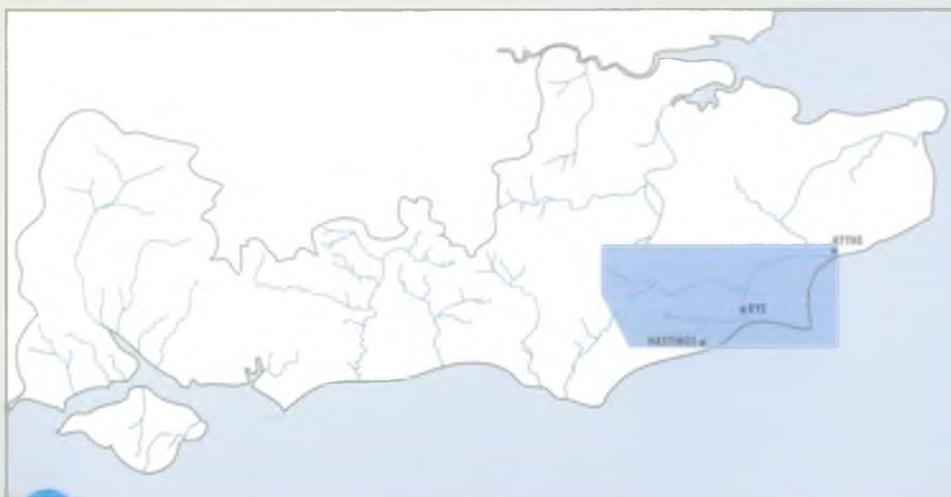


EAST SUSSEX ROTHER CATCHMENT MANAGEMENT PLAN CONSULTATION REPORT



NRA

*National Rivers Authority
Southern Region*

MISSION STATEMENT

The NRA's mission is :

"We will protect and improve the water environment by the effective management of water resources and by substantial reductions in pollution. We will aim to provide effective defence for people and property against flooding from rivers and the sea. In discharging our duties we will operate openly and balance the interests of all who benefit from and use rivers, groundwaters, estuaries, and coastal waters. We will be businesslike, efficient and caring towards our employees".

Our Aims are to :

- * Achieve a continuing overall improvement in the quality of rivers, estuaries and coastal waters, through the control of pollution.
- * Manage water resources to achieve the right balance between the needs of the environment and those of the abstractors.
- * Provide effective defence for people and property against flooding from rivers and the sea.
- * Provide adequate arrangements for flood forecasting and warning.
- * Maintain, improve and develop fisheries.
- * Develop the amenity and recreation potential of inland and coastal waters and associated lands.
- * Conserve and enhance wildlife, landscape and archaeological features associated with inland and coastal waters of England and Wales.
- * Improve and maintain inland waters and their facilities for use by the public where the NRA is the navigation authority.
- * Ensure that dischargers pay the costs of the consequences of their discharges, and, as far as possible, to recover the costs of environment improvements from those who benefit.
- * Improve public understanding of the water environment and the NRA's work.
- * Improve efficiency in the exercise of the NRA's functions and to provide challenge and opportunity for employees and show concern for their welfare.

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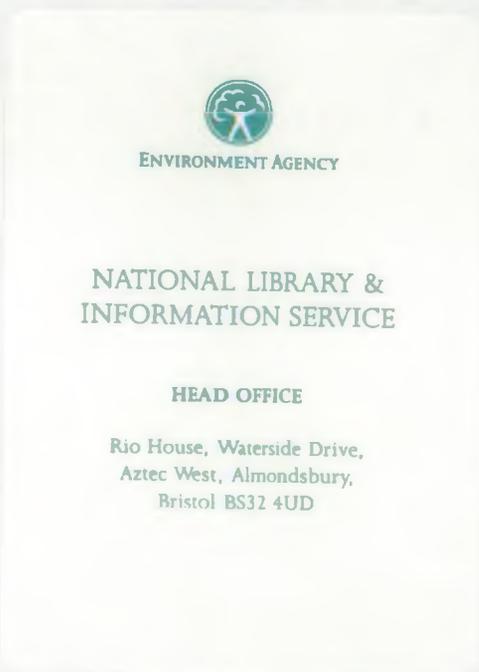
Published May 1994

River Rother Catchment Management Plan

*River Rother Catchment Management Plan
Consultation Report*

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ENVIRONMENT AGENCY



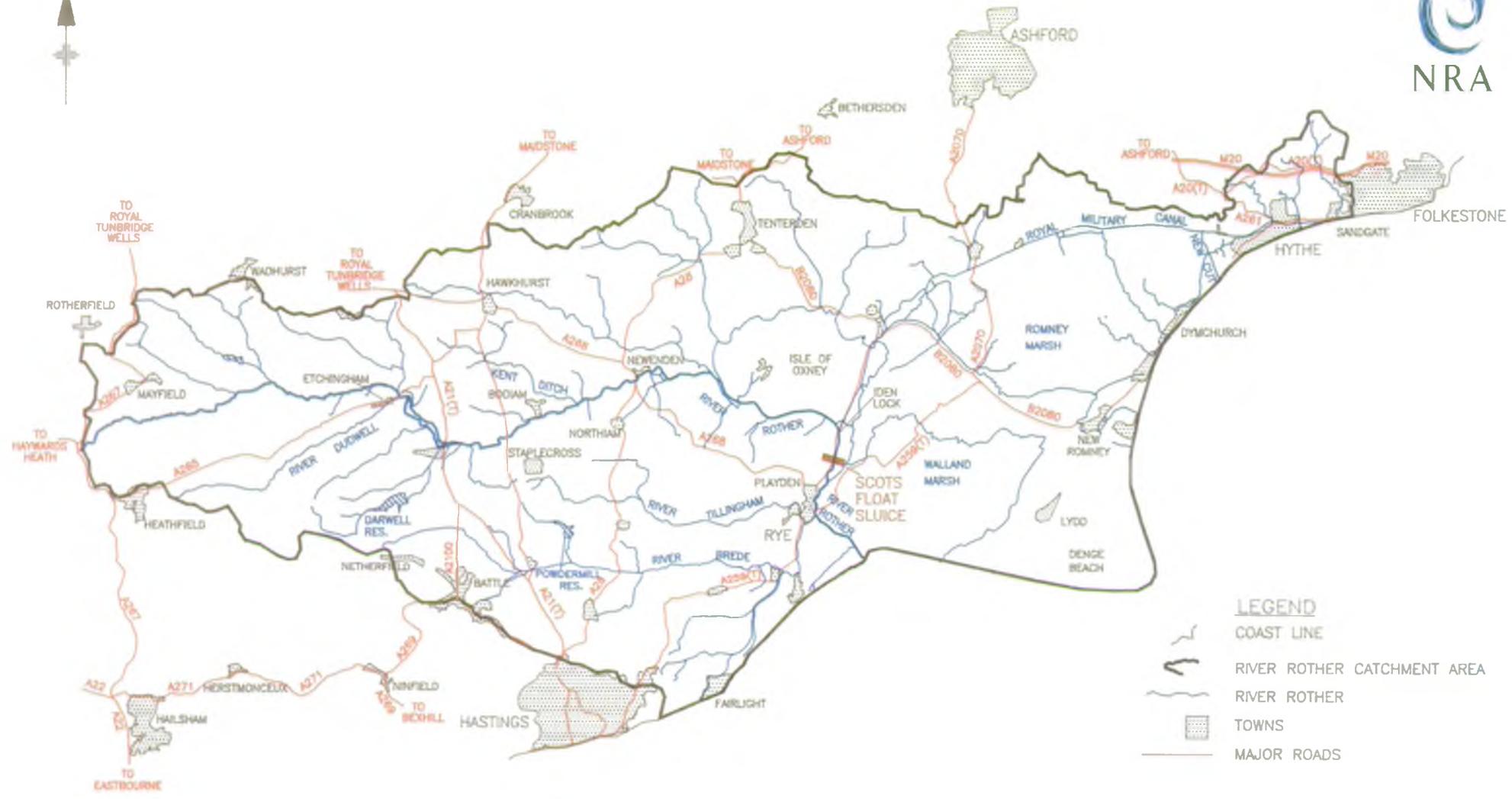
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River Rother Catchment Management Plan



Area	Priority	Responsible Party	Timeline

SECTION A : GENERAL INFORMATION



LEGEND

-  COAST LINE
-  RIVER ROTHER CATCHMENT AREA
-  RIVER ROTHER
-  TOWNS
-  MAJOR ROADS



THE CATCHMENT

River Rother Catchment Management Plan

SECTION A : GENERAL INFORMATION

A1. THE ROTHER CATCHMENT

The catchment geology consists of Recent deposits in the marshland areas, Hastings Beds (clays, silts and sands) in the upper catchment, and Greensand with a small area of Gault clay and Chalk beyond Hythe, at the eastern extremity of Romney Marsh.

The River Rother rises near Rotherfield and flows eastwards, its upper tributaries running through a dendritic network of steeply incised valleys. Between Udiam and Bodiam, about half way along its course, the river reaches sea level and its character changes to a slow-flowing lowland drain running through extensive marshland, much of which is below high tide level. Scots Float Sluice at Playden prevents flooding from the sea and is the head of tide. The rivers Tillingham and Brede join the Rother estuary at Rye to form a drying tidal harbour extending some four kilometres to the sea.

The lower reaches of the Rother have followed a very variable course over the centuries and have been greatly modified for land drainage and flood defence. The rivers Brede, Tillingham and Rother are believed at one time to have flowed into a large lagoon behind a shingle ridge stretching between Fairlight and Sandgate, with an outfall near West Hythe. Siltation allowed marshlands to be reclaimed, and today 27,000 hectares of fertile land lie between the old sea cliffs and the coastline. By mediaeval times, shingle drift had created the promontory of Dungeness, causing the river mouth to migrate westwards to Romney. However, in 1287 a great storm breached the shingle bank at Rye, allowing the river to take a shorter route to the sea. Continuing siltation and the accumulation of shingle along the coastline has left both Rye and the new town of Winchelsea (built by Edward 1st after the storm) some distance inland. Works in the 17th century diverted the river south of the Isle of Oxney, whereas its original course was on the line of the Reading Sewer: the two branches rejoin near Iden Lock.

The resident population of the catchment is approximately 105,000, the main towns being Hythe, Tenterden, New Romney and Rye. Ashford, Folkestone and Hastings lie just beyond the catchment boundary. The Rother catchment is predominantly rural with mixed farming in the upper reaches and arable and sheep farming in the lower lying areas. The Romney Marshes and Shirley Moor support high value agricultural crops. Light industry is found mainly alongside the Rother Estuary within the Port of Rye.

Rivers and reservoirs are the main public water supply sources although some water is taken from underground, principally from the Ashdown Sands and the gravels of Dungeness. The largest surface sources are Darwell and Powdermill Reservoirs which store water pumped from the Rivers Rother and Brede at times of high flow. The NRA water resource strategy for the Region includes an option to link Darwell reservoir by pipeline with Bewl Water in the Medway catchment as a first step to increase resources for the Darwell supply area. A long-term option to meet rising demand would be to increase the capacity of Darwell Reservoir. The changed abstraction licence which this would entail would permit the inclusion of rules requiring augmentation of the flow in the River Rother at times of drought, enhancing the supply of water to feed Walland and Romney Marshes.

The Rivers Rother, Brede and Tillingham support runs of sea trout and there are populations of wild brown trout in the tributaries. The middle and lower reaches of the larger rivers are noted for their good productive fisheries. The catchment has considerable conservation interest, especially in the marshes and along the coast, and the Rye Bay Project (supported by the NRA) has been launched by E.Sussex County Council to raise the profile of countryside management in the area.

