dinlle, near Dinas Dinlle.</p> <p>There is concern about visible pollution of the shoreline resulting from sewage discharges, which is being addressed in a major sewage treatment and disposal scheme by Dwr Cymru Welsh Water.</p> |
| <b>Objective</b>                      | To ensure that the Strait is maintained in a suitable condition to support immersion sports at least at their current levels.   |
| <b>Water Quality Requirements</b>     | <p>Water quality in the Strait should be compatible with immersion sports usage, excluding bathing at identified beaches (Water Quality suites 1,2 and 6, Appendix 1).</p> <p>The identified bathing beach at Dinas Dinlle should comply with the standards of EC Directive (76/160/EEC) (Water Quality suites 1,2 and 5, Appendix 1, also apply).</p>  |
| <b>Water Quantity Requirements</b>    | The existing tidal flow characteristics should be protected.  |
| <b>Physical Features Requirements</b> | <p>Sites which are currently safe for bathing should remain so.</p> <p>Access to the shore for immersion sports should be protected and developed where appropriate.</p> <p>The existing physiography of the Strait, in so far as it is practicable, should be maintained.</p>  |

MAP 12.

MENAI STRAIT BOATING



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**3.11 BOATING**

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|                                   |  |
|-----------------------------------|--|
| <b>General</b>                    | This includes those sports which are dependent upon water but which do not require or inevitably result in total immersion.  |
| <b>Local Perspective</b>          | <p>The sheltered areas of the Strait are very popular for sailing and the ten local sailing clubs have a membership of over 2000 between them. Each summer a two week regatta is held in July/August when over 150 boats compete each day, making this an important tourist attraction. UCNW, Bangor uses the area to the east of Menai Bridge for rowing (Map 12).</p> <p>In all there are over 600 moorings for yachts and power boats, administered by Ynys Mon BC (north-east of the Menai suspension bridge) and the Caernarfon Harbour Trust (between Britannia bridge and the south-west limit of the catchment plan). Local authorities control the public slips on their respective side of the Strait.</p> <p>There is some concern about the environmental impact of mooring chains which might scrape the channel bed. The use of tributyl tin in antifouling paints is now banned for small craft and the Welsh Yachting Association code of practice forbids dumping of waste from boats. Sewage from marine toilets on boats is macerated and then discharged by pumping into the immediate waters.</p> |
| <b>Objectives</b>                 | <p>To ensure that the Strait is maintained in a suitable condition to support non-immersion sports to at least their current level.</p> <p>To seek bye-laws to control discharges from boats within the Strait, particularly of bilges and toilets.</p>  |
| <b>Water Quality Requirements</b> | Water quality should be compatible with non-immersion sports usage (Water Quality suite 1, Appendix 1).  |

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**3.11 BOATING - (CONTINUED)**

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**Water  
Quantity  
Requirements**

The existing tidal flow characteristics should be protected.

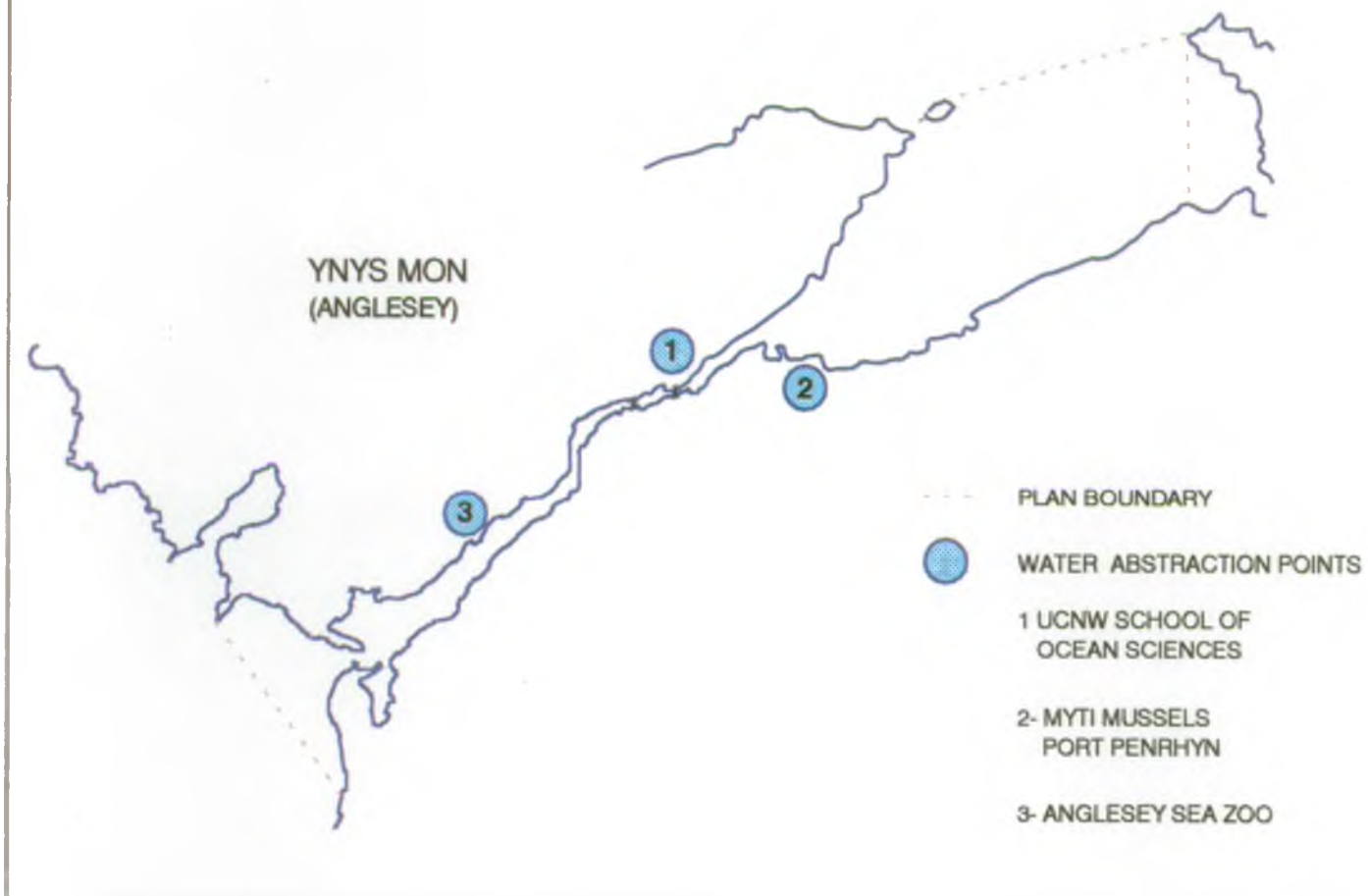
**Physical  
Features  
Requirements**

Access to the shore for non-immersion sports should be protected and developed where appropriate.

The existing physiography of the Strait, in so far as it is practicable, should be maintained.



**MAP 13. MENAI STRAIT WATER ABSTRACTION POINTS**



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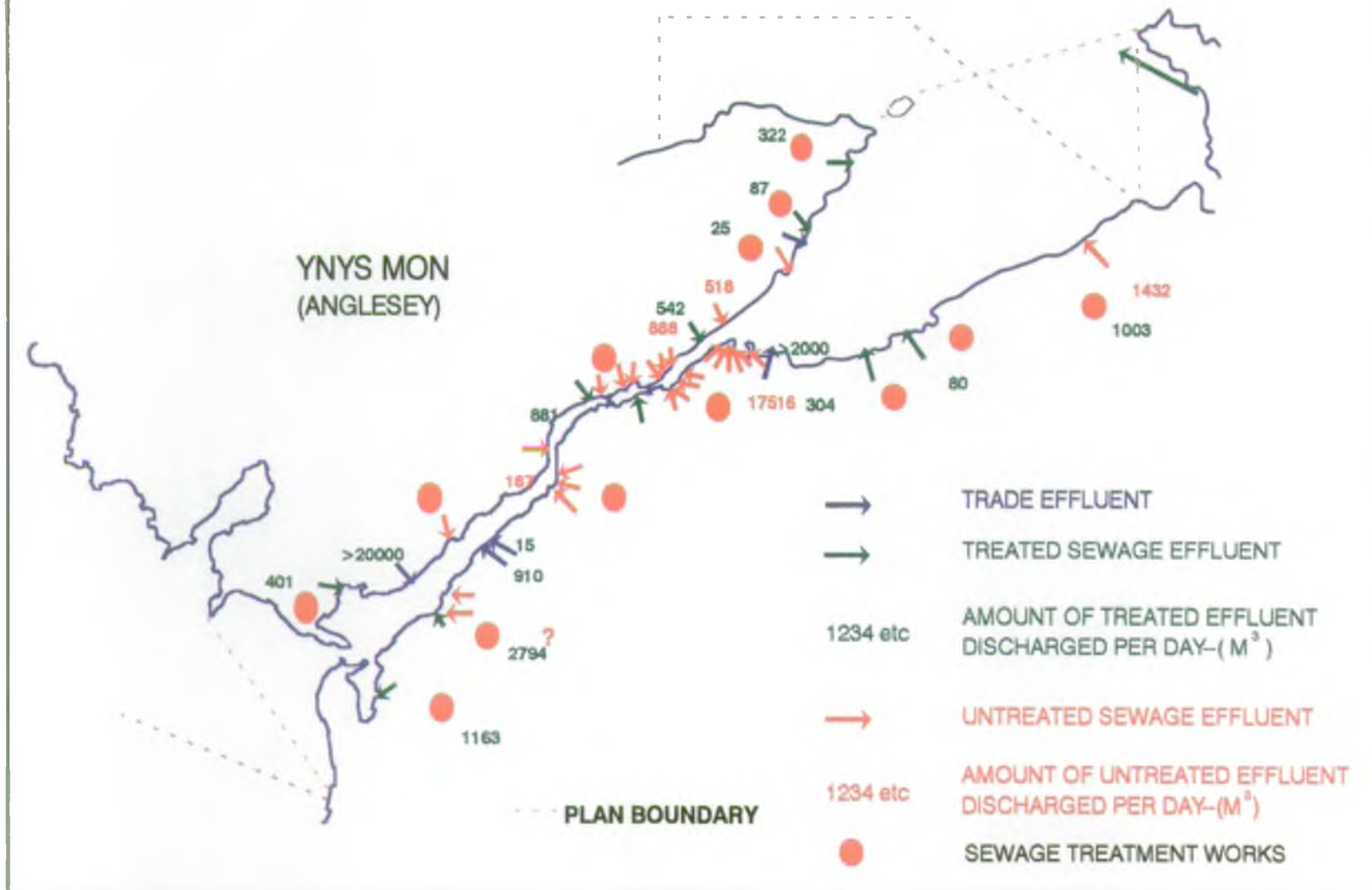
**3.12 WATER ABSTRACTION**

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|                                       |  |
|---------------------------------------|--|
| <b>General</b>                        | This use entails the removal of water from the Strait whether or not it is returned.   |
| <b>Local Perspective</b>              | <p>The NRA boundary is the low water mark of ordinary spring tides and thus abstractors below this level are exempt from the requirement for an abstraction licence. There is similarly no statutory responsibility, other than general pollution control duties, to ensure that the water abstracted is fit for the intended purpose. Nonetheless, the provision of water of suitable quality is vital to the majority of abstractors in the Strait (Map 13).</p> <p>Anglesey Sea Zoo and the Marine Science Laboratory at Menai Bridge abstract water to supply their aquaria, the latter also supplying other academic institutions.</p> <p>There is some concern about the impact on water quality of the regular algal blooms of <i>Phaeocystis sp.</i>, and abstraction ceases at such times.</p> <p>Myti Mussels at Port Penrhyn also abstracts water for shellfish collected from its lays at Bangor which are subject to closure orders. Water is only abstracted from September to April and is thus unaffected by the algal blooms.</p> |
| <b>Objective</b>                      | To ensure that the quality of the water abstracted is suitable for the intended purpose, in so far as it is possible within the NRA's statutory duties.  |
| <b>Water Quality Requirements</b>     | Whilst the NRA has no statutory responsibility to ensure appropriate quality of water for abstraction from marine sources, these needs should be taken into account when setting quality targets and objectives for the Strait (Water Quality suites 1,2,4, Appendix 1).   |
| <b>Water Quantity Requirements</b>    | The existing tidal flow characteristics should be protected.   |
| <b>Physical Features Requirements</b> | The existing physiography of the Strait, in so far as it is practicable, should be maintained.   |



**MAP 14. MENAI STRAIT EFFLUENT DISPOSAL**



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**3.13 EFFLUENT DISPOSAL**

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|                                    |  |
|------------------------------------|--|
| <b>General</b>                     | <p>This section deals with the consented discharge of effluent, including storm sewage and untreated sewage, and the licensed disposal of extraneous material into the Strait (Map 14).</p>  |
| <b>Local Perspective</b>           | <p>Dwr Cymru Welsh Water discharge effluents from eleven Sewage Treatment Works (STW), treating some 8,000 cubic metres of waste per day, into the Strait. This only accounts for 28% of the total volume of sewage effluent which is discharged, the remainder (21,000 m<sup>3</sup>/d) arising from outfalls of untreated sewage from six towns.</p> <p>In recognition of the potential impact on recreational and commercial uses of the Strait Dwr Cymru Welsh Water, in consultation with the NRA, has recently announced plans to improve the quality of effluent from the outfalls under its control. The location and design of new sewage outfalls and the degree of treatment required to protect other uses is being determined by the NRA.</p> <p>Other consented discharges, with the exception of Ferodo Ltd, are of relatively minor consequence although, there is growing concern about the potential impact of discharges of sewage from the many boats using the Strait.</p> <p>Spoil dumping, controlled and licensed by MAFF, takes place at two locations. Silt from annual maintenance dredging at Penrhyn Dock may be dumped off Ynys Seiriol or, more usually, at a site in Conwy Bay. In recent years these two sites have also received spoil from the construction of the A55 Conwy road tunnel. A 'one-off' licence has been issued to Caernarfon Harbour Trust to dump dredgings at a site close to the estuary of the Afon Seiont. However, there is some concern that the dredging and dumping of silt may re-suspend pollutants such as heavy metals and contribute to turbidity in the Strait.</p> <p>Whilst there is no dumping of sewage sludge within the Menai Strait, the cessation of sludge dumping in Liverpool Bay should result in a reduction in the enrichment of coastal waters including the Menai Strait.</p> |
| <b>Objective</b>                   | <p>To ensure the disposal of sewage, including treated effluents and storm discharges, and silt in the Menai Strait is undertaken in a way that protects all the legitimate uses of the Strait.</p>  |
| <b>Water Quality Requirements</b>  | <p>Disposal of sewage effluent and/or silt should not cause the failure of sites identified for other uses, to comply with the appropriate EC Directives values and/or use related standards.</p>  |
| <b>Water Quantity Requirements</b> | <p>The existing tidal flow characteristics should be protected.</p>  |

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3.13 **EFFLUENT DISPOSAL - (CONTINUED)**

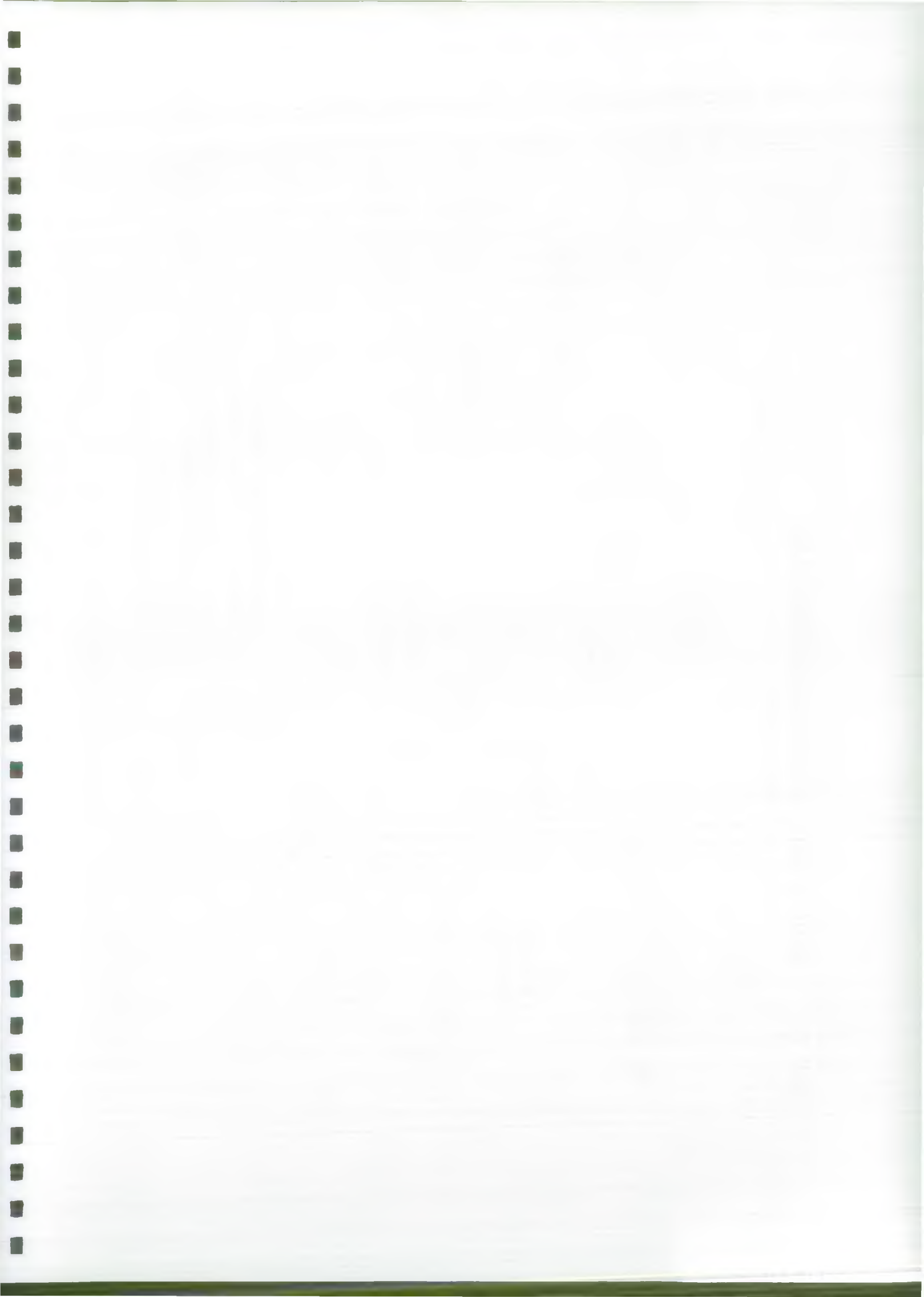
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**Physical  
Features  
Requirements**

Materials of sewage origin should not be visibly evident in the water or on the shores.

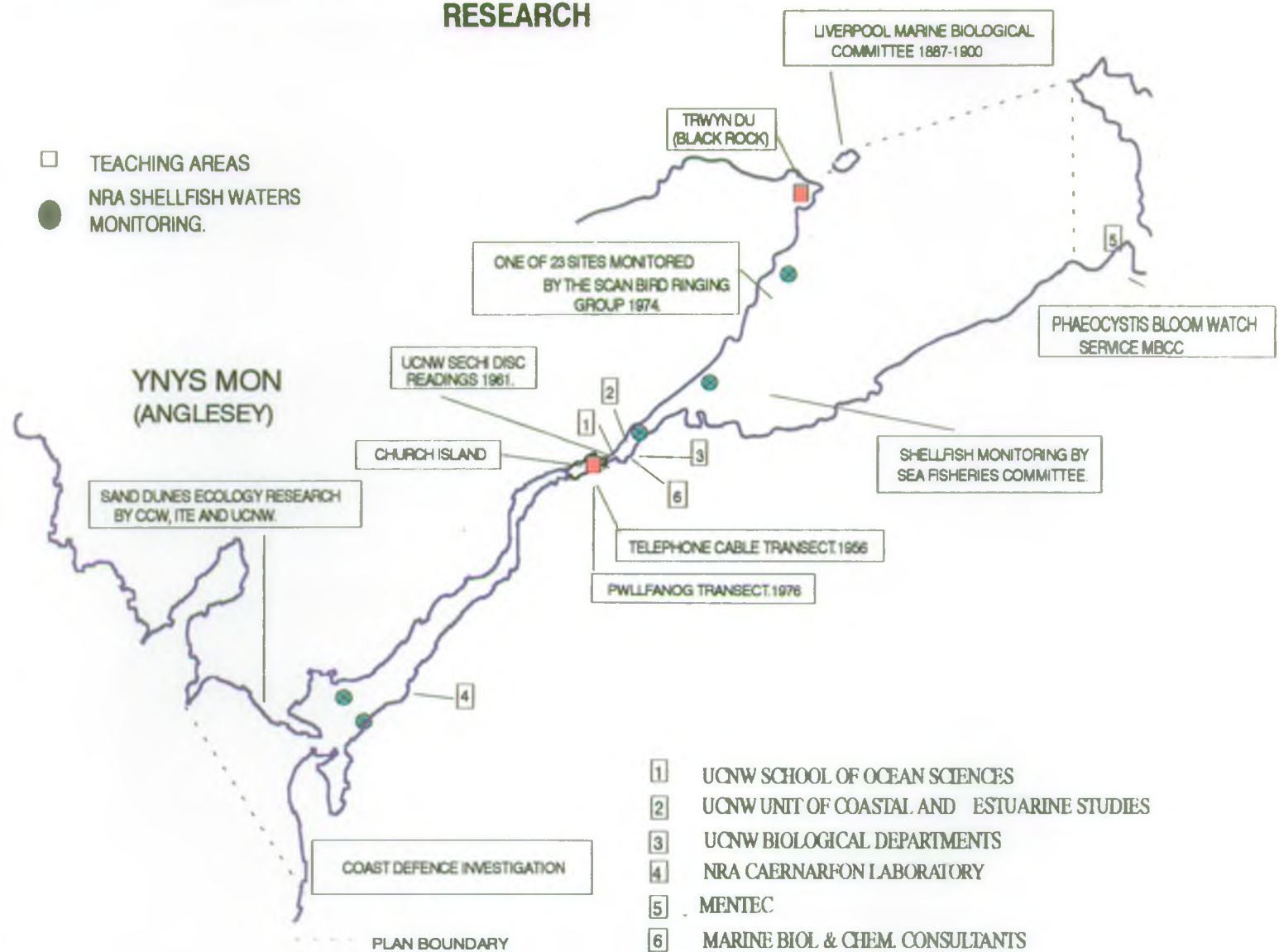
Disposal of sewage effluent or silt should not cause siltation of sensitive marine habitats.

The existing physiography of the Strait, in so far as it is practicable, should be maintained.



**MAP 15. MENAI STRAIT SCIENTIFIC MONITORING AND RESEARCH**

- TEACHING AREAS
- NRA SHELLFISH WATERS MONITORING.



LIVERPOOL MARINE BIOLOGICAL COMMITTEE 1887-1900

TRWYN DU (BLACK ROCK)

ONE OF 23 SITES MONITORED BY THE SCAN BIRD RINGING GROUP 1974

PHAEOCYSTIS BLOOM WATCH SERVICE MBCC

YNYS MON (ANGLESEY)

UCNW SECHI DISC READINGS 1961.

CHURCH ISLAND

SHELLFISH MONITORING BY SEA FISHERIES COMMITTEE.

SAND DUNES ECOLOGY RESEARCH BY CCW, ITE AND UCNW.

TELEPHONE CABLE TRANSECT 1966

PWLLFANOG TRANSECT 1976

COAST DEFENCE INVESTIGATION

- 1 UCNW SCHOOL OF OCEAN SCIENCES
- 2 UCNW UNIT OF COASTAL AND ESTUARINE STUDIES
- 3 UCNW BIOLOGICAL DEPARTMENTS
- 4 NRA CAERNARFON LABORATORY
- 5 MENTEC
- 6 MARINE BIOL. & CHEM. CONSULTANTS

PLAN BOUNDARY

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**3.14 SCIENTIFIC RESEARCH**

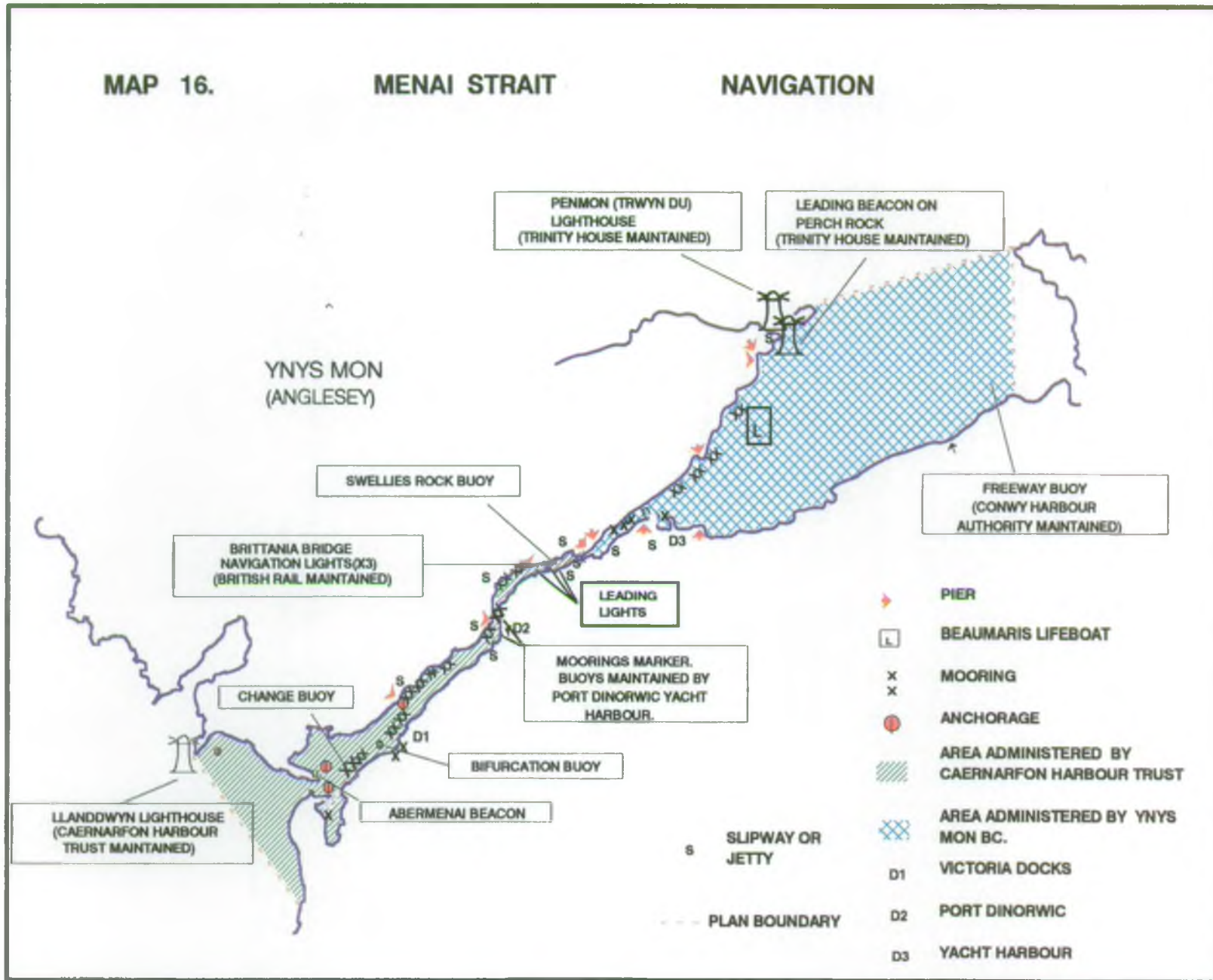
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|                                       |  |
|---------------------------------------|--|
| <b>General</b>                        | This relates to the use of the Strait as a research and educational site for marine sciences (Map 15).   |
| <b>Local Perspective</b>              | <p>The complex physical and ecological structure of the Strait has attracted a number of educational and research establishments concerned with marine sciences. As early as 1887 the Liverpool Biological Committee established a marine biology station on Ynys Seiriol. The University College of North Wales (UCNW), Bangor, has used the Strait for education and research since 1931 and a Marine Science Laboratory was established at Menai Bridge in 1951. The latter has made a substantial contribution to our knowledge and understanding of the Strait.</p> <p>The CCW has sponsored a number of biological surveys in the area, including those at Traeth Lafan and Traeth Melynog. Other surveys have studied the hard shoreline areas and the distribution of algae through the water column.</p> <p>In recent years water quality modelling of the Strait has been undertaken by the Unit of Coastal and Estuarine Studies (UCNW) and Wallace Evans Ltd (consulting engineers).</p> |
| <b>Objective</b>                      | To preserve the Strait as a valuable research and education site of national importance.   |
| <b>Water Quality Requirements</b>     | Water quality should be maintained at a level which supports the natural biota of the Strait (Water Quality suites 1,2, and 4 Appendix 1).   |
| <b>Water Quantity Requirements</b>    | The existing tidal flow characteristics should be protected.   |
| <b>Physical Features Requirements</b> | The existing physiography of the Strait, in so far as it is practicable, should be maintained.   |

MAP 16.