River Rother Catchment Management Plan

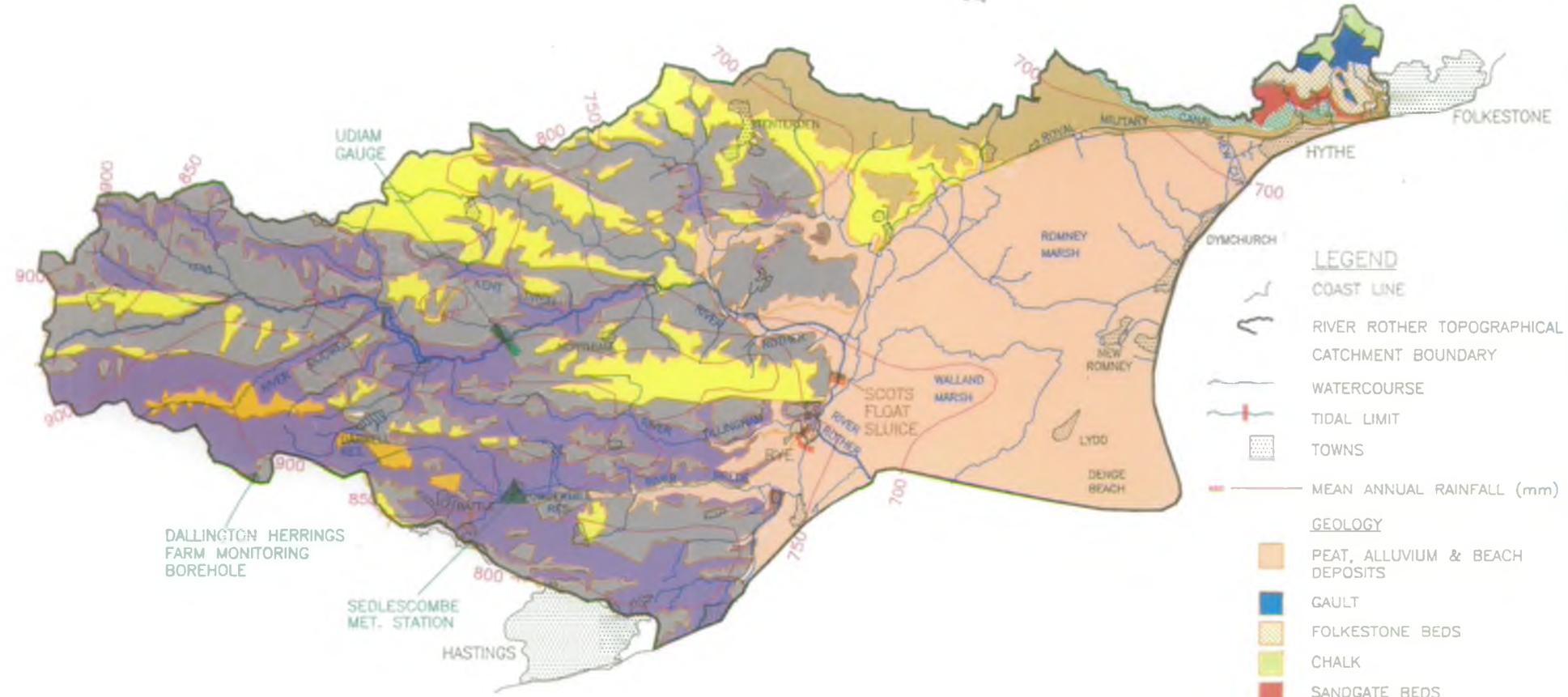
Low-lying land is drained by pumping stations discharging to embanked rivers, to the Rother estuary, or to the sea. The NRA is responsible for arterial land drainage and sea defence; Internal Drainage Boards look after the smaller marshland watercourses, levying charges for the purpose from local landowners. The Royal Military Canal was constructed as a defence against invasion by Napoleon, but is now used in winter as a high-level drain for water pumped from Romney Marsh. In the summer, river water is fed from the Canal into the marshes to maintain ditch levels for wet fencing, stock watering and crop irrigation. In dry summers there is insufficient water for this purpose, but in recent years the work of the NRA to improve the distribution system has lessened the problem.

As the upland catchment is relatively impermeable, river flows respond rapidly to heavy rainfall bringing the risk of flash floods. The outflow through Scots Float Sluice can be tidelocked, so the river below Bodiam is managed as a flood retention lake to hold the freshwater flow when this occurs. However, there are times when even this capacity is overwhelmed, and there is a history of frequent and extensive flooding in the lower Rother valley. This problem was resolved by a flood improvement scheme installed between 1966 and 1980. The banks of the Rivers Rother, Brede and Tillingham were raised to increase storage, land at Wet Level was reserved as an overspill area for excess flood water (with lower river banks which are allowed to overtop), and pumped drainage was provided for low-lying land.

The significance of the Rother estuary for flood defence is the principal reason why the NRA owns and manages the Harbour of Rye, its sole commercial port. In addition to having a flood defence role the Harbour provides moorings for a fleet of inshore trawlers and some 450 small resident pleasure boats. A further 800 pleasure craft visit the harbour each year. Two privately owned wharves handle cargoes of timber, grain, aggregates and fertiliser, and the Harbour caters for 200 visits a year by medium sized cargo vessels.

Statistics for the Rother catchment are set out in Appendix 1.

A2 HYDROLOGY AND RAINFALL



LEGEND

-  COAST LINE
-  RIVER ROTHER TOPOGRAPHICAL CATCHMENT BOUNDARY
-  WATERCOURSE
-  TIDAL LIMIT
-  TOWNS
-  MEAN ANNUAL RAINFALL (mm)

GEOLOGY

-  PEAT, ALLUVIUM & BEACH DEPOSITS
-  GAULT
-  FOLKESTONE BEDS
-  CHALK
-  SANDGATE BEDS
-  HYTHE BEDS
-  WEALD CLAY
-  TUNBRIDGE WELLS SAND
-  WADHURST CLAY
-  ASHDOWN BEDS
-  PURBECK BEDS
-  HASTINGS BEDS
-  GAUGING STATION



CATCHMENT HYDROLOGY & RAINFALL

River Rother Catchment Management Plan

A2. HYDROLOGY AND RAINFALL

A2.1 General

This section considers the main features of the natural water resources within the catchment. Sections B1, B2 and B3 consider the use of these resources for water supply.

A proportion of the rainfall which falls on the catchment is lost through direct evaporation and transpiration from plants and trees. The remainder is termed the effective rainfall and is the total available water resource to the catchment. This resource may manifest itself as surface run-off to streams and rivers or as recharge to the groundwater aquifer.

The allocation of effective rainfall between surface and groundwater is largely dependent on the nature of the surface geology. Low permeability clay and silt areas result in a high run-off component to a strongly developed surface drainage system. Chalk and some sand catchment areas allow a higher proportion of recharge to groundwater. Consequently, the surface drainage system is less well developed and a large part of the river flow is derived by outflow from the groundwater aquifer. This can occur from springs or through the bed of the river and is known as baseflow.

Surface flows in clay catchments respond rapidly to both high rainfall and drought periods. The water resource available at a river intake shows considerable seasonal variation and these catchments are referred to as 'flashy' in character. The water supply during low flow periods can be enhanced by the construction of reservoirs to store water abstracted during the periods of high flow.

Groundwater aquifers provide a natural storage system for the catchment. Groundwater systems react much more slowly to rainfall and generally provide a more reliable resource during drought periods. Recovery from drought periods may also take longer however. These catchments are considered to be baseflow controlled.

A2.2 Local Perspective

The River Rother rises at Charthouse near Rotherfield at an elevation of 150m and flows eastwards across the Hastings Beds to Etchingam, where it is joined by the River Dudwell. Flows from the upland catchment monitored at Udiam (at an elevation of 2m AOD) show the river to be flashy, with a difference of two orders of magnitude between daily minima and maxima.

The character of the river changes considerably downstream of Udiam, flow velocities reduce and the channel widens as it flows across low-lying land to Rye. The lower catchment is criss-crossed by canals and ditches, the most extensive of which are in the Walland and Romney Marshes. In the winter these drain the surrounding land, in summer the process is reversed and supplies are fed from the river to the marshes to retain water levels for irrigation and wet fencing. In a dry year, when Scots Float Sluice is closed for most of the summer, virtually the whole flow of the Rother is diverted into the marsh systems.

The Rivers Tillingham and Brede drain catchments to the south of the Rother and outflow to the estuary downstream of Scots Float Sluice. These rivers are separate from the Rother marsh feeding system but supply water in summer to the Brede and Pett marshes.

Most of the catchment lies on the Hastings Beds, comprising the Tunbridge Wells Sand, Wadhurst Clay

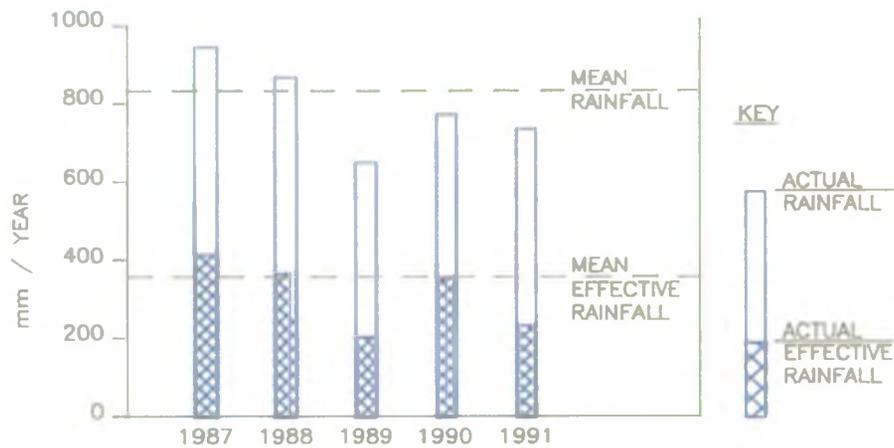
and Ashdown Beds. The Tunbridge Wells Sand is a varied sequence of silty sandstones and clays which provide low yielding local supplies of generally good quality groundwater. The sandy upper strata of the Ashdown Beds form the best aquifers in the catchment, although yields are generally low and the water tends to be rich in iron and manganese which may require reduction before the water can be put into supply.

At Denge Beach a thick deposit of Recent beach gravels forms a discrete aquifer which is a valuable water resource, although it is vulnerable to saline intrusion if over-exploited or otherwise contaminated by sea water. The situation is monitored closely by the NRA. Elsewhere in the catchment the main development of water resources has been from surface waters.

A2.3 Meteorological Considerations

The average annual rainfall ranges from below 700mm on Walland Marshes to 900mm in the western upland reaches. The record from Sedlescombe Station shows that both 1989 and 1991 were drought years with effective rainfall between half and two thirds of the mean, and that in 1989 there was very little rainfall between April and October.

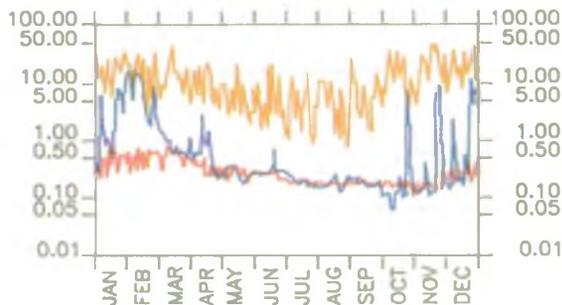
With only a small groundwater component to the baseflow of rivers, levels fall rapidly in response to droughts. This is shown by the surface flow hydrograph for the River Rother at Udiam, where flows over the entire period from May to October 1989 were at or close to the minimum recorded. Low river flows continued into 1991 and in both years there was difficulty maintaining water levels in the marsh systems fed from the River Rother. The isolated aquifers of the Hastings Beds were not so severely depleted by this drought.



Annual Rainfall Record from Sedlescombe Station
Actual Evapotranspiration Data from MORECS
SQUARES 173 AND 174

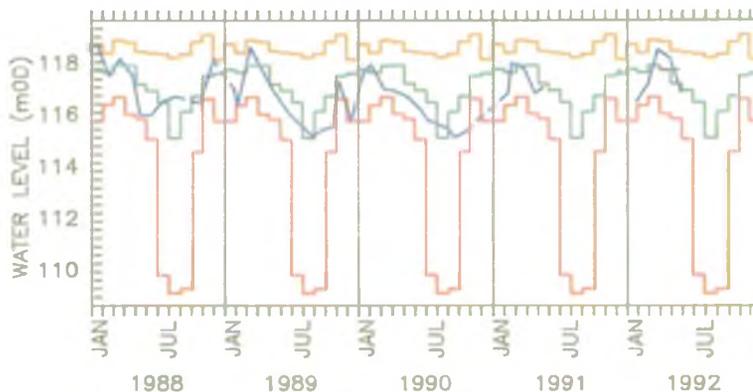
DAILY FLOW HYDROGRAPH (m^3s^{-1})

Max. and min. daily mean flows from 1962 to 1991 with an example yearly hydrograph.



ROTHER AT UDIAM

Site name : DALLINGTON HERRINGS FARM
National grid reference : TQ 6658 1803
Well number : TQ61/44
Ground level : 119.48
Aquifer : HASTINGS BEDS



Actual groundwater levels 1988-1992. This can be compared to long term Max, Min and Mean values calculated from years 1964 to 1992

HYDROMETRIC DATA



- LEGEND**
-  COAST LINE
 -  RIVER ROTHER CATCHMENT AREA
 -  RIVER ROTHER
 -  TOWNS
 -  DISTRICT/BOROUGH BOUNDARY
 -  COUNTY BOUNDARY
 -  PROPOSED ROUTE OF HIGH SPEED RAIL LINK



INTERACTIONS WITH PLANNING AUTHORITIES

River Rother Catchment Management Plan

A3. FUTURE DEVELOPMENT

A3.1 General

The NRA is consulted regularly on planning matters falling within its terms of reference, both in the preparation of statutory plans and in connection with individual applications for planning consent. Recent guidance from the Department of the Environment has strengthened the links between the NRA and the Planning Authorities, but ultimate planning control remains with them.

Catchment Management Plans are complementary to the statutory Plans of Local Authorities. By stating clearly the NRA vision it is hoped that Catchment Management Plans will make a positive input to the formal planning process, which is the responsibility of the District and County Councils.

In taking decisions regarding particular developments, provisions under the Town and County Planning Act 1990 require that planning authorities should have regard to the contents of relevant development plans. Section 54A of the Planning and Compensation Act 1991 specifically states that "decisions are to be in accordance with the plan, unless material considerations indicate otherwise". The plan framework required by the 1991 Act requires the preparation in non-metropolitan areas of the following plans:

- i) **County Structure Plan.** This provides the broad strategic planning framework and should ensure that the provision for development is realistic and consistent with national and regional policy.
- ii) **District or Local Plan.** This plan sets out detailed policies and specific proposals for the development and use of land. The local plan should be in general conformity with the Structure Plan and it makes proposals for specific allocations of land as well as setting out the policies for the control of development.
- iii) **Minerals Local Plan.** The exploitation of mineral resources within the catchment can impact upon it in a number of ways. The extraction of sands and gravels from a river valley can have a significant effect on the river corridor and its associated flood plain. Mining activities can be a source of pollution either during operation or following closure and subsequent flooding of the mine. Finished mineral workings can provide important conservation or amenity sites, but can also be a further cause of concern if they are used as solid waste disposal sites. Although County Structure Plans will address broad strategies, the Minerals Locals Plan should cover these in more detail. It should indicate the areas where provision is made for mineral working and the disposal of mineral wastes as well as the areas where mineral resources are to be safeguarded for future working. The plans should also set out development control criteria and requirements for the restoration and aftercare of such sites.
- iv) **Waste Local Plan.** The 1974 Control of Pollution Act places a duty on the Waste Disposal Authority to licence disposal sites and ensure that the sites do not endanger public health, cause water pollution or cause serious detriment to the local amenity. The 1990 Environmental Protection Act also introduced stricter controls on the closure and aftercare of waste disposal sites. A waste disposal operator will have to acquire a certificate of completion from the Waste Disposal Authority before they are able to hand back their licence and exonerate themselves of any further legal responsibility. The Waste Disposal Authority can integrate waste disposal policies into the Minerals Local Plan or prepare a separate Waste Local Plan. The Plan should examine land use implications and identify suitable locations for further facilities.

River Rother Catchment Management Plan

Within all the development plans outlined above proper provision should be made for the needs of the utilities responsible for water supply, sewerage, electricity, gas and telecommunications as well as the National Rivers Authority with all its areas of responsibility. The Town and Country Planning (Development Plan) Regulations 1991 require local authorities to statutorily consult a number of bodies before putting plans on deposit including the National River Authority and it is at this stage that authorities will wish to resolve points and attempt to minimise objections once the plan is on deposit.

A3.2 Local Perspective

A3.2.1 Housing and Employment

The Rother Catchment straddles the boundary between Kent and East Sussex. Within Kent the catchment includes the southern parts of Shepway District and the Boroughs of Ashford and Tunbridge Wells. Strategic planning is provided by the Kent structure plan which was approved in 1990. In June 1992 the County Council published a consultation Draft Third Review of the Structure Plan which will look forward to 2011. Within East Sussex the catchment covers most of Rother District, the north eastern corner of Wealden District and a small part of Hastings Borough. The 5th and 6th Alterations of the County Structure Plan provide the strategic planning context.

Provision for housing in both counties has been based on demographic and migration factors acting between 1991 and 2001. The figures for Rother and Wealden districts take account of completions between 1986 and 1991 as the Structure Plan allocations are for the period 1986-2001.

District/Borough	Housing Provision
Shepway	1400
Ashford	8000
Tunbridge Wells	2800
Rother	2260
Wealden	4120

NB. These figures are for entire Boroughs or Districts and it is important to note that in the case of Ashford, Tunbridge Wells, Rother and Wealden, the majority of the housing allocation will be developed outside the Rother catchment area.

In Rother District and Hastings Borough most new housing planned for the next decade will be beyond the catchment boundary, although there may be some development within the catchment in the vicinity of Rye and Battle.

River Rother Catchment Management Plan

The High Weald Area of Outstanding Natural Beauty and other areas of countryside conservation cover a large proportion of the catchment area, and are subject to strict planning restrictions.

The constraints on housing development also apply to commerce and industry. The figures in the table are based on total Borough and District areas and only a small proportion of the allocation for Ashford, Tunbridge Wells, Rother and Wealden apply to the Rother catchment area.

District/Borough	Land Allocated for commercial and industrial development (Ha)
Shepway	5.0
Ashford borough	50.0
Tunbridge Wells	11.5
Rother	14.0
Wealden	26.0

A3.2.2 Waste Disposal

The Kent Structure Plan Review highlights the need for adequate, safe and properly controlled waste disposal facilities. The urgent need is emphasised by there being less than five years permitted tipping capacity available, although landfill will continue to be important in the short term.

Revised draft planning policies for Kent now emphasise the importance of environmental constraints, particularly the protection of groundwater, with landfill locations being sought on impermeable geological strata. Structure Plan policies together with the Waste Disposal Plan (prepared by the County as the Waste Regulation Authority) form the starting point for the Waste Local Plan currently being prepared.

The approved Structure Plan for East Sussex outlines the county's commitment to the controlled use of landfill and supports the burning of waste to reduce the amount of land required. New landfill sites must not cause water pollution.

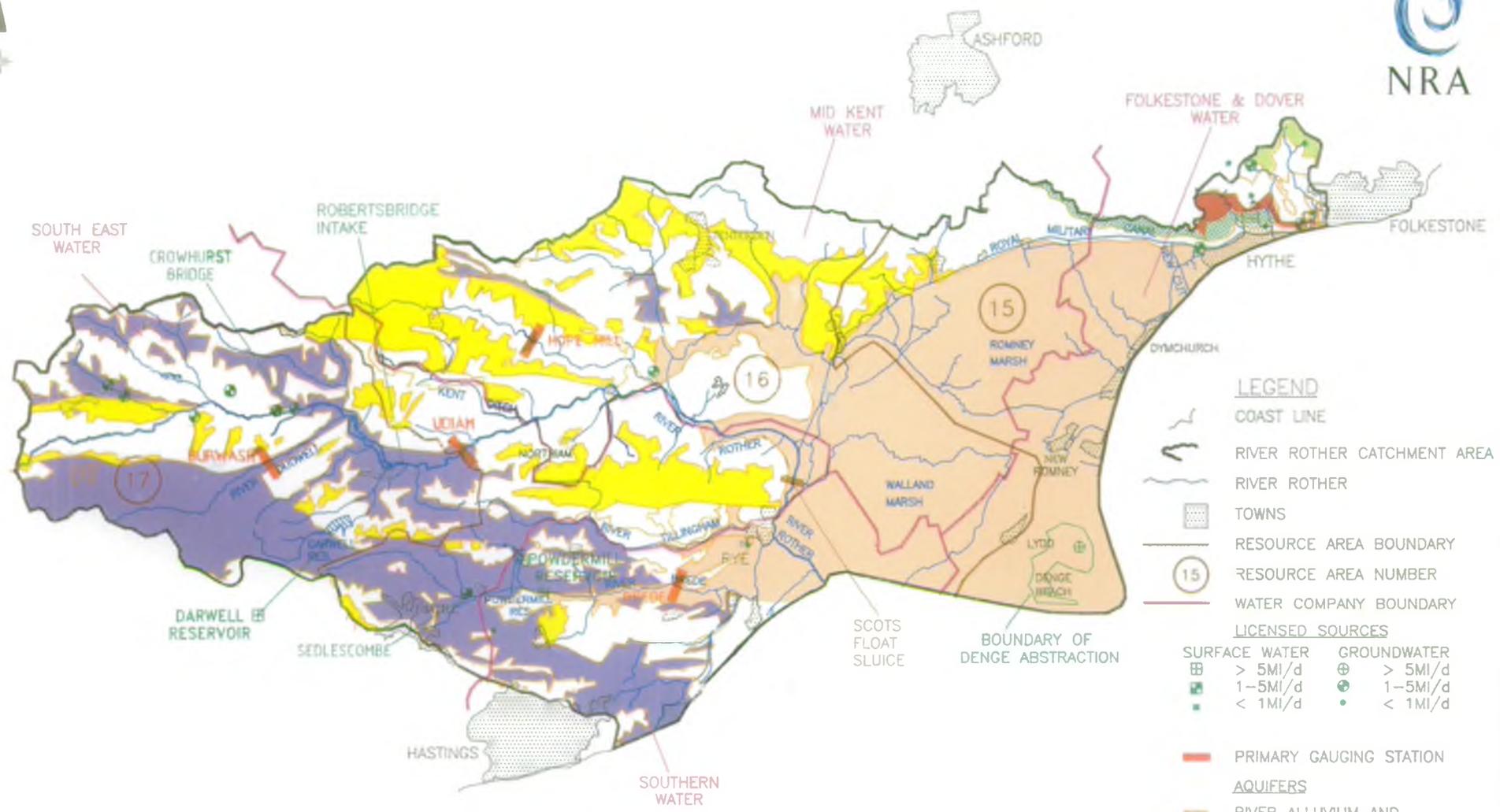
A3.2.3 Minerals

National policy proposes that each county should provide for 10 years' extraction of construction aggregates from local sources, at current rates of demand. This is achieved in East Sussex, which also has considerable deposits of aggregates off the coast, but the Kent Minerals Local Plan identifies a shortage of flint gravels in the County and recognises that the South East Region relies on imports to meet the demand. This situation is expected to continue during the Plan period. Exploitation of the gravel deposits of Dungeness is restricted by the designation of large areas to the south and east of Lydd as being important for sea defence, as catchment areas for water supply, or as having high landscape or nature conservation value. Working for minerals within designated areas will not normally be permitted.