MENAI STRAIT

NAVIGATION



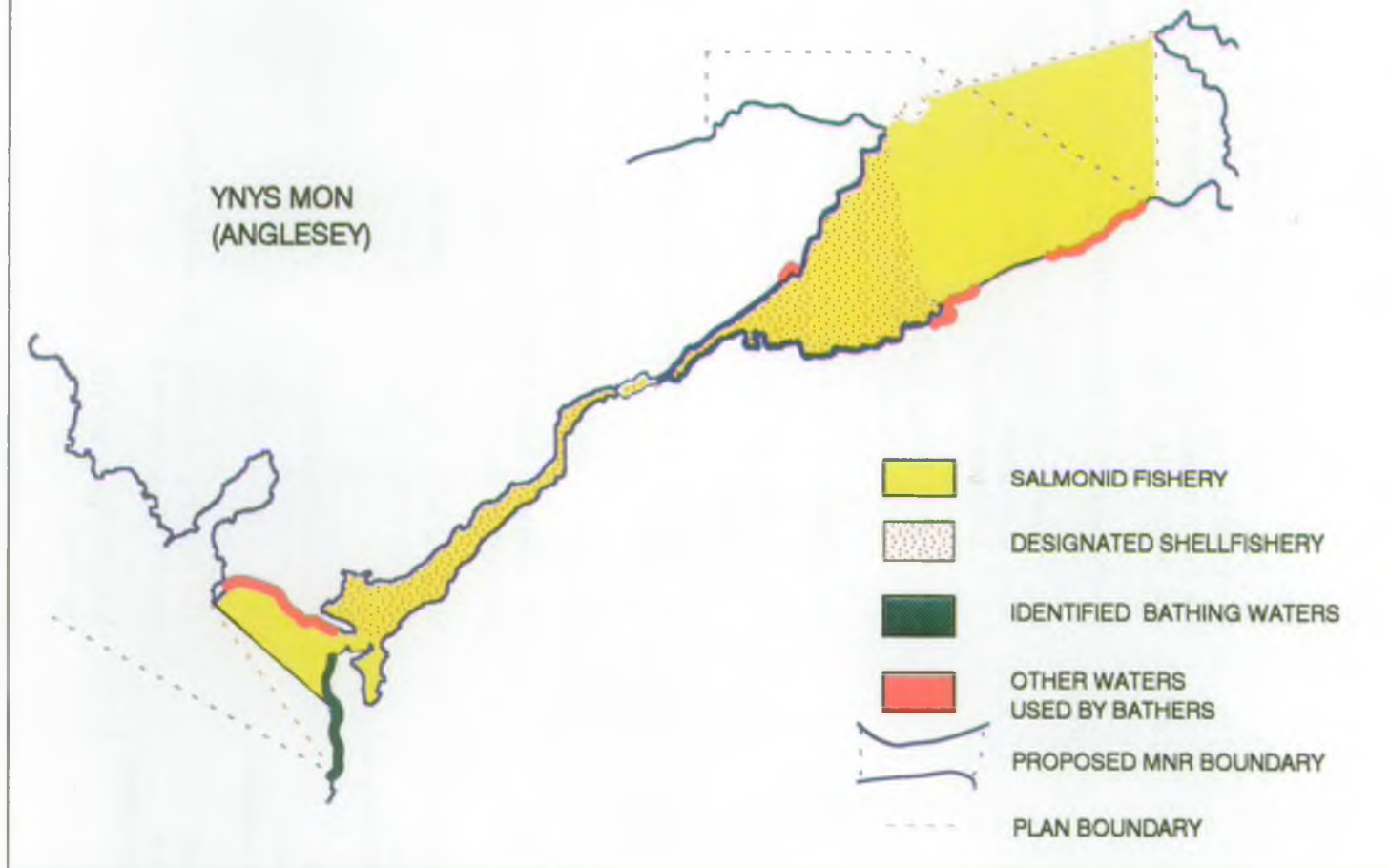
### 3.15 NAVIGATION

|                                       |   |
|---------------------------------------|---|
| <b>General</b>                        | This use relates to navigational aids such as buoys, perches and marks used to facilitate safe passage through the Strait.  |
| <b>Local Perspective</b>              | <p>The NRA has no responsibility for the provision of navigation aids in the Strait.</p> <p>Physical features of the waterway limit the maximum draft for shipping to 3.5m. There is a low level of use by commercial shipping, primarily to Menai Bridge and Port Penrhyn. One or two large passenger ships use the Strait annually but by far the greatest use is made by fishing vessels and other small craft.</p> <p>Responsibility for Navigation comes under a number of bodies (Map 16):</p> <ol style="list-style-type: none"> <li>a) south-west limit of catchment area to Menai Suspension Bridge - Caernarfon Harbour Trust (although eastern jurisdiction limit is the Britannia bridge).</li> <li>b) navigational aids for approach to Port Dinorwic Swing Bridge - Arfon Borough Council</li> <li>c) Bangor Pier - Bangor City Council</li> <li>d) north east of Menai Suspension Bridge - Anglesey Borough Council</li> <li>e) Penmon Lighthouse, Perch Rock and associated buoys - Trinity House</li> <li>f) Port Penrhyn - Penrhyn Estates</li> </ol> |
| <b>Objective</b>                      | To maintain both navigational routes through the waterway, and safe passage to harbours and moorings.   |
| <b>Water Quality Requirements</b>     | Water quality should be compatible with navigational usage. (Water Quality suite 1, Appendix 1).  |
| <b>Water Quantity Requirements</b>    | The existing tidal flow characteristics should be protected.  |
| <b>Physical Features Requirements</b> | <p>The existing physiography of the Strait, in so far as it is practicable, should be maintained.</p> <p>Any dredging activity should have regard to the other legitimate uses of the Strait.</p>   |



MAP 17.

MENAI STRAIT WATER QUALITY TARGETS



## 4.0 CATCHMENT TARGETS

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### 4.1 WATER QUALITY TARGETS

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#### General

This section considers the water quality requirements for the various uses of the catchment. There are minimum statutory water quality requirements which apply, but the purpose here is to ensure that water quality not only meets these requirements, but is also suited to the most sensitive recognised use at any location.

#### Water Quality Targets

Water quality in the Menai Strait may be assessed by reference to a number of control measures. These are:

- (i) Requirements of relevant EC Directives
- (ii) National Water Council (NWC) target classes
- (iii) Proposed NRA scheme of classification of estuaries
- (iv) NRA Environmental Quality Standards (EQSs)
- (v) NRA Environmental Policies.

EC Directives set water quality standards which must be achieved. Currently the most relevant for the Menai Strait are the Dangerous Substances, Shellfish Waters and Bathing Waters Directives. Compliance with the Dangerous Substances Directive is a requirement of the whole catchment, and compliance with the Shellfish Waters Directive is a requirement of a defined area (Map ), whilst identified waters at Morfa Dinlle (near Dinas Dinlle) must comply with the Bathing Waters Directive. The NRA currently reports to the Department of the Environment on the quality of the Strait with regard to the Shellfish Waters and Bathing Waters Directives.

As shown opposite, (Map 17), most of the Strait is a classified estuary in accordance with the NWC classification scheme, and historically the quality has been reported to the Department of the Environment. Under the NWC classification scheme estuaries are assessed (A - good, B - fair, C - poor and D - bad) using a scoring system for biological, aesthetic and chemical quality of the waters. The NRA survey of 1990 will be the last to use the NWC classifications. A new scheme is currently being developed in which water quality will be assessed alongside Statutory Water Quality Objectives and EC Directives requirements. The scheme will adopt the same philosophy as catchment management plans.

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**4.1 WATER QUALITY TARGETS - (CONTINUED)**

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Catchment management plans are based on the philosophy of setting water quality standards to protect the use(s) of any waters. To this end, Environmental Quality Standards (EQSs) have been proposed by the NRA. An Environmental Quality Standard is the concentration of a substance, or any calculated value of a measure of water quality, which must be met in order to protect a given use of a water body. Where more than one legitimate use takes place in a particular part of the catchment, the various suites of EQSs which apply are considered together, and the strictest set of standards derived from the combined suites will apply to that part of the catchment, thus protecting all legitimate uses.

Discharges into the Menai Strait will need to be diluted by the receiving waters to a degree that will reflect the standard of treatment given to effluents. All discharges must receive an appropriate level of treatment, and all outfalls must discharge below Mean Low Water Spring tide level. The NRA standards on frequency of operations of combined storm overflows (CSOs) are also applicable.

Discharges into the catchment must not only be of suitable quality to allow receiving waters to meet use related requirements, but must also comply with discharge consents and meet all relevant legislative requirements (both current requirements and, within agreed timetables, those coming into force within the lifetime of the Catchment Management Plan).

There are other targets which the NRA must consider although they are the responsibilities of other organisations.

- The Environmental Health Departments of the relevant local authorities have a responsibility for monitoring the public health quality of fish and shellfish products. The NRA should endeavour to ensure that water quality is compatible with targeted health quality standards where achievable and practicable. The Ministry of Agriculture, Fisheries and Food has set a medium term objective of category B for all shellfishery areas in the Strait, under the EC Shellfish Hygiene Directive (91/492/EEC), with a long term objective of category A. These categories relate to the standard of treatment required for the shellfish prior to human consumption.

4.2 WATER QUANTITY TARGETS

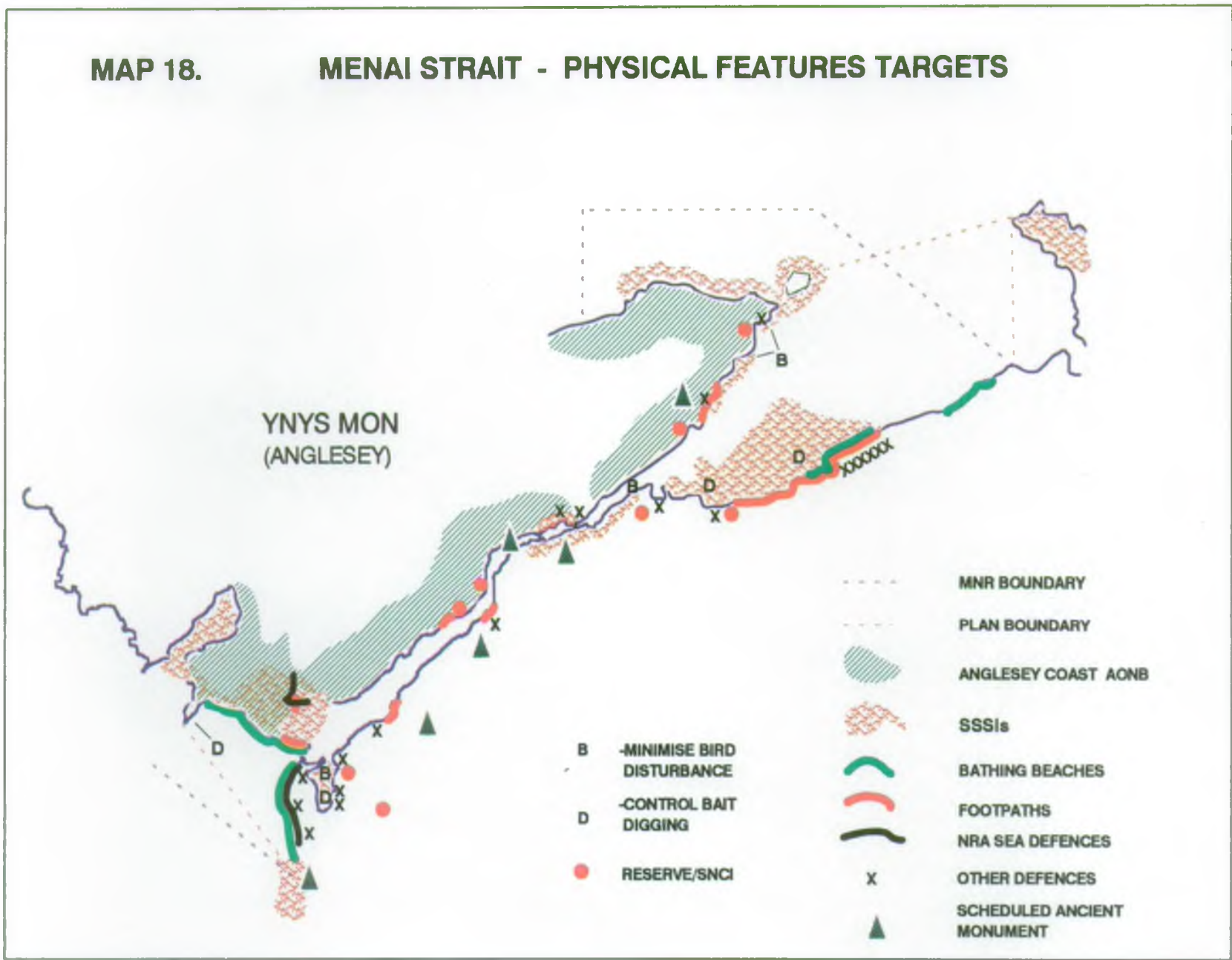
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Abstraction of water in the Menai Strait is very limited and not subject to any licensing requirements.

The NRA proposes that the existing and unusual tidal flow characteristics found in the Strait should be protected. No development that would adversely affect these characteristics should be allowed, although it must be said that the NRA is not aware of any proposals which could have this impact.

MAP 18.

MENAI STRAIT - PHYSICAL FEATURES TARGETS



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### 4.3 PHYSICAL FEATURES TARGETS

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**General**

This section considers the requirements for physical and other features in the catchment, and the provision and maintenance of permanent facilities for access.

**Local  
Perspective**

There are many uses in the catchment with their own physical features requirements. Map 18 shows the areas where for particular uses specific requirements exist which, with the exception of bait digging and bird disturbance, are to maintain or protect existing physical features.

The following summarises all the physical features (and other) requirements of identified uses. Those with an asterisk are illustrated (although some only in part) on Map 18. It has not been possible for reasons of clarity to include all requirements.

These targets represent the NRA's vision for the catchment. Two categories of targets have been identified:

**NRA has direct responsibility for implementing or promoting:**

\* Maintenance and improvement as appropriate of sea defences, to provide adequate level of service. Enhancement of conservation to be an integral part of the work where practicable.

Provision of suitable access for maintenance of tidal doors on designated main river outfalls, and coastal defences.

\* Protection of the landscape features which contribute to the natural beauty of the Strait, in particular the Anglesey Coast AONB, Great Orme's Head Heritage Coast, SSSIs, SNCIs, NNRs and SAMs.

Maintenance and enhancement of riparian vegetation and natural features to improve the general habitat, and enhance the conservation and landscape quality.

Enhancement of wetland bird habitats adjacent to the Strait.

Protection of features of archaeological interest in the Strait.

Protection of the diversity of natural features to ensure variety of habitat to maximise production of fish populations.

No exploitation of salmon and sea trout, or obstruction to their migration through the Strait by marine fishing.

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4.3 PHYSICAL FEATURES TARGETS - (CONTINUED)

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\* Reduction of bird disturbance. Promotion of studies into impact of human activities on birds.

Co-operation of all responsible bodies to ensure the Strait is free from litter and other imported debris wherever practicable.

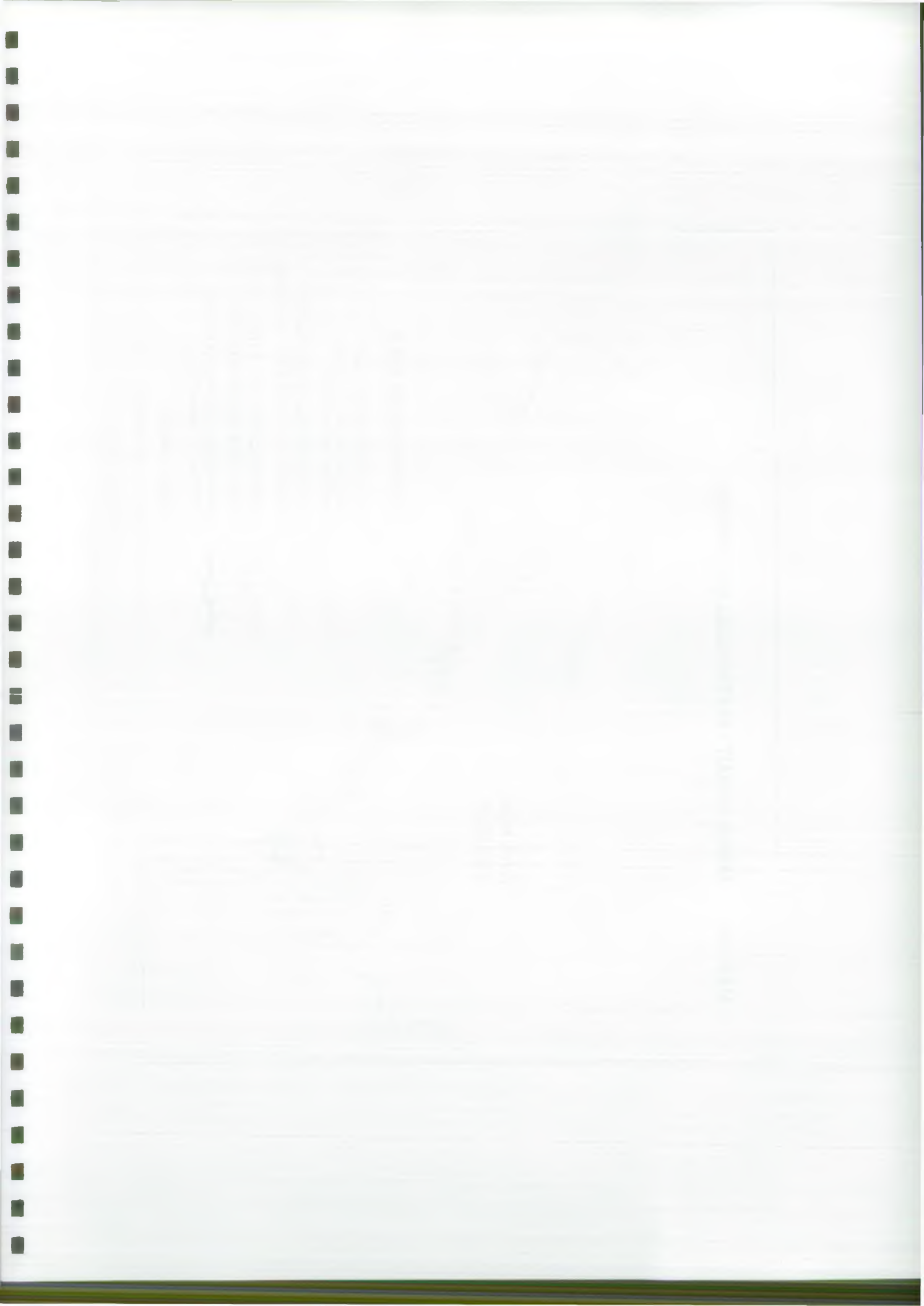
**NRA will provide advice and support:**

\* Maintenance and improvement as appropriate of controlled access, footpaths, and use-associated facilities.

No new development in an area where the existing level of flood protection is considered below the standard required for the type of development proposed, unless the installation of appropriate flood defence measures is an integral part of the development.

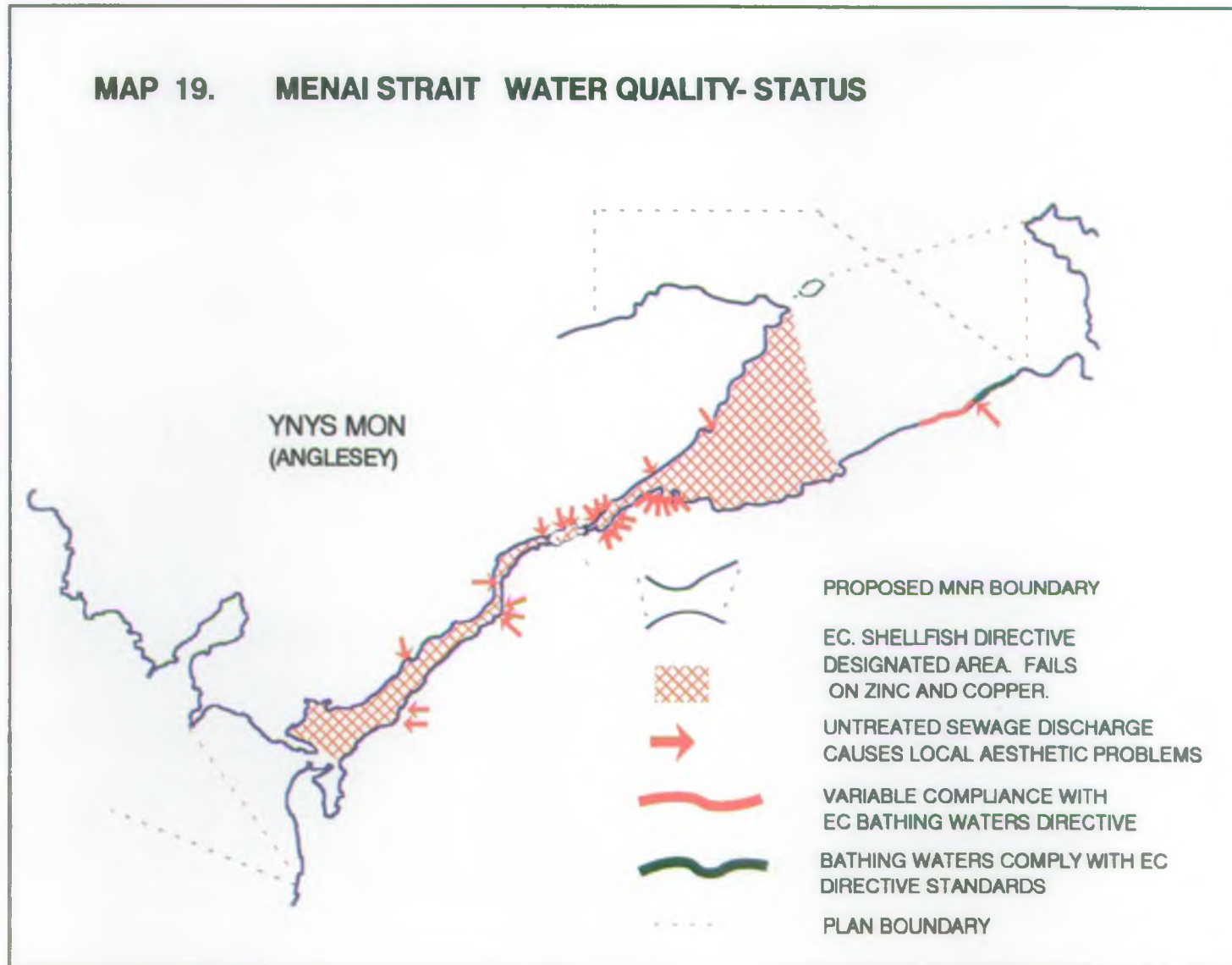
No new development that would reduce the special conservation value, or obstruct the passage of fish into and out of the Strait.

\* Provision of support to the proposed MNR.





**MAP 19. MENAI STRAIT WATER QUALITY-STATUS**



## 5.0 STATE OF THE CATCHMENT

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### 5.1 WATER QUALITY

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#### General

Objectives and targets have been set to protect the various uses. It is now necessary to compare the current state of the water quality of the catchment with the different targets (Map 19) that have been set. If it becomes apparent that the current water quality falls short of the use related targets, action is required to improve quality unless the non attainment is due to natural causes. However, cost will be a major factor in determining the timescale of future improvements.

The NRA estuary classification scheme is not yet available, but an assessment of the water quality against the NW classification scheme shows the estuary to be in Class A (good).

The designated shellfishery fails to comply with the EC Shellfish Waters Directive (79/923/EEC) due to breaches of the copper limit. The NRA is currently examining whether there has been any real deterioration over the last 5 years. If the failure is the result of natural causes, the NRA may seek a derogation for these waters which would mean that assessment of compliance would exclude this metal.

#### Issues Identified

The Strait fails to comply with the EC Shellfish Water Directive due to the presence of copper at concentrations above the required standards (Issue 7, Section 6).

There are 28 known discharges of untreated sewage into the Strait, many through short outfall pipes, which cause at least localised aesthetic problems and amenity loss (Issue 1, Section 6).

Bathing waters (albeit not EC identified), forming a part of the western half of the beach at Penmaenmawr/Dwygyfylchi would have failed to comply with the standards of the EC Bathing Waters Directive during 3 of the last 4 bathing seasons (Issue 11, Section 6).

Sampling of mussels by the local authorities under the Shellfish Hygiene Directive (91/492/EEC) shows the beds to be in Class B, with one in Class C. The objective of MAFF is to achieve Class B at all sites as a minimum, with Class A as a long term objective (Issue 9, Section 6).

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**5.1 WATER QUALITY - (CONTINUED)**

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The Strait may also fail to comply with the EC Shellfish Waters Directive (79/923/EEC) on bacteriological grounds, once the Closure Orders are lifted by the implementation of EC Directive (91/492/EEC) (Issue 8, Section 6).

Algal blooms (Phaeocystis sp.) which occur regularly in the Strait force 2 abstractors to shut their intakes. The third abstraction takes place from September to April and is consequently unaffected by the blooms (Issue 5, Section 6).

Discharges from boats within the Strait, particularly of bilges and toilet waste, cause localised aesthetic problems. (Issue 12, Section 6).