Other mineral resources (chalk, clay, sand) are relatively extensive and their extraction should continue. The Structure Plans also include policies relating to oil and gas development, and the need to prevent pollution of land, air or water.

River Rother Catchment Management Plan

SECTION B : USES



LEGEND

- COAST LINE
- RIVER ROTHER CATCHMENT AREA
- RIVER ROTHER
- TOWNS
- RESOURCE AREA BOUNDARY
- RESOURCE AREA NUMBER
- WATER COMPANY BOUNDARY

LICENSED SOURCES

SURFACE WATER		GROUNDWATER	
	> 5MI/d		> 5MI/d
	1-5MI/d		1-5MI/d
	< 1MI/d		< 1MI/d

PRIMARY GAUGING STATION

AQUIFERS

- RIVER ALLUVIUM AND BEACH DEPOSITS
- CHALK
- HYTHE BEDS
- SANDGATE BEDS
- TUNBRIDGE WELLS SAND
- ASHDOWN BEDS

LOWER GREENSAND

HASTINGS BEDS



PUBLIC WATER SUPPLY

SECTION B : USES

B1. PUBLIC WATER SUPPLY

B1.1 General

This use relates to the provision of public water supplies from both surface and groundwaters. Abstractions are operated by the Water Companies, controlled by licences from the NRA which stipulate the maximum allowable annual and daily abstraction. The mean licensed abstraction is the average daily abstraction allowable under the annual licence. Private groundwater supplies for domestic use are also included, although these are generally very small and not significant from the resources standpoint.

Those water supply sources in use before 1963 were granted Licences of Right under the Water Resources Act (1963). Since then, new sources have been licensed on the basis that abstraction does not adversely affect existing sources or impair the natural environment. Licences issued after 1963 may also be linked to Prescribed Flows such that abstraction must cease once the river flow falls below the prescribed value.

Prescribed Flows (PFs) are increased in stages, as more licences are granted, so as to protect both the Minimum Residual Flow (MRF) and the rights of existing licence holders. MRFs are set at gauging stations and are intended to protect flows for other uses. PFs can thus control abstractions but do not control the river flows. Compensation flows may also be set into licence conditions such that abstractions from groundwater or releases from a reservoir are used to augment low river flows.

Water companies may apply for a Drought Order to vary the licence conditions during periods of exceptional shortage. This may allow, for example, the temporary reduction of the Prescribed Flow controlling abstraction or an increase to the maximum licensed abstraction. The terms of the Drought Order may require the Water Company to introduce demand reduction measures, such as hose-pipe bans, at the same time.

B1.2 Local Perspective

The Rother Catchment is divided into three resource areas; Upper Rother, Lower Rother and Romney Marsh. The licensed and actual abstraction volumes (1990) for each resource area, subdivided into surface and groundwater abstractions, are presented in Table B1.1.

A large percentage of the licensed total abstraction of 79 Ml/d is exported from the catchment, with trunk mains supplying water south to Hastings and Eastbourne and north to Folkestone. Proposed new developments are also largely for export, as the catchment is underutilised in comparison with adjoining areas (see Section B3).

River Rother Catchment Management Plan

TABLE B1.1 - Mean Licensed and Actual Abstractions for Public Water Supply

Resource Area	Mean Licensed Abstraction (Ml/d)			Mean Actual Abstraction for a Typical Year (1990) (% Licensed)		
	Surface	Groundwater	Total	Surface	Groundwater	Total
15 ROMNEY MARSH	0.0	14	14	0	*	*
16 LOWER ROTHER	17	9.0	26	*	*	49
17 UPPER ROTHER	32	7.0	39	*	*	80
TOTAL CATCHMENT	49	30	79	58	62	60

* Actual abstractions not revealed as they could be identifiable to a single source.
All values are included in the total.

B1.2.1 Surface Water Sources

Surface water accounts for over 60% of the abstraction licensed from the catchment for public water supply, the major source being Darwell Reservoir operated by Southern Water Services. Impounded run-off to the reservoir is supplemented by water pumped from the River Rother at Robertsbridge, the abstraction being controlled by a Minimum Residual Flow (MRF) at Udiam Gauging Station, which is set at 26.4 Ml/day between 1st April and 30th September to protect the requirements of marsh feeding. The total annual abstraction from Robertsbridge is limited to 8,182 Ml (of which no more than 4091 Ml may be taken in the summer months), but from October to March the MRF is relaxed to 4.5 Ml/day, resulting in most of the water being taken in this period.

Powdermill is a small reservoir on a tributary of the River Brede, filled from its natural catchment and by up to 7.8 Ml/day pumped from the river at Brede Valley Waterworks, subject to an MRF of 6.3 Ml/day. Crowhurst Bridge (on the River Rother upstream of Robertsbridge) has recently been developed as a combined river/groundwater source where operations are controlled by MRFs at Crowhurst Bridge and Udiam, and by the rate of abstraction for Darwell at Robertsbridge. Sedlescombe, on the River Line, is a combined river/ groundwater source upstream of the confluence with Powdermill Stream.

B1.2.2 Groundwater Sources

Whilst groundwater amounts to 40% of the total licensed abstraction for public water supply, the quantity taken is usually less than the licenses permit and in 1990 groundwater accounted for only 23% of the total volume actually taken from the catchment. Components of the Hastings Beds are the major aquifers in the catchment, eight public supply sources with a licensed abstraction of some 30 Ml/day have been developed in the Ashdown Beds, but the actual abstraction in 1990 was only one third of this despite the prevailing drought.

River Rother Catchment Management Plan

Reasons for the limited use of this groundwater resource are:-

- 1) The Ashdown Beds tend to outcrop as small aquifers isolated by silts, clays and/or fault boundaries. Their reliable yield can be significantly reduced during drought periods as the aquifer is dewatered.
- 2) The groundwater has a high content of iron and manganese and generally requires treatment before use.
- 3) Water from the Ashdown Beds is silty and may clog well screens, reducing the source efficiency and yield.

Folkestone and Dover Water Services Ltd. has eight spring sources in the Hythe Beds of the Lower Greensand in the north east corner of the catchment, but these tend to be unreliable and are not heavily used. More reliance is placed on the Denge source, a discrete aquifer developed in the gravels of Denge Beach. This comprises a network of 22 boreholes designed to maximise yield whilst ensuring that saline intrusion of the groundwater does not occur. However, there is a risk of sea water reaching the gravel aquifer via drainage ditches, so it is important to ensure that tidal gates are maintained. Gravel winning also threatens the Denge groundwater resource, but is controlled by the planning authority acting on the advice of the NRA.

The security of the abstraction at Crowhurst Bridge has been improved by the installation of a 3.5 Ml/day groundwater source at Witherenden to augment flows in the River Rother, the first use of groundwater to augment surface flow within this catchment. In 1991 a 3.5 Ml/day source at Stonegate was commissioned by Eastbourne Water Company to reinforce supplies in the area.

A proposal to meet increasing demand and to improve the reliability of the catchment's water resource is to transfer water from Bewl Reservoir (in the Medway catchment) to the upper Rother, allowing increased abstraction to fill Darwell reservoir. A further option for the future, subject to environmental safeguards, is to enlarge Darwell reservoir to increase its capacity.

B1.3 Supply Requirements

Water Resources

- Maximum availability of resources within the terms specified in the licence.
- Protection of existing public water supply abstractions

Water Quality

- **Surface sources.** Within the limiting values defined for D2 Category Treatment (EC Council Directive 75/440/EEC) as set out in the Surface Water (Classification) Regulations 1989.
- **Groundwater sources.** In 1992 NRA published "Policy and Practice for the Protection of Groundwater". Application of this policy depends on the circumstances of each case, but the document gives guidance which can be summarised as follows:-
- Nature of the soil cover: soils with high, intermediate or low leaching potential.

River Rother Catchment Management Plan

- High leaching potential soils are sub-divided according to the physical processes controlling the movement of water through them.
- Nature of any drift cover.
- Properties of the bed-rock as a major aquifer, minor aquifer or non-aquifer.

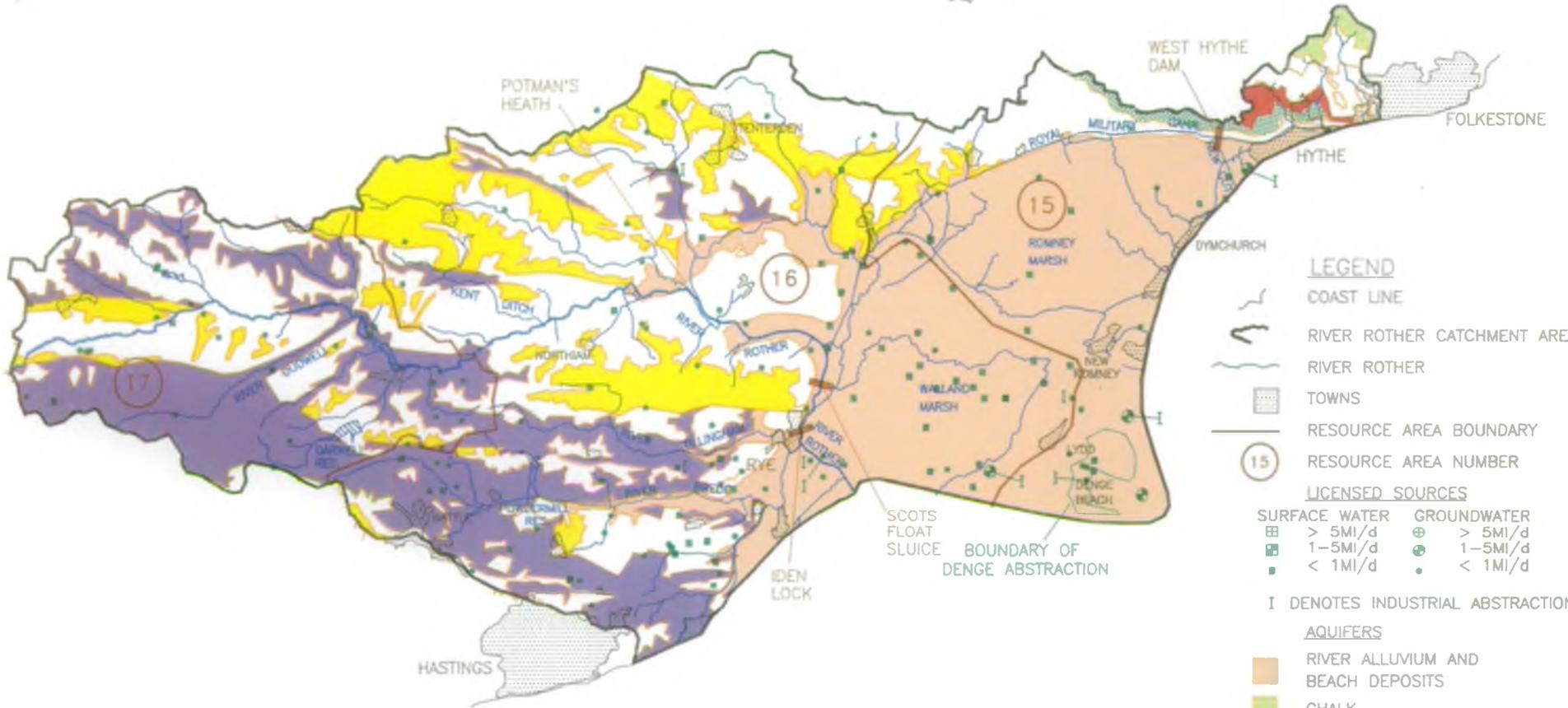
Three zones of protection are defined around each groundwater supply source as follows:

Zone One - Within the 50 day groundwater travel-time horizon to the supply source.