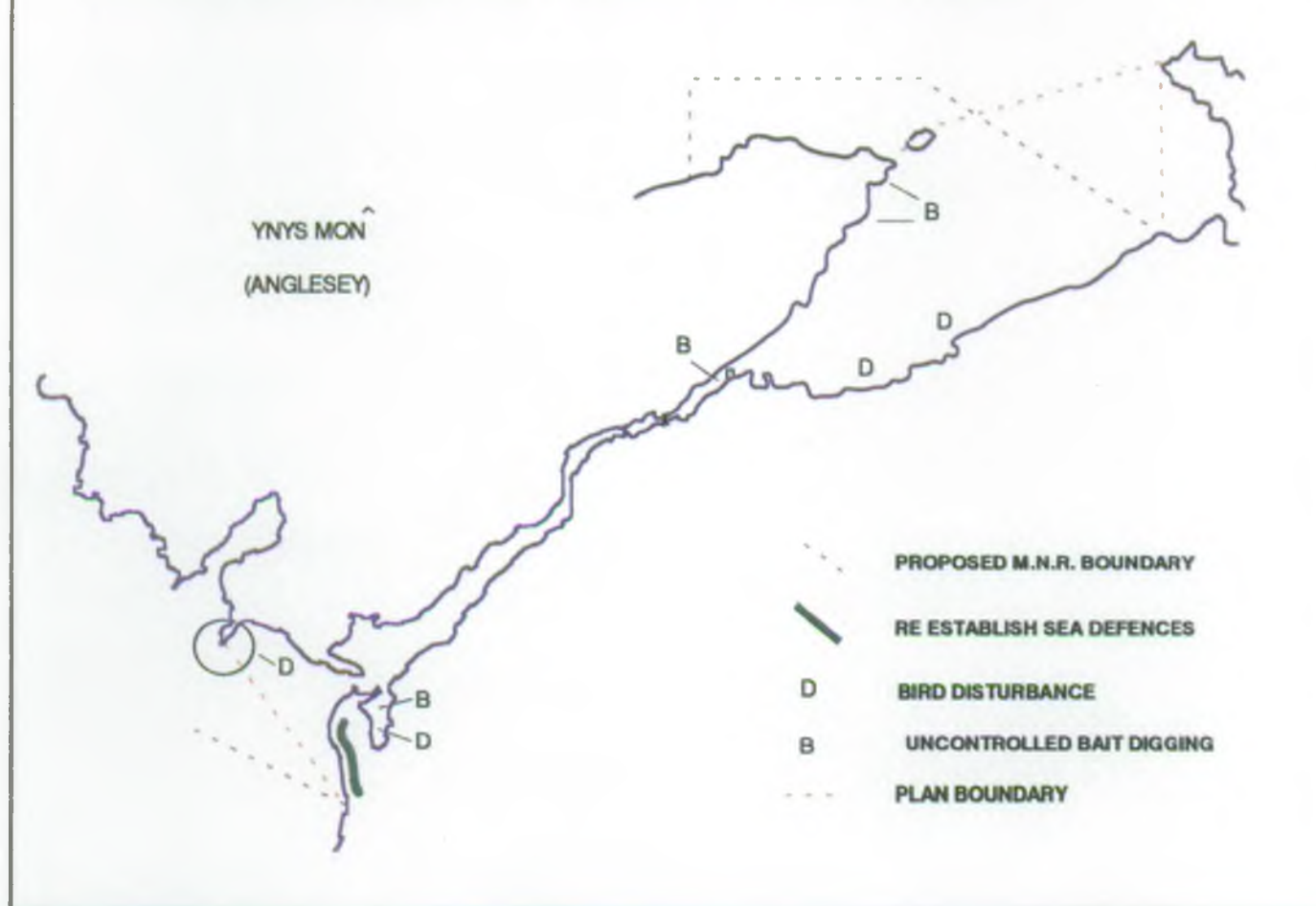
5.2 WATER QUANTITY

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There are no known water quantity problems in the Strait other than the shortages that may arise because of the need to shut down intakes during times of algal blooms (Phaeocystis sp.) - a water quality problem.

MAP 20.

STATE OF THE CATCHMENT PHYSICAL FEATURES



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**5.3 PHYSICAL FEATURES**

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**General**

Examination of the current status in relation to the targets shows that most are being achieved. The important target failures (Map 20) are detailed below, although some of the issues need further evaluation to establish the scale of problems (see Section 6).

**Issues Identified**

Human activity, such as dog walking, horse riding, boating etc, is disturbing roosting wildfowl and waders (Issue 3, Section 6).

A decision on the proposed Marine Nature Reserve has been outstanding since 1987 (Issue 2, Section 6).

Uncontrolled bait digging for angling is having an adverse impact on sedimentary shores (Issue 4, Section 6).

Increased sediment loading from pollution and natural causes is affecting the quality of the waters in the Strait, with subsequent adverse effects on the ecology and conservation value, e.g. the distribution of some seaweed species (Issue 10, Section 6).

The existing sea defence at Dinas Dinlle is subject to serious erosion (Issue 6, Section 6).

Hydraulic dredging for cockles may be adversely affecting the ecology and conservation value of the Strait (Issue 13, Section 6).

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## 6.0 ISSUES AND OPTIONS

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### **General**

This section of the plan considers options to address the issues that have been raised in the preceding section. The options as presented are the initial thoughts of the Northern Area, Welsh Region of the NRA and do not constitute policy statements. Comments on the issues and options are invited together with any new ideas/suggestions.

Wherever possible the body responsible for carrying out each option has been identified. In some cases this is identified as an individual or organisation other than the NRA. However, the options as presented are intended as a plan to facilitate improvements to the water environment for the benefit of all users. Their implementation will entail the co-operation of many bodies and individuals. In the tables of issues and options that follow, no priority has been assigned to the issues. They are listed in accordance with the current understanding of when the work or part of the work will be completed.

## ISSUES AND OPTIONS

| OPTIONS  | Responsibility  | Advantages  | Disadvantages  |
|--|---|---|--|
| ISSUE No: 1  | Discharges of untreated sewage.   |   |  |
| <p>All discharges to be appropriately treated, and diluted.</p> <p>All outfalls to discharge below mean low water spring tide level. (currently being progressed)</p> <p>This entails determination of appropriate quality standards for discharges.</p> | <p>Dwr Cymru Welsh Water and Private Dischargers</p> <p>NRA</p>                         | <p>Removal of aesthetic problems.</p> <p>Amenity gain. Enhanced Protection of uses in the catchment, in particular shellfishery and bathing.</p> <p>As above.</p> | <p>Cost £23M to Dwr Cymru Welsh Water</p> <p>Cost for private dischargers unknown.</p> <p>Cost and commitment of staff resources</p> |
| ISSUE No: 2  | Proposed Marine Nature Reserve by Countryside Council for Wales awaiting determination. |   |  |
| <p>Welsh Office (WO) and CCW to progress determination. (Currently being progressed)</p>   | <p>WO/CCW.</p>  | <p>Protection of ecology and conservation value of the Strait.</p> <p>Controlled bait digging.</p> <p>Bird disturbance minimised.</p>                             | <p>Impact on other uses of the Strait.</p>   |
| ISSUE No: 3  | Bird disturbance at Llanddwyn, Foryd Bay and Penmon                                     |   |  |
| <p>Designation of Strait as MNR. (Currently being progressed).</p>   | <p>CCW/WO.</p>  | <p>Disturbance minimised.</p>   | <p>Impact on other uses, in particular boating.</p>  |
| ISSUE No: 4  | Uncontrolled bait digging, damaging the at Foryd Bay, and Lafan Sands.                  |   |  |
| <p>Designation of Strait as MNR. (Currently being progressed).</p>   | <p>CCW/WO.</p>  | <p>Controlled bait digging.</p>   | <p>May impact on anglers.</p>  |



| OPTIONS  | Responsibility   | Advantages   | Disadvantages  |
|--|--|--|--|
| ISSUE No: 5  | Algal blooms ( <u>Phaeocystis sp.</u> ) cause aesthetic problems and shutdown of abstraction(s).                     |  |  |
| <p>Options limited. Origin from outside the catchment. General reduction in nutrient inputs from agriculture, industry and domestic sewage discharges may help.</p> <p>Investigation of any trends in nutrient status of coastal waters. (Currently being progressed).</p> | <p>Industry including Agriculture, Dwr Cymru Welsh Water, Private Dischargers.</p> <p>Irish Sea Nutrients Group.</p> | <p>Increase in nutrient content of waters will be minimised. Improved water quality for all uses.</p> <p>Establishment of any trend as basis for determining action required</p> | <p>Cost - unknown. May not reduce the size or frequency of the blooms. Natural nutrient status of sea water may not be a limiting factor to the growth of algae.</p> <p>Action may prove costly.</p> |
| ISSUE No: 6  | Re-establishment of adequate sea defence at Dinas Dinlle.  |  |  |
| Promotion of scheme to re-establish adequate sea defence at Dinas Dinlle (during 1993/94)  | NRA/Arfon B.C.   | Protection of land and property from inundation  | cost - unknown   |
| ISSUE No: 7  | Water quality non compliance with EC Shellfish Waters Directive (copper).  |  |  |
| Revision of historical data to establish whether there has been any increase in the content of copper, and whether it is a natural phenomenon. (completion by 1994/95)   | NRA  | Establishment of cause as a basis for determining the required action.   | If a natural phenomenon the elevated levels will have to be accepted. If pollution, the source may prove difficult to identify/ do anything about it.  |

ISSUES AND OPTIONS

| OPTIONS   | Responsibility  | Advantages   | Disadvantages   |
|---|---|--|---|
| ISSUE No: 8   | Lifting of Closure Orders may render the waters bacteriologically non compliant with EC Shellfish Water Directive.                        |  |   |
| All sewage discharges to be adequately treated and diluted.<br>(during 1995-1998)   | Dwr Cymru<br>Welsh Water<br>and<br>Private<br>Dischargers<br><br>MRA/MAFF   | Compliance with<br>bacteriological<br>standards of EC<br>directive.<br>Enhanced<br>protection of<br>other uses in the<br>catchment.<br><br>As above. | Cost £23M to<br>Dwr Cymru<br>Welsh Water Cost<br>to private<br>dischargers<br>unknown.<br>Waters may still<br>not comply with<br>EC Directive.<br><br>Cost - unknown.         |
| ISSUE No: 9   | Mussel beds in one area in Class C accordance with EC Shellfish Hygiene Directive, Class B a minimum MAFF objective in the Strait.        |  |   |
| As in issue 8.  | As in issue 8.  | As in issue 8.   | As in issue 8.  |
| ISSUE No: 10  | Transport of sediments into the estuary is increasing turbidity, and may be affecting the ecology e.g. distribution some seaweed species. |  |   |
| Origin from outside the catchment.<br>Sediment source identification.<br><br>Prevention of sewage sludge dumping at sea from 1998, under EC Municipal Waste Waters Directive. | UCNW Bangor<br>(School of<br>Marine Science)<br><br>Water Companies   | Reduction of<br>sediment load in<br>the Strait.<br><br>Reduction of<br>turbidity in the<br>Strait.   | Cost -<br>unknown.<br>Difficult to<br>implement.<br><br>Cost -<br>unknown.<br>Will cause<br>sludge disposal<br>problems. May not<br>have the desired<br>effect on the Strait. |

| OPTIONS  | Responsibility  | Advantages  | Disadvantages   |
|--|---|---|---|
| ISSUE No: 11   | Bathing waters in parts of the western half of the Penmaenmawr/Dwygyfylchi beach would fail to comply with EC Bathing Waters Directive. |   |   |
| Provide adequate treatment at the Dwygyfylchi sewage outfall. Outfall to discharge below mean low water spring level. (target date 2000+)<br><br>NRA to set appropriate quality standards for discharge. | Dwr Cymru<br>Welsh Water<br><br><br>NRA   | Compliance with EC directive, and enhanced protection for bathers and other users.<br><br>As above. | Cost - Unknown.<br><br>Waters may still not comply with EC directive. Non Identified waters do not have to comply with EC Directive |
| ISSUE No: 12   | Discharges from boats of bilges and toilet waste within the Strait.   |   |   |
| Promotion of byelaws.  | NRA<br>Harbour<br>Authorities.  | Improvement to aesthetic quality for all uses.  | Cost - unknown. Difficult to implement.   |
| ISSUE No: 13   | Hydraulic dredging for cockles may adversely affect the ecology and conservation value of the Strait.                                   |   |   |
| Reiew of available historical data, to establish whether this is a problem.  | NRA<br>CCW<br>NWNWSFC   | Provision of data for determining action required.  | Cost - unknown. Determined action may impact on the commercial harvesting of cockles.   |

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## 7.0 CONFLICTS

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### **General**

In considering the many uses, and the demands which those uses place upon the water environment, conflicts are bound to arise. An example would be an increased demand for effluent disposal, which could increase the bacteriological content of water, and affect the level of cleaning required for harvested shellfish. Areas of conflict have been addressed during the formulation of this Plan, resulting in the options for action that are proposed for wider consideration. Some conflicts still remain and the public consultation will no doubt identify others. A strategy for action to address these issues will be developed following this process of consultation.

### **Internal Conflicts**

When considering the functions that the NRA performs, internal conflicts can and do arise.

However, in preparing this plan only one has been identified. This arises from the NRA's duty to (i) develop the amenity and recreational potential of waters and land under its control; and (ii) to conserve and enhance wildlife, landscape and archaeological features associated with waters under its control.

The NRA in supporting the designation of the Strait as an MNR, and in promoting the reduction of bird disturbance, is making the conscious decision that the conservation interests of the Strait need protection at the cost of increased control over some recreational activities.

This apart, the options in section 6 have been developed with consideration of all those functions affected. Indeed, the interaction was found to be either of only limited conflict or positive in nature. For example, the promotion of sewage treatment in the Strait by the Water Quality function will prove beneficial to the interests of the Fisheries, Conservation and Recreation functions.

The table below shows the interactions (not necessarily conflicts) between the NRA functions in the Menai Strait catchment. The table shows the degree to which requirements of the functions listed along the top of the matrix need to be taken into account by the functions listed in the left hand column. (VS = very significant, S = significant, -- = insignificant). The NRA has a responsibility for navigation on some waters, but this does not apply to the Menai Strait.

|                    | Fisheries | Conser-<br>vation | Rec-<br>reation | Flood<br>Defence | Water<br>Resources | Water<br>Quality |
|--------------------|-----------|-------------------|-----------------|------------------|--------------------|------------------|
| Fisheries          |           | S                 | VS              | S                | --                 | VS               |
| Conser-<br>vation  | --        |                   | S               | VS               | --                 | S                |
| Rec-<br>reation    | VS        | --                |                 | S                | --                 | S                |
| Flood<br>Defence   | S         | VS                | --              |                  | --                 | S                |
| Water<br>Resources | --        | --                | --              | --               |                    | --               |
| Water<br>Quality   | S         | S                 | S               | --               | --                 |                  |

### External Conflicts

These are conflicts which will arise when users demands have an impact on others, examples are:

- The expenditure of £23m which will be incurred by Dwr Cymru Welsh Water in carrying out work to improve water quality to a degree which will protect other uses.
- The MNR if it is established will entail imposing control measures on certain activities in the Strait, such as bait digging by anglers.
- The promotion of bye-laws by the NRA and Harbour Authorities to curtail the discharges from boats of bilges and toilet waste within the Strait, would reduce the 'freedom' currently enjoyed by the boating fraternity.

### Summary of General Conflicts

In considering the issues and options it is generally felt tha three main areas of conflict re-occur and warrant further comment. As previously stated the consultation process will address these, and other conflict further before any final plan is produced.

Priorities of water uses - It should be understood that there is no priority ranking of uses of the water environment. All users must consider each other and an element of compromise may be required.

Cost - The options proposed for resolving 9 out of the 13 issues have implementation costs, and which are substantial for some (£23m) although not quantified for others. Whilst not a constraint in the identification of options it is a major factor in determining the preferred course of action.

Environmental impact - In any discussion regarding future works to resolve issues, the overall effect on the environment must be considered along with all other factors. This aspect, as with the previous two, is the responsibility of all users of the water environment who must work together to seek the improvements that all would wish to see.

This consultation process is a vital stage in determining how these conflicts can be addressed for the overall benefit of the catchment.

## APPENDIX 1. WATER QUALITY SUITES

### Water Quality Suite 1 : Aesthetic Criteria

| DETERMINAND                 | ASSESSMENT METHOD    | STANDARD  |
|-----------------------------|----------------------|---|
| Colour                      | Visual inspection    | No perceptible abnormal discolouration          |
| Mineral oils                | Visual inspection    | Only visible on detailed inspection (<2% cover) |
| Foaming                     | Visual inspection    | Only visible on detailed inspection (<2% cover) |
| Transparency                | Visual inspection    | No perceptible turbidity *                      |
| Litter                      | Visual inspection    | Only visible on detailed inspection (<2% cover) |
| Odour                       | Olfactory inspection | No perceptible odour                            |
| Excessive biological growth | Visual inspection    | Only visible on detailed inspection (<2% cover) |
| Aerobic conditions          | Visual inspection    | Aerobic conditions should be maintained         |

\* Depending upon meteorological and geographical conditions.

Water Quality Suite 2 - List I Substances

| Parameter                          | Unit                    | Water quality standard |                              |       | Standstill provision <sup>b</sup> |                  |
|------------------------------------|-------------------------|------------------------|------------------------------|-------|-----------------------------------|------------------|
|                                    |                         | Inland                 | Marine <sup>a</sup>          |       |                                   |                  |
| Mercury                            | µg Hg/l                 | 1                      | TAA                          | 0.3   | DAA                               | Yes <sup>c</sup> |
| Cadmium                            | µg Cd/l                 | 5                      | TAA                          | 2.5   | DAA                               | Yes              |
| Hexachlorocyclohexane <sup>d</sup> | µg HCH/l                | 0.1                    | TAA                          | 0.02  | TAA                               | Yes              |
| Carbon tetroachloride              | µg CCl <sub>4</sub> /l  | 12                     | TAA                          | 12    | TAA                               | No               |
| DDT                                |                         |                        |                              |       |                                   |                  |
| (total)                            | µg DDT/l                | 0.025                  | TAA                          | 0.025 | TAA                               | Yes              |
| (para, para DDT)                   | µg ppDDT/l              | 0.01                   | TAA                          | 0.01  | TAA                               | Yes              |
| Pentachlorophenol                  | µg PCP/l                | 2                      | TAA                          | 2     | TAA                               | Yes              |
| Drins                              |                         |                        |                              |       |                                   |                  |
| (total)                            | µg/l                    | 0.03                   | TAA                          | 0.03  | TAA                               | Yes              |
| (aldrin) <sup>e</sup>              | µg/l                    | 0.01                   | TAA                          | 0.01  | TAA                               | Yes              |
| (dieldrin) <sup>e</sup>            | µg/l                    | 0.01                   | TAA                          | 0.01  | TAA                               | Yes              |
| (endrin)                           | µg/l                    | 0.005                  | TAA                          | 0.005 | TAA                               | Yes              |
| (isodrin) <sup>e</sup>             | µg/l                    | 0.005                  | TAA                          | 0.005 | TAA                               | Yes              |
| Hexachlorobenzene                  | µg HCB/l                | 0.03                   | TAA                          | 0.03  | TAA                               | Yes              |
| Hexachlorobutadiene                | µg HCBD/l               | 0.1                    | TAA                          | 0.1   | TAA                               | Yes              |
| Chloroform                         | µg CHCl <sub>3</sub> /l | 12                     | TAA                          | 12    | TAA                               | No               |
| 1,2-dichloroethane <sup>f</sup>    | µg EDC/l                | 10                     | TAA                          | 10    | TAA                               | No               |
| Perchloroethylene <sup>f</sup>     | µg PER/l                | 10                     | TAA                          | 10    | TAA                               | No               |
| Trichlorobenzene <sup>f</sup>      | µg TCB/l                | 0.4                    | TAA                          | 0.4   | TAA                               | Yes              |
| Trichloroethylene <sup>f</sup>     | µg TRI/l                | 10                     | TAA                          | 10    | TAA                               | No               |
| <u>Estuarine Waters</u>            |                         |                        |                              |       |                                   |                  |
| <u>Parameter</u>                   |                         |                        | <u>Water Quality Studies</u> |       | <u>Standstill Provision</u>       |                  |
| Cd                                 | µg/cdl <sup>-1</sup>    | 5                      | DAA                          |       | YES                               |                  |
| Mg                                 | µg/Hgl <sup>-1</sup>    | 0.5                    | DAA                          |       | YES                               |                  |

NB. For all other determinands Marine Water Quality Standards apply to estuarine waters.



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Water Quality Suite 2 - List I Substances

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Notes:

TAA total, annual average

DAA dissolved, annual average

- a Although the daughter directives for mercury and cadmium specify different standards for estuarine and coastal waters, in the UK the more stringent standards for coastal waters apply. For other substances the EC standards for estuarine and coastal waters are the same (HMSO 1989).
- b Most directives include a provision that the total concentration of the substance in question in sediments and/or fish and/or shellfish must not increase significantly with time. For the precise wording see individual directives.
- c For mercury an additional standard applies: the concentration of mercury in a "representative sample of fish flesh chosen as an indicator" must not exceed 0.3 mg Hg/kg.
- d All isomers, including lindane.
- e The standard relating to this substance comes into effect on 1/1/94.
- f The standard relating to this substance came into effect on 1/1/93.

Water Quality Suite 3 : Protection of aquatic life including cyprinid fish

Standards applying to Inland Waters and Estuaries / Coastal Waters:

| DETERMINAND              | UNIT      | VALUE:        |                              | STATISTIC |
|--------------------------|-----------|---------------|------------------------------|-----------|
|                          |           | Inland Waters | Estuaries/<br>Coastal Waters |           |
| Arsenic                  | µgAs/l    | 50            | 25                           | AA, D     |
| Boron                    | µgB/l     | 2000          | 7000                         | AA, T     |
| *Inorganic tin           | µgSn/l    | 25            | 10                           | AA, T     |
| Organotins:              | µg/l      | TBT           | 0.02                         | M, T      |
| TBT / TPT                |           | TPT           | 0.02                         | M, T      |
| pH                       | pH values | 6.0-9.0       |                              | 95P       |
| Iron                     | µgFe/l    | 1000          | 1000                         | AA, D     |
| Mothproofing agents:µg/l |           |               |                              | 95P, T    |
| PCSDs/PADs               |           | 0.05          | 0.05                         |           |
| Sulcofuron               |           | 25            | 25                           |           |
| Flucofuron               |           | 1             | 1                            |           |
| Permethrin               |           | 0.01          | 0.01                         |           |
| Cyfluthrin               |           | 0.001         | 0.001                        |           |

Standards applying to Estuaries and Coastal Waters:

| DETERMINAND       | UNIT                 | VALUE | STATISTIC                |
|-------------------|----------------------|-------|--------------------------|
| Ammonia:          | mgN/l                |       |                          |
| Total             |                      | 0.78  | M                        |
| Unionised         |                      | 0.021 | AA                       |
|                   |                      | 0.042 | 95P                      |
|                   |                      | 0.12  | M                        |
| Dissolved Oxygen  | mgO <sub>2</sub> /l  | >5    | 95P                      |
|                   |                      | >3    | M                        |
| Hydrogen Sulphide | µgH <sub>2</sub> S/l | 10    | Average over 24<br>hours |
| Chromium          | µgCr/l               | 15    | AA, D                    |
| Copper            | µgCu/l               | 5     | AA, D                    |
| Lead              | µgPb/l               | 25    | AA, D                    |
| Nickel            | µgNi/l               | 30    | AA, D                    |
| Zinc              | µgZn/l               | 40    | AA, D                    |
| Vanadium          | µgV/l                | 100   | AA, T                    |

\* Proposed EQS

Water Quality Suite 3 (Continued)

Standards applying to Inland Waters

| DETERMINAND   | UNIT                 | VALUE<br>(Inland Waters)                                  | STATISTIC            |
|---|----------------------|---|----------------------|
| Nitrite   | mgNO <sub>2</sub> /l | 0.03  | 95P                  |
| Ammonia:  | mgN/l                |   |                      |
| Total   |                      | 0.78  | 95P                  |
| Unionised   |                      | 0.021   | 95P                  |
| BOD   | mg/l                 | 6   | 95P, T               |
| Dissolved oxygen  | mgO <sub>2</sub> /l  | ≥ 7   | AA, T                |
| Suspended Solids  | mg/l                 | 25 **   | AA, T                |
| Residual chlorine   | mgCl <sub>2</sub> /l | 0.0068 (at PH6)   | 95P, T               |
| *Hydrogen sulphide  | µgH <sub>2</sub> S/l |   |                      |
|   | <15 °C,              | <5 mg O <sub>2</sub> /l                                   | 0.5 (24 hr max 5.0)  |
|   | <15 °C,              | >5 mg O <sub>2</sub> /l                                   | 1.0 (24 hr max 10.0) |
|   | >15 °C,              | <5 mg O <sub>2</sub> /l                                   | 0.25 (24 hr max 2.5) |
|   | >15 °C,              | >5 mg O <sub>2</sub> /l                                   | 0.5 (24 hr max 5.0)  |
| Temperature   | °C                   | Thermal discharges must not cause a rise greater than 3°C | 98P                  |
|   |                      | ≤28 **  | 98P                  |
|   |                      | ≤10 for breeding of cold-water species **                 | 98P                  |
| Phosphorus<br>(indicative of need to reduce eutrophication) | mgPO <sub>4</sub> /l | 0.13  | AA,T                 |

The following standards are hardness-related in inland waters:

|          |        | Mean Hardness (mg/l as CaCO <sub>3</sub> ) |        |         |         |         |      |        |
|----------|--------|--|--------|---------|---------|---------|------|--------|
|          |        | <50  | 50-100 | 100-150 | 150-200 | 200-250 | >250 |        |
| Chromium | µgCr/l | 150  | 175    | 200     | 200     | 250     | 250  | AA, D  |
| Copper   | µgCu/l | 1  | 6      | 10      | 10      | 10      | 28   | AA, D  |
|          |        | 5  | 22     | 40      | 40      | 40      | 112  | 95P, D |
| Lead     | µgPb/l | 50   | 125    | 125     | 250     | 250     | 250  | AA, D  |
| Nickel   | µgNi/l | 50   | 100    | 150     | 150     | 200     | 200  | AA, D  |
| Zinc     | µgZn/l | 75   | 175    | 250     | 250     | 250     | 500  | AA, T  |
|          |        | 300  | 700    | 1000    | 1000    | 1000    | 2000 | 95P, T |
| Vanadium | µgV/l  | 20   | 20     | 20      | 20      | 60      | 60   | AA, T  |

AA = annual average; M = maximum; 95P = 95 percentile; 98P = 98 percentile;  
 T = total; D = dissolved; E; Value applies to Estuaries only; \*\* = Derogation permitted in the event of exceptional meteorological or geographical conditions. \* Proposed EQS

Water Quality Suite 4 : Protection of sensitive aquatic life including salmonid fish

| DETERMINAND          | UNIT     | VALUE<br>(Inland waters) | STATISTIC |
|----------------------|----------|--------------------------|-----------|
| Arsenic              | µgAs/l   | 50                       | AA, D     |
| Boron                | µgB/l    | 2000                     | AA, T     |
| Inorganic tin        | µg/Sn/l  | 25                       | AA, T     |
| Organotins:          | µg/l     | TBT 0.02                 | M, T      |
| TBT / TPT            |          | TPT 0.02                 | M, T      |
| pH                   | pH value | 6.0-9.0                  | 95P       |
| Iron                 | µgFe/l   | 1000                     | AA, D     |
| Mothproofing agents: | µg/l     |                          | 95P, T    |
| PCSDs/PADs           |          | 0.05                     |           |
| Sulcofuron           |          | 25                       |           |
| Flucofuron           |          | 1                        |           |
| Permethrin           |          | 0.01                     |           |
| Cyfluthrin           |          | 0.001                    |           |