Zone Two - Between 50 and 400 days groundwater travel-time to the supply source.

Zone Three - Within the source catchment area but more than 400 days groundwater travel-time to the supply source.

B2 WATER SUPPLY FOR INDUSTRY AND AGRICULTURE



LEGEND

-  COAST LINE
 -  RIVER ROTHER CATCHMENT AREA
 -  RIVER ROTHER
 -  TOWNS
 -  RESOURCE AREA BOUNDARY
 -  RESOURCE AREA NUMBER
- LICENSED SOURCES**
- | | | | |
|---|---------------|---|-------------|
|  | SURFACE WATER |  | GROUNDWATER |
|  | > 5MI/d |  | > 5MI/d |
|  | 1-5MI/d |  | 1-5MI/d |
|  | < 1MI/d |  | < 1MI/d |
- I DENOTES INDUSTRIAL ABSTRACTIONS

AQUIFERS

-  RIVER ALLUVIUM AND BEACH DEPOSITS
 -  CHALK
 -  HYTHE BEDS
 -  SANDGATE BEDS
 -  TUNBRIDGE WELLS SAND
 -  ASHDOWN BEDS
- LOWER GREENSAND {
- HASTINGS BEDS {



INDUSTRIAL & AGRICULTURAL ABSTRACTION

River Rother Catchment Management Plan

B2. WATER SUPPLY FOR INDUSTRY AND AGRICULTURE

B2.1 General

This use deals with surface and groundwater supplies abstracted for industrial and agricultural purposes. Industrial abstractions include all licensed supplies for industrial process uses, cooling water and gravel washing. Agricultural abstractions include all supplies for spray irrigation and general agricultural use.

B2.2 Local Perspective

The Rother catchment is predominantly rural and virtually all the agricultural licences relate to small abstractions for irrigation or general use. Control is achieved by linking abstractions to river MRF settings or to water levels in the ditches from which water is taken.

The three main industrial users abstract water for gravel washing, which accounts for almost 70% of the total licensed abstraction in this category, but being a non-consumptive use does not influence the net catchment balance.

The mean daily licensed abstraction of both surface and groundwater is given in Table B2.1 together with the percentage of this total actually abstracted in a typical year (1990). Since abstraction details for individual sources are confidential totals are not shown where they can be identified to one source.

Table B2.1 Mean Licensed and Actual Abstractions for Water Supply for Industry and Agriculture

Resource Area	Mean Licensed Abstraction (Ml/d)			Mean Actual Abstraction for a Typical Year (1990) (% Licensed)		
	Surface	Groundwater	Total	Surface	Groundwater	Total
15 ROMNEY MARSH	0.5	12.5	13	*	*	24
16 LOWER ROTHER	2.0	3.0	5	*	*	75
17 UPPER ROTHER	0.5	0.1	0.6	*	*	3
TOTAL CATCHMENT	3.0	15.6	18.6	41	37	38

The maintenance of water levels in Walland and Romney Marshes through dry summer periods is the major issue for this use. In the winter, water is pumped from the ditch system to drain the marshes - in spring, a network of stops is used to pen the outflow. Timing of this operation is critical as it must both minimise the flood risk and maximise the water resource retained in the marsh. Ditch levels are maintained through the summer by drawing on the River Rother - a pumping station at Potmans Heath supplies river water to the Royal Military Canal via Reading Sewer, another at Iden Lock draws directly on the River Rother. This water is then fed into the marshes through a network of gravity ditches and low lift pumps.

In a drought year such as 1989 or 1991, Scots Float Sluice remains closed for most of the summer and virtually all the river flow is used for marsh feeding, but even so, water levels in the ditches fall as the summer progresses. River flow records indicate that 20 Ml/day is transferred to the marshes in summer, whereas the licensed spray irrigation abstraction is seasonal, peaking in May at only 5 Ml/day. It is clear

River Rother Catchment Management Plan

that the main water loss is by natural evaporation and not by spray irrigation, although this use has increased in recent years.

In an average summer there is sufficient water to maintain ditch levels in most of the marsh area, any shortage being experienced only at the greatest distance from the River Rother. The NRA has improved the water distribution network in recent years by repairing existing control structures and installing new pumps, notably that at Iden Lock.

The small catchment to the east of West Hythe Dam currently drains to the sea via Seabrook sluice at Hythe. The NRA has proposed transferring this water westwards to augment the resources available for marsh feeding.

B2.3 Supply Requirements

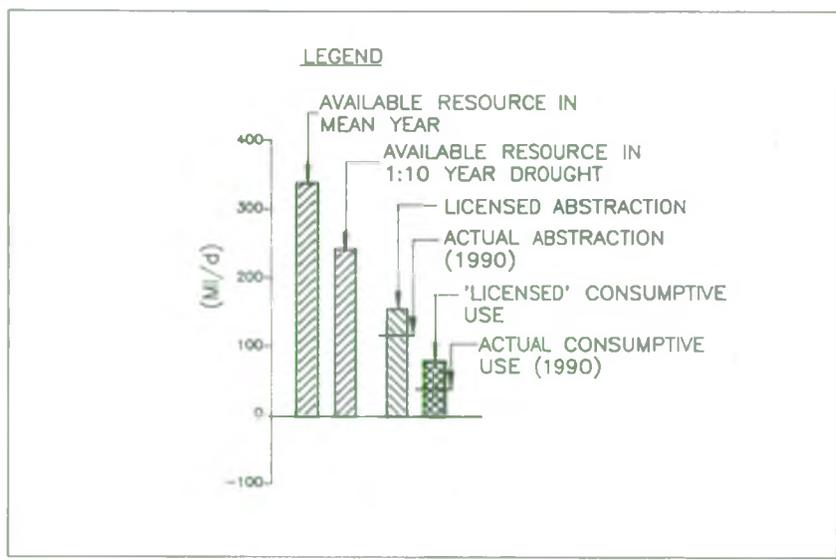
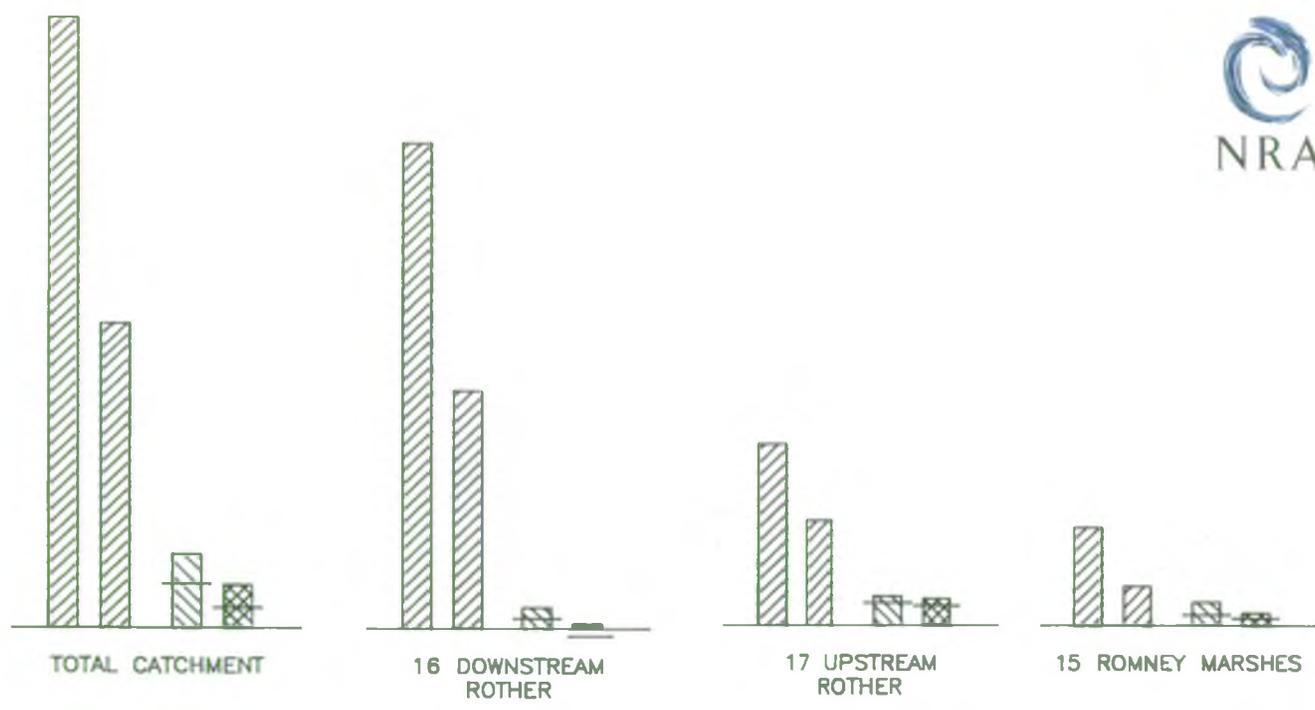
Water Resources

- Availability of resources within the terms specified in the licence.
- New agricultural licences to specify winter abstraction and storage.

Water Quality

- There are no mandatory water quality standards for agricultural irrigation purposes although proposals have been drafted for sodium, chloride and sulphate (NRA R&D Note 131. November 1992).
- The Food and Agricultural Organisation of the United Nations (FAO) classifies water with salinity and chloride concentrations between 0.7 - 3.0 ds/m and 140-350mg/l respectively as having slight to moderate restrictions for irrigation use. NRA working guidelines categorise the types of crops grown under irrigation as "very sensitive" to "least sensitive" in terms of chloride toxicity. The maximum chloride concentrations recommended in the irrigation water range from 100mg/l (C1) up to 500mg/l (C1) depending on the tolerance of the crop.
- Water quality criteria for irrigation and livestock watering are given in the Government's Consultation Paper on River Quality (December 1992).

B3 USE OF THE WATER RESOURCE



Resource Area	'Licensed' Consumptive Use (% of Resource)	
	Mean Year	1:10 Year Drought
15 ROMNEY MARSH	13	29
16 LOWER ROTHER	1	2
17 UPPER ROTHER	15	23
Overall Catchment Balance	7	13

USE OF THE WATER RESOURCE

B3. USE OF THE WATER RESOURCE

B3.1 General

This section compares the overall use of water within the catchment with the available resource.

The catchment is divided into various resource areas, defined on the basis of size and common characteristics and used for water resources assessment purposes. The available water resource for each resource area is defined as the sum of the annual effective rainfall to the area and any inflow from an upstream resource area. This total resource is available as either surface water or groundwater. Both mean and 1:10 year drought annual available resource totals have been assessed. These totals are compared with the total annual licensed abstraction and the estimated actual abstraction for a typical year (1990).