The following standards are hardness-related:

|          |        | Mean Hardness (mg/l as CaCO <sub>3</sub> ) |        |         |         |         |      |       |
|----------|--------|--|--------|---------|---------|---------|------|-------|
|          |        | <50  | 50-100 | 100-150 | 150-200 | 200-250 | >250 |       |
| Chromium | µgCr/l | 5  | 10     | 20      | 20      | 50      | 50   | AA, D |
| Copper   | µgCu/l | 1  | 6      | 10      | 10      | 10      | 28   | AA, D |
|          |        | 5  | 22     | 40      | 40      | 40      | 112  | 95P D |
| Lead     | µgPb/l | 4  | 10     | 10      | 20      | 20      | 20   | AA, D |
| Nickel   | µgNi/l | 50   | 100    | 150     | 150     | 200     | 200  | AA, D |
| Zinc     | µgZn/l | 8  | 50     | 75      | 75      | 75      | 125  | AA, T |
|          |        | 30   | 200    | 300     | 300     | 300     | 500  | 95P T |
| Vanadium | µgV/l  | 20   | 20     | 20      | 20      | 60      | 60   | AA T  |

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Water Quality Suite 4 (Continued)

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| DETERMINAND   | UNIT                  | VALUE<br>(Inland waters)  | STATISTIC |
|---|-----------------------|---|-----------|
| Nitrite   | mgNo <sub>2</sub> /l  | 0.01  | 95P       |
| Ammonia:  | mg N/l                |   |           |
| Total   |                       | 0.78 *  | 95P       |
| Unionised   |                       | 0.021 * 95P   |           |
| BOD   | mgO <sub>2</sub> /l   | 3   | 95P, T    |
| Dissolved oxygen  | mgO <sub>2</sub> /l   | ≥9 *  | AA, T     |
| Suspended solids  | mg/l                  | 25 **   | AA, T     |
| Residual chlorine   | mgCl <sub>2</sub> /l  | 0.0068 (at pH 6)  | 95P, T    |
| Hydrogen sulphide<br>(undissociated H <sub>2</sub> S)       | µgH <sub>2</sub> S/l  |   | AA        |
|   |                       | <15 °C, <5 mg O <sub>2</sub> /l 0.5 (24 hr max 5.0)             |           |
|   |                       | <15 °C, >5 mg O <sub>2</sub> /l 1.0 (24 hr max 10.0)            |           |
|   |                       | >15 °C, >5 mg O <sub>2</sub> /l 0.25 (24 hr max 2.5)            |           |
|   |                       | >15 °C, >5 mg O <sub>2</sub> /l 0.5 (24 hr max 5.0)             |           |
| Temperature   | °C                    | Thermal discharges must not cause<br>a rise greater than 1.5 °C | 98P       |
|   |                       | ≤21.5   | 98P       |
|   |                       | ≤10 for breeding of cold-<br>water species                      | 98P       |
| Phosphorus<br>(indicative of need to reduce eutrophication) | mg PO <sub>4</sub> /l | 0.065   | T         |

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AA = annual average; 95P = 95 percentile; T = total; D = dissolved;  
M = maximum; 98P = 98 percentile; \*\* Derogation permitted in the event of  
exceptional meteorological or geographical conditions.

\* Different values apply for migratory salmonids in estuaries and coastal waters: -

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|                  |                     |       |     |
|------------------|---------------------|-------|-----|
| Ammonia          | mg N/l              |       |     |
| Total            |                     | 1.0   | M   |
| Unionised        |                     | 0.021 | AA  |
|                  |                     | 0.042 | 95P |
|                  |                     | 0.12  | M   |
| Dissolved oxygen | mgO <sub>2</sub> /l | >3    | 95P |
|                  |                     | >5    | M   |

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## Water Quality Suite 5 - Bathing

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Guidelines on public health standards for bathing are being awaited. In the absence of guidelines, the following standards will apply.

### Aesthetic standards

- i. No visual evidence of pollution by gross sewage solids and debris except under occasional unfavourable circumstances.
- ii. No regular or consistent substantiated complaints from water users
- iii. No formation of sewage slicks, discolouration or foaming visible from offshore areas frequented by the public.
- iv. In order to meet these standards, foul flows into bathing waters shall be subject to the following requirements.

### **MINIMUM STANDARDS FOR DOMESTIC SEWAGE DISCHARGES TO TIDAL WATERS**

The following sections detail the minimum standards required of discharges following current and developing NRA policy, both internally derived and as required to implement UK government and EC policy and Directives.

To a large extent, the minimum standards vary dependent upon the degree of treatment that is provided. In some cases, for larger discharges, policy requirements are such that minimum levels of treatment must be provided. It is therefore appropriate to present such standards with reference to treatment level rather than water use.

For rainfall dependent intermittent discharges such as combined sewer overflows the minimum standards are generally expressed relative to the use and sensitivity of the receiving waters. These discharges are therefore dealt with separately.

### **IMPORTANT NOTE:**

This Appendix describes minimum standards only. The NRA will apply further standards or consent conditions, necessarily required to achieve relevant use-related EQS's as detailed in the main text of this document, as appropriate to the discharge on a case by case basis. (e.g. offshore outfall location, increased treatment level, etc.).

#### **A2.1 PRELIMINARY TREATED DISCHARGES**

- a) All persistent material to be removed from the flow and disposed of off site.
- b) The soffit level of the discharge must be located below the level of low water mark of mean spring tides (MLWS).

- c) Faecal particle size discharged will be dependent upon the available minimum initial dilution (AMID) in the receiving waters at the discharge point as calculated during a mean spring or neap tidal range, whichever gives the lowest value at any time during the tidal cycle.

| Available minimum<br>Initial dilution | Maximum particle size |
|---------------------------------------|-----------------------|
| AMID $\leq$ 10                        | $\leq$ 1mm            |
| 10 < AMID < 100                       | $\leq$ 3mm            |
| AMID $\geq$ 100                       | $\leq$ 6mm            |

#### A2.2 PRIMARY TREATED DISCHARGES

- a) All persistent material to be removed from the flow and disposed of off site.
- b) The soffit level of the discharge must be located below the level of low water mark of mean spring tides (MLWS).
- c) Primary treatment will be required for all qualifying discharges of sewage effluent into relevant coastal waters serving a population equivalent of more than 10,000 or into relevant estuarine waters serving a population equivalent of between 2,000 and 10,000. (See Appendix 3).

#### A2.3 SECONDARY TREATED DISCHARGES

- a) All persistent material to be removed from the flow and disposed of off site.
- b) The soffit level of the discharge must be located below the level of low water mark of mean spring tides (MLWS).
- c) The minimum flow to full treatment to be at least 3 x DWF as calculated from the equation:  $3xPG+I+3xE$  where:  
P = Peak population served.  
G = Water consumption per head per day.  
I = Allowance for infiltration water entering sewerage network.  
E = Industrial effluent to sewer from trade effluent activities.
- d) The storm tanks should be sized to provide at least 2 hours retention of all flows between 3xDWF and the greater of Formula A (Ref. 2.1 below) or 6xDWF.
- e) Maximum consent limits of 50 mg/l Biochemical Oxygen Demand (BOD) and 60 mg/l Suspended solids will be applied on a 95%ile basis.
- f) Secondary treatment will be required for all qualifying discharges of sewage effluent into relevant coastal waters serving a population equivalent of more than 150,000 or into relevant estuarine waters serving a population equivalent of more than 10,000. (See Appendix 3).

#### A2.4 STORM DISCHARGES

- a) The soffit level of the discharge must be located below the level of low water mark of mean spring tides (MLWS).
- b) The sewerage system must be designed such that the combined sewer overflow will not spill until the incoming flow exceeds that calculated from Formula A (Ref. 2.1 below).
- c) For storm discharges located at MLWS (See a) above) and discharging to sensitive use waters, the number of spills within the period May to Sept inclusive will be restricted between 1 (identified bathing waters) and 3 (water contact/shellfish harvesting waters). In the case of shellfish harvesting waters, this will subject to the agreement of MAFF and in consultation with the Local Sea Fisheries Committee.
- d) For storm discharges to sensitive use waters, extending beyond MLWS and receiving increased dispersion, the NRA will consider increased spill frequencies provided it can be demonstrated, to the NRA's satisfaction, that no deterioration in water quality to that which would be afforded in c) above would occur and that, for identified bathing waters, failure of bacteriological standards in the waters as a result of the storm discharge(s) will not exceed 0.8% of the time during the bathing season.
- e) Solids separation will be required with persistent material returned to the pass forward flow or removed off site. The level of separation will depend upon such factors as the sensitivity of the waters and the spill frequency of the overflow(s). Typical NRA requirements will be for solids separation equivalent to the performance of 6mm aperture screening, 10mm bar screening or effective physical installations (e.g. high-side weir) as appropriate.

#### A2.5 EXCEPTIONAL CIRCUMSTANCES

Only under exceptional circumstances may the achievement of one or more of the minimum standards be waived or amended. The NRA policy allows for local decisions to be made on a case by case basis to determine the best practical environmental option in such circumstances. As for all tidal discharges, consultation with Welsh Office and MAFF would be required before consent is given.

#### REFERENCE:

- 2.1 Technical Committee on Storm Overflows and the Disposal of Storm Sewage (1970).



### Microbial standards

Standards used to assess compliance with bathing water quality objectives will be those used by the Department of the Environment to assess compliance with the EC Bathing Waters Directive in designated bathing waters. These standards are as follows:

|                              |       |                                     |
|------------------------------|-------|-------------------------------------|
| <u>E. Coli</u> (per 100 ml)  | 2000  | 95 percentile.<br>Imperative value. |
| Total coliforms (per 100 ml) | 10000 | 95 percentile.<br>Imperative value. |

The Catchment Management Plan should note whether Salmonella or enteroviruses are present above the following limits:

|                                 |   |                |
|---------------------------------|---|----------------|
| Salmonella (per litre)          | 0 | 95 percentile  |
| Enteroviruses (PFU / 10 litres) | 0 | 95 percentile. |

The Catchment Management Plan should also note whether the following standards, which must be passed if a bathing beach is to qualify for a European Blue Flag award, are achieved:

|                              |     |                |
|------------------------------|-----|----------------|
| <u>E. Coli</u> (per 100 ml)  | 100 | 95 percentile. |
| Total coliforms (per 100 ml) | 500 | 95 percentile. |

In cases where a beach has been awarded a Blue Flag, these standards will be used to assess water quality in preference to the Department of the Environment standards listed below.

Guidelines on public health standards for immersion sports are being awaited. In the absence of guidelines, the following standards will apply.

Aesthetic standards

- i) No visual evidence of pollution by gross sewage solids and debris except under occasional unfavourable weather conditions.
- ii) No regular or consistent substantiated complaints from water users.
- iii) No formation of sewage slicks, discolouration, or foaming visible from foreshore areas frequented by the public.
- iv) In order to meet these standards and safeguard participants in immersion sports, foul flows into recognised areas where such sports are traditionally practised within the catchment shall be subject to the following requirements:

**MINIMUM STANDARDS FOR DOMESTIC SEWAGE DISCHARGES TO TIDAL WATERS**

The following sections detail the minimum standards required of discharges following current and developing NRA policy, both internally derived and as required to implement UK government and EC policy and Directives.

To a large extent, the minimum standards vary dependent upon the degree of treatment that is provided. In some cases, for larger discharges, policy requirements are such that minimum levels of treatment must be provided. It is therefore appropriate to present such standards with reference to treatment level rather than water use.

For rainfall dependent intermittent discharges such as combined sewer overflows the minimum standards are generally expressed relative to the use and sensitivity of the receiving waters. These discharges are therefore dealt with separately.

**IMPORTANT NOTE:**

This Appendix describes minimum standards only. The NRA will apply further standards or consent conditions, necessarily required to achieve relevant use-related EQS's as detailed in the main text of this document,

as appropriate to the discharge on a case by case basis. (e.g. offshore outfall location, increased treatment level, etc.).

## A2.1 PRELIMINARY TREATED DISCHARGES

- a) All persistent material to be removed from the flow and disposed of off site.
- b) The soffit level of the discharge must be located below the level of low water mark of mean spring tides (MLWS).
- c) Faecal particle size discharged will be dependent upon the available minimum initial dilution (AMID) in the receiving waters at the discharge point as calculated during a mean spring or neap tidal range, whichever gives the lowest value at any time during the tidal cycle.

| Available minimum Initial dilution | Maximum particle size |
|------------------------------------|-----------------------|
| AMID $\leq$ 10                     | $\leq$ 1mm            |
| 10 < AMID < 100                    | $\leq$ 3mm            |
| AMID $\geq$ 100                    | $\leq$ 6mm            |

## A2.2 PRIMARY TREATED DISCHARGES

- a) All persistent material to be removed from the flow and disposed of off site.
- b) The soffit level of the discharge must be located below the level of low water mark of mean spring tides (MLWS).
- c) Primary treatment will be required for all qualifying discharges of sewage effluent into relevant coastal waters serving a population equivalent of more than 10,000 or into relevant estuarine waters serving a population equivalent of between 2,000 and 10,000. (See Appendix 3).

## A2.3 SECONDARY TREATED DISCHARGES

- a) All persistent material to be removed from the flow and disposed of off site.
- b) The soffit level of the discharge must be located below the level of low water mark of mean spring tides (MLWS).
- c) The minimum flow to full treatment to be at least 3 x DWF as calculated from the equation:  $3 \times PG + I + 3 \times E$  where:  
P = Peak population served.  
G = Water consumption per head per day.  
I = Allowance for infiltration water entering sewerage network.  
E = Industrial effluent to sewer from trade effluent activities.
- d) The storm tanks should be sized to provide at least 2 hours retention of all flows between 3xDWF and the greater of Formula A (Ref. 2.1 below) or 6xDWF.
- e) Maximum consent limits of 50 mg/l Biochemical Oxygen Demand (BOD) and 60 mg/l Suspended solids will be applied on a 95%ile basis.

- f) Secondary treatment will be required for all qualifying discharges of sewage effluent into relevant coastal waters serving a population equivalent of more than 150,000 or into relevant estuarine waters serving a population equivalent of more than 10,000. (See Appendix 3).

#### A2.4 STORM DISCHARGES

- a) The soffit level of the discharge must be located below the level of low water mark of mean spring tides (MLWS).
- b) The sewerage system must be designed such that the combined sewer overflow will not spill until the incoming flow exceeds that calculated from Formula A (Ref. 2.1 below).
- c) For storm discharges located at MLWS (See a) above) and discharging to sensitive use waters, the number of spills within the period May to Sept inclusive will be restricted between 1 (identified bathing waters) and 3 (water contact/shellfish harvesting waters). In the case of shellfish harvesting waters, this will be subject to the agreement of MAFF and in consultation with the Local Sea Fisheries Committee.
- d) For storm discharges to sensitive use waters, extending beyond MLWS and receiving increased dispersion, the NRA will consider increased spill frequencies provided it can be demonstrated, to the NRA's satisfaction, that no deterioration in water quality to that which would be afforded in c) above would occur and that, for identified bathing waters, failure of bacteriological standards in the waters as a result of the storm discharge(s) will not exceed 0.8% of the time during the bathing season.
- e) Solids separation will be required with persistent material returned to the pass forward flow or removed off site. The level of separation will depend upon such factors as the sensitivity of the waters and the spill frequency of the overflow(s). Typical NRA requirements will be for solids separation equivalent to the performance of 6mm aperture screening, 10mm bar screening or effective physical installations (e.g. high-side weir) as appropriate.

#### A2.5 EXCEPTIONAL CIRCUMSTANCES

Only under exceptional circumstances may the achievement of one or more of the minimum standards be waived or amended. The NRA policy allows for local decisions to be made on a case by case basis to determine the best practical environmental option in such circumstances. As for all tidal discharges, consultation with Welsh Office and MAFF would be required before consent is given.

#### REFERENCE:

- 2.1 Technical Committee on Storm Overflows and the Disposal of Storm Sewage (1970).

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Water Quality Suite 7 : Potable Abstraction

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| DETERMINAND                 | UNIT    | VALUE (95P, T, unless shown otherwise) |              |              |   |
|-----------------------------|---------|--|--------------|--------------|---|
|                             |         | A1 treatment                           | A2 treatment | A3 treatment |   |
| <u>Bacteria and viruses</u> |         |  |              |              |   |
| Total coliforms<br>(37°C)   | /100 ml | 50                                     | 5000         | 50 000       | G |
| Faecal coliforms            | /100 ml | 20                                     | 2000         | 20 000       | G |
| Faecal streptococci         | /100 ml | 20                                     | 1000         | 10 000       | G |
| Salmonella                  | / 5 l   | 0                                      | 0            |              |   |
| <u>List I Substances</u>    |         |  |              |              |   |
| Cadmium                     | µgCd/l  | 5                                      | 5            | 5            |   |
| Mercury                     | µgHg/l  | 1                                      | 1            | 1            |   |
| Total pesticides            | µg/l    | 1                                      | 2.5          | 5            |   |
| <u>List II Substances</u>   |         |  |              |              |   |
| Arsenic                     | µgAs/l  | 50                                     | 50           | 100          |   |
| Boron                       | µgB/l   | 1000                                   |              | 1000         | G |
| Chromium                    | µgCr/l  | 50 (T)                                 |              | 50 (T)       |   |
| Copper                      | µgCu/l  | 20                                     |              | 50           | G |
| Iron                        | µgFe/l  | 300 (D)                                | 2000 (D)     | 1000 (D)     | G |
| Lead                        | µgPb/l  | 50                                     | 50           | 50           |   |
| Selenium                    | µgSe/l  | 10                                     | 10           | 10           |   |
| Zinc                        | µgZn/l  | 3000                                   | 5000         | 5000         |   |
| Organotins:                 | µg/l    |  |              |              |   |
| Tributyl tin                |         | 0.02(M)                                | 0.02(M)      |              |   |
| Triphenyl tin               |         | 0.09(M)                                | 0.09(M)      |              |   |
| Mothproofing agents:        | µg/l    |  |              |              |   |
| Cyfluthrin                  |         | 0.001                                  | 0.001        |              |   |
| Permethrin                  |         | 0.01                                   | 0.01         | 0.01         |   |

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Water Quality Suite 7 : Potable Abstraction (Continued)

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| DETERMINAND                                 | UNIT                                 | VALUE (95P, T, unless shown otherwise) |              |              |
|---|--------------------------------------|--|--------------|--------------|
|   |                                      | A1 treatment                           | A2 treatment | A3 treatment |
| <u>Other Determinands</u>                   |                                      |  |              |              |
| Ammonia                                     | µgNH <sub>4</sub> /l                 | 0.05(G)                                | 1.5          | 4            |
| Dissolved Oxygen                            | % sat                                | >70 (G)                                | >50 (G)      | >30 (G)      |
| BOD   | mg O <sub>2</sub> /l                 | <3 (G)                                 | <5 (G)       | <7 (G)       |
| Barium                                      | µgBa/l                               | 100                                    | 1000         | 1000         |
| Cyanide                                     | µgCN/l                               | 50                                     | 50           | 50           |
| Fluorides                                   | µgF/l                                | 1500                                   | 700-1700(G)  | 700-1700(G)  |
| Phenols                                     | µgC <sub>6</sub> H <sub>5</sub> OH/l | 1                                      | 5            | 100          |
| Polycyclic aromatic hydrocarbons            | µgPAH/l                              | 0.2                                    | 0.2          | 1            |
| Dissolved or emulsified hydrocarbons        | µg/l                                 | 50                                     | 200          | 1000         |
| pH  | pH value                             | 6.5-8.5(G)                             | 5.5-9.0(G)   | 5.5-9.0(G)   |
| Colour                                      | mg/l Pt scale                        | 20 **                                  | 100 **       | 200 **       |
| Temperature                                 | °C                                   | 25 **                                  | 25 **        | 25 **        |
| Nitrates                                    | mgNO <sub>3</sub> /l                 | 50 **                                  | 50 **        | 50 **        |
| Sulphates                                   | mgSO <sub>4</sub> /l                 | 250                                    | 250 **       | 250 **       |
| Phosphates                                  | µgP <sub>2</sub> O <sub>5</sub> /l   | 400(G)                                 | 700(G)       | 700(G)       |
| Chloride                                    | mgCl/l                               | 200(G)                                 | 200(G)       | 200(G)       |
| Kjeldahl Nitrogen (except NO <sub>3</sub> ) | mg/l O <sub>2</sub>                  | 1 (G)                                  | 2 (G)        | 3 (G)        |
| COD   | mg/l O <sub>2</sub>                  |  |              | 30 (G)       |
| Odour                                       | Dilution factor 25°C                 | 3 (G)                                  | 10 (G)       | 20 (G)       |
| Conductivity                                | µg/cm <sup>-1</sup> , 20°C           | 1000(G)                                | 1000(G)      | 1000 (G)     |
| Suspended solids                            | mg/l                                 | 25 (G)                                 |              |              |
| Surfactants (laurylsulphate)                | µg/l                                 | 200(G)                                 | 200(G)       | 200 (G)      |
| Substances extractable with Chloroform      | µg/l SEC                             | 100(G)                                 | 200(G)       | 500 (G)      |

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M = Maximum; D = Dissolved; 95P = 95 percentile; T = Total.

\*\* = Exceptional climatic or geographic conditions; G = Guide value.

Definition of the standard methods of treatment for transforming surface water of categories A1, A2 and A3 into drinking water.

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Water Quality Suite 7 (Continued)

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Category A1

Simple physical treatment and disinfection, e.g. rapid filtration and disinfection.

Category A2

Normal physical treatment, chemical treatment and disinfection e.g. pre-chlorination, coagulation, flocculation, decantation, filtration, disinfection (final chlorination).

Category A3

Intensive physical and chemical treatment, extended treatment and disinfection e.g. chlorination to break-point, coagulation, flocculation, decantation, filtration, absorption (activated carbon), disinfection (ozone, final chlorination).

**APPENDIX 2 - DEVELOPMENT**

|   |  |
|---|--|
| 1. Catchment Area                               | Menai Strait                               |
| 2. Total Population                             | 44,827 (1981 Census)                       |
| 3. <u>Towns and Main Villages</u>               | <u>Present Population</u><br>(1981 Census) |
| <u>Arfon B.C.</u>                               |  |
| Caernarfon                                      | 9,278                                      |
| Felinheli                                       | 1,766                                      |
| Bangor  | 11,772                                     |
| Aber  | 232  |
| <u>Aberconwy B.C.</u>                           |  |
| Llanfairfechan                                  | 3,708                                      |
| Penmaenmawr                                     | 3,863                                      |
| <u>Ynys Mon B.C.</u>                            |  |
| Brynsiencyn                                     | 886  |
| Llanfairpwll                                    | 2,884                                      |
| Porthaethwy (Menai Bridge)                      | 2,942                                      |
| Beaumaris & Llanfaes                            | 2,047                                      |
| Llandegfan & Glyn Garth                         | 1,947                                      |
| Llangoed & Penmon                               | 1,120                                      |
| Llaniestyn                                      | 79   |
| Dwyran  | 740  |
| Niwbwrch (Newborough)                           | 906  |
| Llangaffo                                       | 296  |
| Llansadwrn                                      | 361  |
| 4. <u>Local Authorities/Utilities Companies</u> |  |
| Arfon B.C.                                      |  |
| Aberconwy B.C.                                  |  |
| Ynys Mon B.C.                                   |  |
| Gwynedd C.C.                                    |  |
| Dwr Cymru/Welsh Water                           |  |
| Manweb plc                                      |  |
| British Gas                                     |  |
| British Telecom                                 |  |

\* Based on communities where drainage is either dependent on, or directly discharges into the Menai Strait for disposal.



**APPENDIX 2 - DEVELOPMENT (Continued)**

|   |   |
|---|---|
| <p><b>5. <u>Structure/Local Plan Proposals</u></b></p> <p>Menai Strait Local Plan<br/>Ynys Mon Local Plan</p> <p>Arfon District Wide Local Plan<br/>Aberconwy Local Plan<br/>Gwynedd Structure Plan</p> | <p>Adopted Nov. '87<br/>Deposit Anticipated Early '93<br/>Draft by July '93</p> <p>Draft Anticipated '93<br/>With Sec. of State for<br/>Modifications</p> |
|---|---|

**APPENDIX 2 - DEVELOPMENT (Continued)**

|  |   |
|--|---|
| <p><u>5. Structure/Local Plan Proposals</u></p> <p>Menai Strait Local Plan<br/>Ynys Mon Local Plan</p> <p>Arfon District Wide Local Plan<br/>Aberconwy Local Plan<br/>Gwynedd Structure Plan</p> | <p>Adopted Nov. '87<br/>Deposit Anticipated Early '93<br/>Draft by July '93</p> <p>Draft Anticipated '93<br/>With Sec. of State for<br/>Modifications</p> |
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### APPENDIX 3

#### GLOSSARY OF TERMS

|                                   |   |  |
|-----------------------------------|---|--|
| M <sup>3</sup> /DAY <sup>-1</sup> | = | Cubic Metres Per Day   |
| STW                               | = | Sewage Treatment Works   |
| CCW                               | = | Countryside Council for Wales (formerly NCC - Nature Conservancy Council)  |
| NWNWSFC                           | = | North Western and North Wales Sea Fisheries Committee  |
| SSSI                              | = | Site of Special Scientific Interest  |
| SNCI                              | = | Site of Nature Conservation Interest   |
| SAM                               | = | Scheduled Ancient Monument   |
| PSSI                              | = | Proposed Site of Special Scientific Interest   |
| NNR                               | = | National Nature Reserve  |
| NWC                               | = | National Water Council   |
| SNP                               | = | Snowdonia National Park  |
| AONB                              | = | Area of Outstanding Natural Beauty   |
| SWQO                              | = | Statutory Water Quality Objectives   |
| MNR                               | = | Marine Nature Reserve  |
| NRA                               | = | National Rivers Authority  |
| UCNW                              | = | University College of North Wales, Bangor  |
| MAFF                              | = | Ministry of Agriculture, Fisheries and Food  |
| EQS                               | = | Environmental Quality Standard, level set for a substance, or measure of water quality, to protect a particular use. |

**PROPOSED STATUTORY WATER QUALITY OBJECTIVES**

| USE CLASS             | WATER QUALITY CRITERIA |                     |                           |                                     |  |           |  |  |
|-----------------------|------------------------|---------------------|---------------------------|-------------------------------------|--|-----------|--|--|
| 1.Fisheries Ecosystem | Class                  | DO % sat<br>10% ile | BOD (ATU)<br>mgN/l 90%ile | Total<br>Ammonia<br>mgN/l<br>90%ile | Un-ionised<br>Ammonia<br>mgN/l<br>95%ile | pH 95%ile | List II Substances                     | Class Description  |
|                       | 1                      | 80                  | 2.5                       | 0.2                                 | 0.021                                    | 6.9       | Standards for 'sensitive' aquatic life | Water quality suitable for high class salmonoid and cyprinid fisheries.            |
|                       | 2                      | 70                  | 4.0                       | 0.6                                 | 0.021                                    | 6.9       | Standards for 'sensitive' aquatic life | Water quality suitable for sustaining salmonoid and high class cyprinid fisheries. |
|                       | 3                      | 60                  | 6.0                       | 1.3                                 | 0.021                                    | 6.9       | Standards for 'other' aquatic life     | Water quality suitable for high class cyprinid fisheries.                          |
|                       | 4                      | 50                  | 8.0                       | 2.5                                 |  | 6.9       | Standards for 'other' aquatic life     | Water quality suitable for sustaining cyprinid fisheries.                          |
|                       | 5                      | 20                  | 15.0                      | 9.0                                 |  |           |  | Some species may be present but water quality unsuitable for fishery               |
|                       | 6                      | <20                 |                           |                                     |  |           |  | Fish unlikely to be present  |