In some cases abstracted water is returned directly to the river with minimal losses, as for example with cooling waters or gravel washing. Part of the public water supply abstraction is for customers within the catchment, a significant proportion of which may then returned to the river via consented effluent discharges. This return of effluent can play an important part in the maintenance of river flows.

The difference between the water abstracted from the catchment and that returned is termed the 'consumptive use'. 'Licensed' consumptive use has been assessed for each resource area by subtracting the consented discharge total from the licensed abstraction total. Actual consumptive use has been assessed using actual abstraction and discharge data for a typical year, in this case 1990.

The purpose of these data, which are shown in the figure, is to illustrate the scale of water resources development within the total catchment and each resource area. The area covered by each resource area is shown on the plans for Section B1.

B3.2 Local Perspective

The total catchment balance indicates that just over 10% of the mean effective rainfall is allocated for abstraction. Approximately half of this total is returned to the catchment, making consumptive use about 5% of the available resource. In a 1 in 10 year drought the effective rainfall is halved and consumptive use rises to around 15%

Only a small percentage of the available resource is used for public supply, particularly when compared with more urbanised catchments to the south and east. However, much of the rain falling on the Rother catchment is lost by rapid run-off, there is little storage in aquifers, the baseflow component of river flows is low, and in a dry summer (such as 1989 or 1991) virtually the whole surface flow is used to sustain water levels in the marshes. When this occurs the main loss of water is by evaporation, a loss which is not included in the resource balance.

The initial proposal to augment the resource of the catchment is to transfer up to 8 Ml/day from Bewl Water (in the Medway catchment) to Darwell, via the River Rother, for export to the Hastings area. This strategic scheme would take advantage of the increased yield of Bewl Water, which will result from the construction of a new intake at Yalding. This, with its associated pipeline will be completed in 1994/95.

Groundwater resources in the Rother catchment are limited due to their dispersed nature and low yields. The only exception is the Denge Beach gravel aquifer, a small discrete resource of good quality

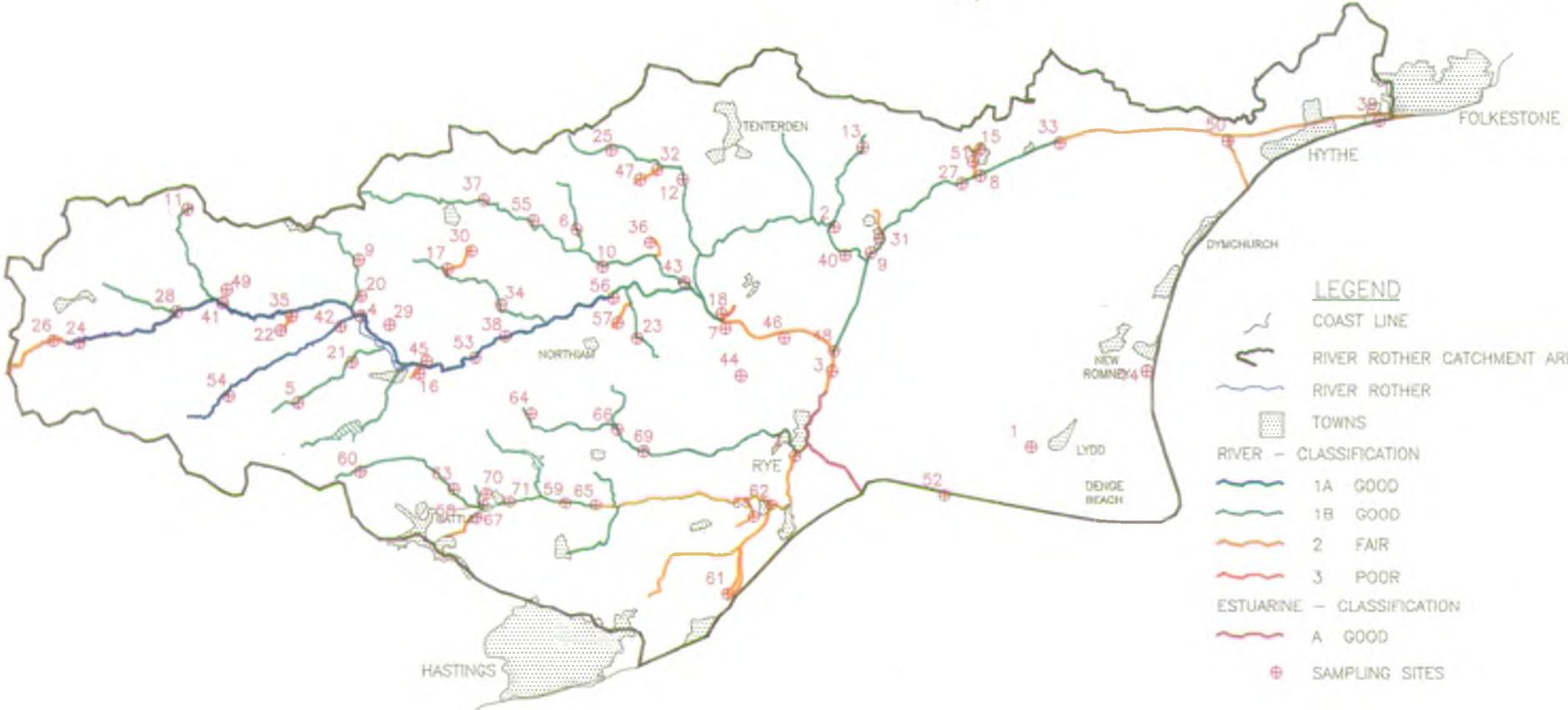
groundwater surrounded by sea and marshes. Licensed abstraction at Denge is close to the sustainable yield of the aquifer and groundwater quality is monitored carefully to minimise the risk of saline intrusion. The yield of the aquifer would be threatened by uncontrolled gravel extraction.

In Kent and East Sussex there is a potential shortfall of water for public supply to meet the demand expected by 2011, especially when the peak summer demand is considered. Before more abstraction is authorised, the NRA looks to the supply companies to control leakage and implement demand management measures (eg metering) to ensure that water is used efficiently and that the environmental impact of abstraction is minimised. However, in the longer term there is the option to increase the capacity of Darwell reservoir as a component of a strategic Regional supply scheme designed to meet this need.

B3.3 Overall Supply Objectives

- To ensure that future resource developments do not adversely affect the flow regime or the ecology of the catchment.
- Where possible, to draft new licence agreements so as to secure measures for the benefit of the catchment.
- To conform with existing minimum residual flow settings in the catchment.
- To incorporate additional controlling flows in new abstraction licences, as required.
- To encourage the operation of seasonal resource management schemes and winter storage to improve surface flows during the summer.
- To encourage water users to adopt water saving measures.
- To encourage water companies to meet leakage targets and to adopt measures to manage demand.
- To protect the Denge gravel aquifer for public water supply abstraction.
- To maintain and develop the hydrometric monitoring network.
- To encourage the return of suitably treated effluent to the catchment.
- To encourage linking resources with those of adjacent catchments to optimise resource management.
- To maximise the effectiveness of the marsh feeding system.
- To consider the effects of possible climate change in water resource planning.

B4 WATER QUALITY



LEGEND

- COAST LINE
- RIVER ROTHER CATCHMENT AREA
- RIVER ROTHER
- TOWNS
- RIVER - CLASSIFICATION
 - 1A GOOD
 - 1B GOOD
 - 2 FAIR
 - 3 POOR
- ESTUARINE - CLASSIFICATION
 - A GOOD
- SAMPLING SITES



WATER QUALITY CLASSIFICATION

B4. WATER QUALITY

B4.1 General

Whereas continental European practice is to apply uniform emission standards to all effluents, river water quality in the United Kingdom is managed by matching effluent consent conditions to the needs of the environment and the circumstances of individual discharges. Environmental Quality Objectives (EQOs) are determined for receiving waters and quantified as Environmental Quality Standards (EQSs); permitted pollution load and consent conditions can then be calculated for each discharge.

United Kingdom EQSs and consent standards for toxic or non-degradable substances are very strict and in practice there is little difference between the two control philosophies, but in the case of degradable wastes the British approach achieves protection of the environment at minimum cost, allowing rational decisions to be taken about the allocation of investment between competing improvement schemes.

By defining the water quality requirements of different water uses (e.g. agriculture, water supply, angling etc.) it is possible to set use-based EQOs and to classify individual river reaches according to the functions they serve. However, this approach lacks the means for making absolute comparisons of water quality - from year to year or between different water courses. The NRA is developing a more comprehensive water quality classification system to meet this need, but it has not yet received Government approval for general use.

B4.2 Local Perspective

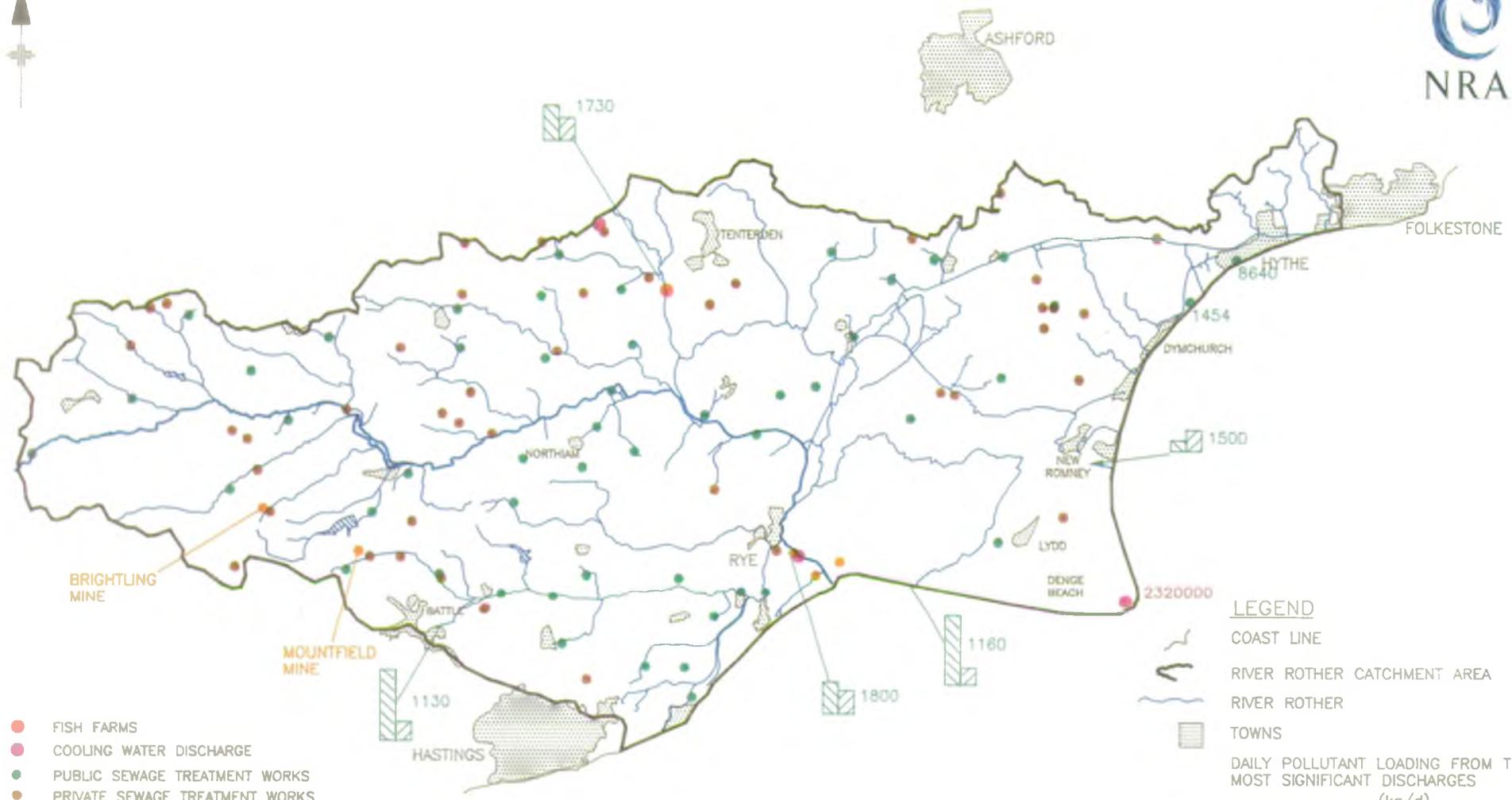
The map shows the existing water quality target designations within the Rother catchment. Compliance is assessed from the analysis of programmed routine water samples taken by the NRA from sites shown on the map and detailed in Table B4.1

River Rother Catchment Management Plan

Table B4.1 - Routine Surface Water Sampling Points

Map Ref. No.	River/Stream	Sampling Point	Grid Ref.
1	Romney Marshes	DS/Lydd STW	TR 028 203
2	Cradlebridge Petty Sewer	B2080 Road Bridge	TQ 937 302
3	Rother	Boonshill Bridge	TQ 936 237
4	Rother	Etchingham	TQ 718 262
5	Socknersh Stream	Brown Oak Farm	TQ 689 223
6	Hexden Channel	D/S Iden Green STW	TQ 818 301
7	Rother	Blackwall Bridge	TQ 886 258
8	RMC	Ham Street	TR 003 324
9	RMC	Appledore	TQ 958 292
10	Hexden Channel	A28 Road	TQ 830 284
11	Tidebrook	D/S Wadhurst STW	TQ 638 310
12	Newmill Channel	D/S Tenterden STW	TQ 867 323
13	Cradlebridge Petty Sewer	D/S Woodchurch STW	TQ 950 337
14	Littlestone Sewer	Greatstone Pumping Station	TR 081 237
15	Speringbrook Sewer	D/S Confluence of Viaduct & Ham Street Arms	TR 002 331
16	Abbey Petty Sewer	D/S Robertsbridge STW South Trib.	TQ 745 236
17	Kent Ditch	A229 D/S Confluence Hawkhurst South Trib	TQ 758 283
18	Blackbrook Petty Sewer	D/S Wittersham STW	TQ 885 263
19	R. Limden	D/S Ticehurst STW	TQ 717 287
20	R. Limden	Burgh Hill	TQ 718 271
21	Socknersh Stream	Clapson's Bridge	TQ 714 241
22	Rother	Crowhurst Bridge	TQ 684 263
23	Knelle Petty Sewer	D/S Beckley STW	TQ 846 252
24	Rother	D/S Mayfield Meres	TQ 588 250
25	Newmill Channel	D/S Benenden STW	TQ 834 336
26	Meres Farm Trib.	D/S Mayfield Meres STW	TQ 576 251
27	Speringbrooke Sewer	At RMC	TR 000 323
28	Coggins Mill Stream	Bivelham Farm	TQ 633 264
29	Hurst Green Stream	D/S Hurst Green & Etchingham STW	TQ 723 258
30	Hawkhurst South Stream	D/S Hawkhurst South STW	TQ 769 291

B5 EFFLUENT DISPOSAL



- FISH FARMS
- COOLING WATER DISCHARGE
- PUBLIC SEWAGE TREATMENT WORKS
- PRIVATE SEWAGE TREATMENT WORKS
- PROCESS EFFLUENT DISCHARGES
- ▨ PUBLIC SEWAGE TREATMENT WORKS (Consent >1000m³/d)

LEGEND

- COAST LINE
- RIVER ROTHER CATCHMENT AREA
- RIVER ROTHER
- ▨ TOWNS

DAILY POLLUTANT LOADING FROM THE MOST SIGNIFICANT DISCHARGES (kg/d)

Symbol	NH ₄	BOD
▨	15	75
▨	12	60
▨	9	45
▨	6	30
▨	3	15
▨	0	0



EFFLUENT DISPOSAL

B5. EFFLUENT DISPOSAL

B5.1 General

This use relates to the disposal of domestic, industrial and agricultural effluent to the river system. The conditions to be met by a particular discharge are set out in a specific discharge consent. They are calculated in relation to the quality objective assigned to the receiving water. It follows that if there is any subsequent deterioration in upstream water quality, or diminution of river flow beyond the values used in calculating the consent, then downstream uses could be put at risk.

The discharge of effluent to the river system can play an important part in the maintenance of river flows. The location of a discharge is therefore important with regard to quantity as well as quality.

B5.2 Local Perspective

By the standards of south east England the Rother catchment is sparsely populated; there are no conurbations, but the numerous villages and small towns are served by nearly a hundred sewage treatment works, only five of which are consented to discharge more than 1000 m³/d. In a number of cases these small installations have a history of being overloaded or poorly maintained, creating localised water quality problems, but since 1989 effluent consent conditions have been made stricter and improved treatment facilities have been installed, significantly reducing the polluting load. Three of the largest discharges (Rye, Hythe and Dymchurch) are either to tidal estuaries or to the sea, and less than half of the total volume of effluent generated in the catchment is returned to freshwater.

There are very few consented process effluent discharges in the catchment, most of them being for gravel washing and causing no significant pollution.

B5.3 Environmental Requirements

Water Quality

- No deterioration in upstream water quality beyond that used in setting the consent.
- Continued monitoring of surface waters and effluent discharges to ensure compliance with standards and NRA consents.
- Continued programme for consenting uncontrolled discharges

River Flow

- No diminution of the flow regime below that used in setting the consents.

River Topography

- Outfalls sited so as to achieve good effluent mixing with the river.

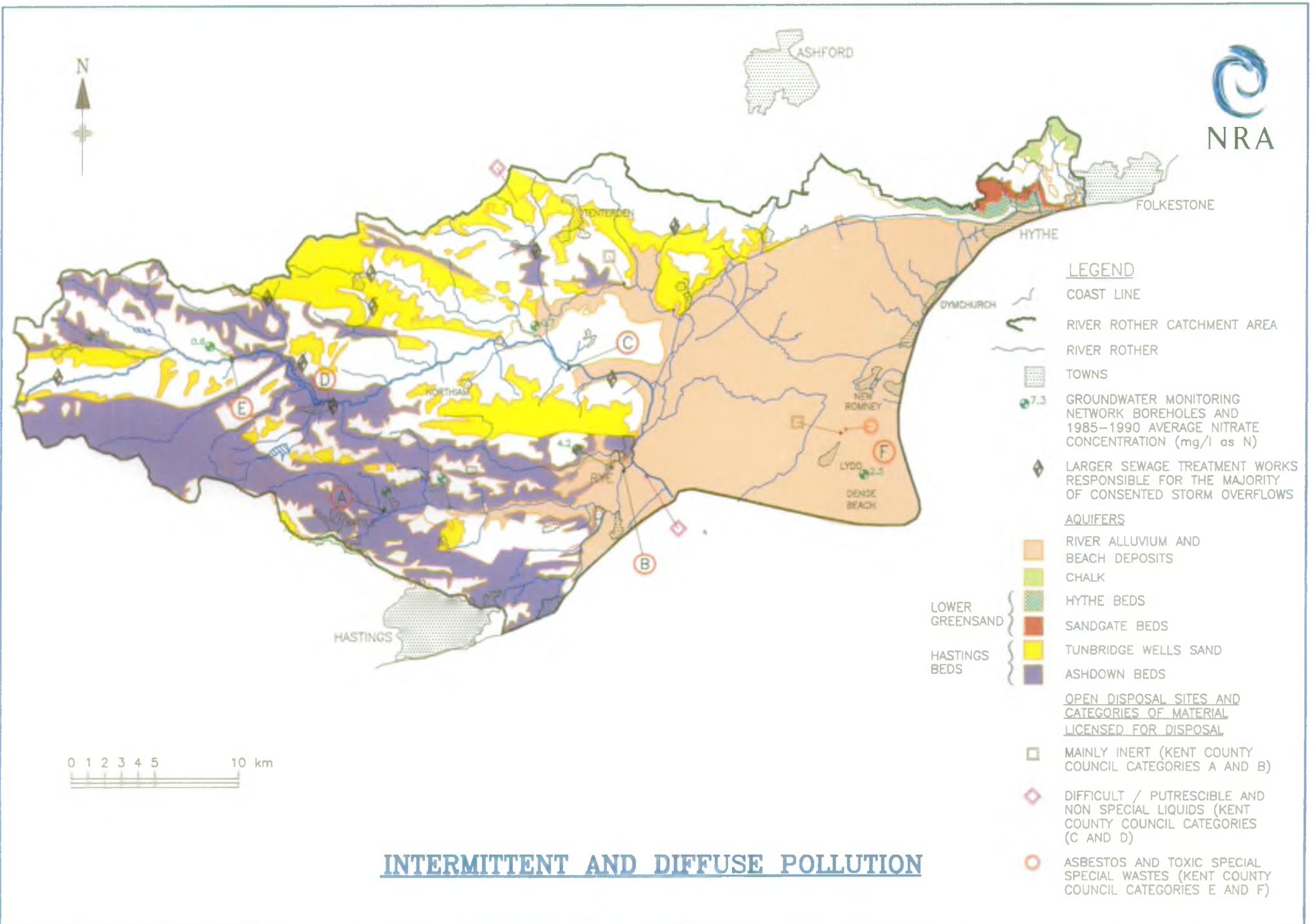
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Table B5.1 List of Major Consented Discharges

Name	Type	Consented Flow (Ml/day)	Average Daily Loads (kg/day)	
			BOD	Ammonia
Battle	Public STW	1.13	8.55	1.85
Camber	Public STW	1.16	8.99	8.25
New Romney	Public STW	1.50	12.28	0.81
Rye	Public STW	1.8	14.54	3.8
Tenterden	Public STW	1.73	12.96	3.84
ALL OTHER DISCHARGES	Private STW, Cooling, Industry, Fish Farms etc.			

- * Ammonia is not included in the discharge consent.
- ** These works discharge directly to underground strata.

B6 INTERMITTENT AND DIFFUSE POLLUTION



B6. INTERMITTENT AND DIFFUSE POLLUTION

B6.1 General

This section considers the wide range of pollution inputs to the river catchment which are not covered by formal discharge consents. There are three main causes of pollution within this category; accidental or deliberate intermittent discharges from point sources, unconsented intermittent or constant point source discharges and diffuse inputs.

The main source of accidental or deliberate intermittent discharges in rural catchments is often agricultural. The cause may be, for example, washing down of cattle stands or leakage from silage or slurry stores. The pollutant is generally organic with a high BOD loading and can cause significant fish kills, particularly where the outfall is to a small stream with limited dilution capacity. Pollution incidents may also occur as a result of spillages from industrial sources, for example oil or chemical stores, or due to failure at a public or private treatment works. Other major potential sources are traffic accidents involving road, rail or river transport.

Most public sewage works have storm overflows to allow drainage outflows to bypass the works following heavy rainfall events. A storm water storage facility is often included at the sewage works to hold the initial flushing out flow. Nevertheless, stormwater outflows can significantly increase the pollutant load to the river system. The NRA are steadily increasing the number of overflows controlled by a discharge consent. Most overflows, particularly in rural areas, are unconsented at present.

Other pollutant sources which may or may not operate under a discharge consent are landfill sites and mine tailings. The NRA are a statutory consultee on all planning applications for new developments and have a duty to ensure that new sites do not pollute the water environment. Most old and disused sites, and some open sites have little or no control on pollutant movement and can cause pollution problems to both surface and groundwater resources.

Diffuse pollutant sources are often a result of agricultural practices. High nitrate concentrations are a particular concern in many catchments and causes include fertilizer applications and ploughing of fallow land as well as sewage works and riverine organic inputs. The main sources of herbicide input are often not agricultural but due to weed control along roadsides, railway lines etc. Pesticides and herbicide concentrations, along with nitrate are often the main concerns of water companies when meeting the EC Drinking Water Directive (75/440/EEC).

The NRA Groundwater Protection Policy was issued in late 1992. This document sets out NRA policy with regard to potential sources of groundwater pollution. These policies are categorised dependent on the risk of the pollution source polluting (a) an aquifer and (b) a groundwater source and maps are to be produced showing each of these zones of risk. This document is discussed further in Section B1.3.

B6.2 Local Perspective

With the Rother being a rural catchment the majority of pollution incidents are related to agriculture. The NRA is now responsible for the 1989 Farm Waste Regulations covering the management of slurry and silage and the storage of fuel. Enforcement will include monitoring agricultural installations and the provision of advice on best practice for the control of farm-based pollution risks.

There are few landfill sites within the catchment and most are acceptable, but there is concern about the

River Rother Catchment Management Plan

situation at Mountfield, where a stream has been piped through a refuse tip. Pollution is prevented by intercepting tip liquors and removing them by tanker, but the situation needs to be kept under review.

The run-off from gypsum mines at Brightling and Mountfield has a high sulphate content which contaminates the receiving streams. This is a particular problem on the River Line (a tributary of the River Brede) where water abstracted for public supply has to be blended with water from other sources to reduce the sulphate concentration below the Maximum Admissible Concentration (MAC) required by EC Directives. Sulphate discharged from both point sources and surface run-off is not controlled at present, but the NRA is negotiating with the mine operators to reduce the problem.

The map shows average groundwater nitrate concentrations for 1984-92, which are significantly below the guideline level and MAC required by EC Directive (71/354/EEC) on the quality of water for human consumption.

Pesticide concentrations are monitored at six sites in the catchment and results for the period 1985-1990 are given in Table B6.1. The MAC for Triazines (herbicide) and 'Drins (insecticide) is 500 ng/l (one part in two thousand million), in no case was this level exceeded.

Table B6.1 - Representative Pesticide Concentrations (ng/l)

Water Site	Total Surface	Total Triazines	Drins
A	Surface	106	20
B	Surface	110	14
C	Surface	294	3
D	Surface	144	3
E	Surface	229	4
F	Ground	<20	<10

B6.3 Environmental Requirements

Water Quality

- To encourage the early reporting of pollution incidents to the NRA.
- To have emergency procedures to eliminate or mitigate the impact of accidental discharges.
- Continued monitoring of surface and groundwater quality.
- Compliance with EC Directives on the discharge of dangerous substances.
- Implementation of the NRA National Groundwater Protection Policy.
- Monitoring of high risk sites (eg. waste disposal sites and farms) to assess their impact on surface and groundwater quality.

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River Flow

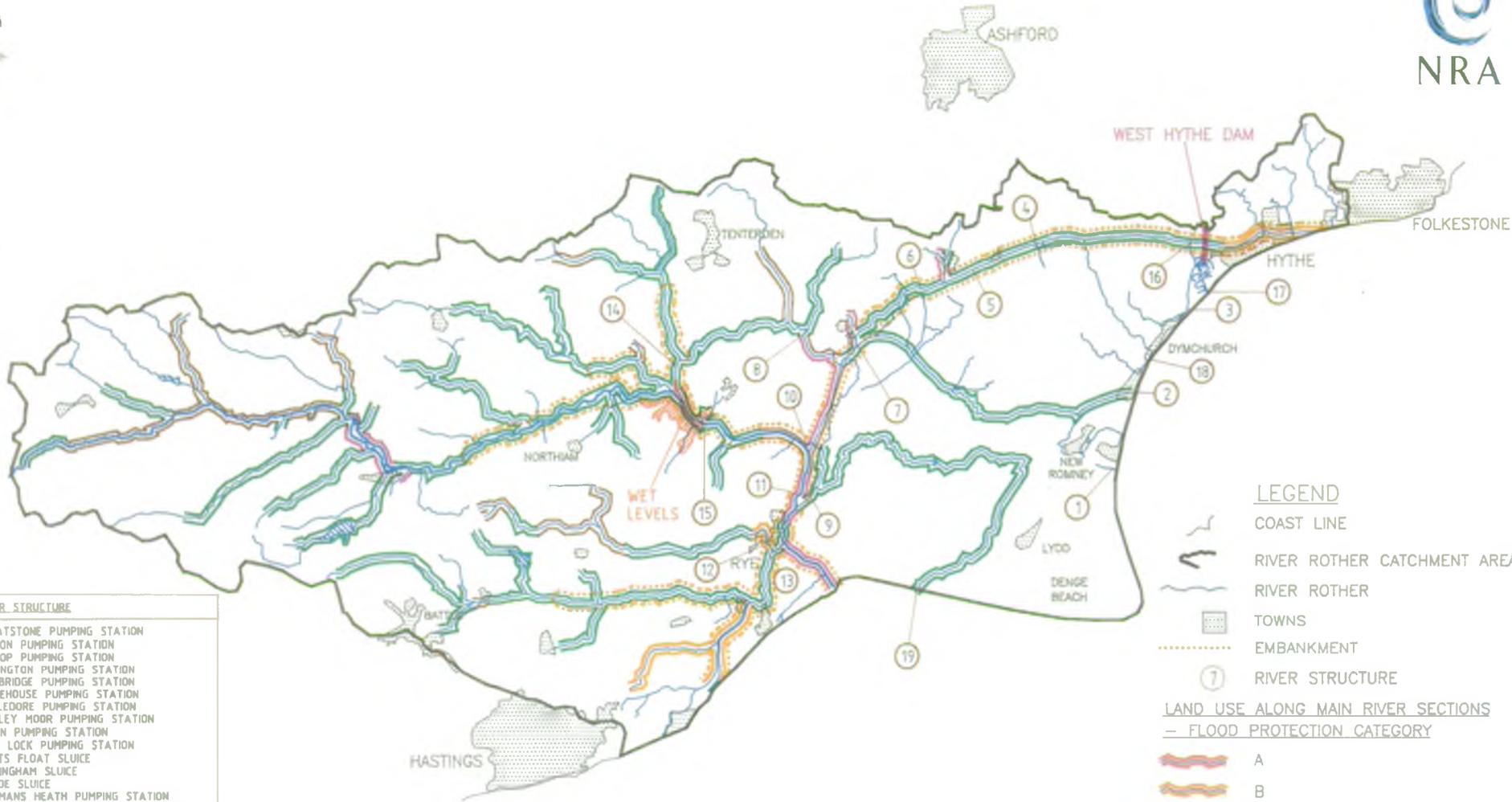
- Basic flow regime to reduce the impact of intermittent and diffuse pollution is met by the requirements detailed in Section B8.

River Topography

- Provision of terrestrial bankside vegetation to act as a buffer for diffuse pollution from overland run-off, particularly in areas of intensive agriculture.

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B7 FLOOD DEFENCE AND LAND DRAINAGE



RIVER STRUCTURE	
1	GREATSTONE PUMPING STATION
2	JESSON PUMPING STATION
3	WILLOP PUMPING STATION
4	BILSINGTON PUMPING STATION
5	KITSBRIDGE PUMPING STATION
6	WAREHOUSE PUMPING STATION
7	APPLEDORE PUMPING STATION
8	SHIRLEY MOOR PUMPING STATION
9	UNION PUMPING STATION
10	IDEN LOCK PUMPING STATION
11	SCOTS FLOAT SLUICE
12	TILLINGHAM SLUICE
13	BREDE SLUICE
14	POTMANS HEATH PUMPING STATION
15	BLACKWALL BRIDGE PUMPING STATION
16	GLENFIELD GATE CONTROL STRUCTURE
17	ROYAL MILITARY CANAL SEA OUTFALL
18	MARSHLAND OUTFALL
19	JURY'S GUT OUTFALL

LEGEND

- COAST LINE
- RIVER ROTHER CATCHMENT AREA
- RIVER ROTHER
- TOWNS
- EMBANKMENT
- RIVER STRUCTURE

**LAND USE ALONG MAIN RIVER SECTIONS
- FLOOD PROTECTION CATEGORY**

- A
- B
- C
- D
- E

SEE TABLE B7.1 FOR LAND USE CATEGORIES



FLOOD DEFENCE AND LAND DRAINAGE

B7. FLOOD DEFENCE AND LAND DRAINAGE

B7.1 General

Flood defence relates to the provision of effective defence for people and property against flooding from rivers and the sea. This use also relates to providing land drainage for agricultural areas within river valleys for which the level of the water table is of vital importance. Normally flooding is a result of extreme climatic conditions, such as high winds or very heavy rainfall. Flood events are described in terms of the frequency at which, on average, a certain severity of flood is exceeded. This frequency is usually expressed as a return period, such as 1 in 50 years.

The effectiveness of flood defence can be measured in terms of the return period up to which they prevent flooding. It is clear that different types of land use, for example, urban areas and pasture land, require different levels of effectiveness for their defence. The different land uses and the proposed targets for their protection are shown on Table B7.1.

For the purposes of management, certain reaches of the river are formally designated as Statutory Main River. On Main River, the NRA have special powers under the Water Resources Act (1991) to carry out works or control the actions of others. Any proposal that could interfere with the bed or banks or obstruct the flow in the river requires formal consent from the NRA. Under the Land Drainage Act the NRA also have a general duty to oversee, and have powers to control, significantly obstructive works on any watercourse. The criteria for designation of Main River are currently under review.

The drainage of low-lying land may be the legal responsibility of Internal Drainage Boards. IDB's are responsible for the drainage ditches within their area, up to the point where they discharge into Main River.

The nature of the works carried out for flood defence means that this use can come into conflict with other river uses - notably fisheries and conservation. Consultations are carried out and, where feasible, methods are devised whereby the river can achieve its flood protection target without significant habitat degradation.

Residential and commercial development in a river catchment is potentially a cause for concern. Urbanisation of an area increases the amount and rate of run-off into the river which can increase the risk of flooding. Development in the flood plain can be a particular problem as it places additional properties at some risk of flooding and reduces the natural flow attenuation properties of the flood plain. This can lead to higher levels upstream and higher flows downstream of the development, and therefore an increased risk of flooding. The effects of development in a catchment therefore have to be considered very carefully, particularly if they are in the flood plain.

B7.2 Local Perspective

Flood defence and land drainage for agriculture are the most important considerations in the management of the Rother catchment. Historically the area has been vulnerable to flooding, with impermeable soils in the upper catchment concentrating rainfall rapidly and discharging it to the flat marshlands, where outfalls to the sea are frequently tidelocked. In the past regular floods were experienced in the winter months, and in November 1960 an exceptional flood inundated the whole valley. Following this event the Rother Area Drainage Improvement Scheme (RADIS) was implemented between 1966 and 1980.

River Rother Catchment Management Plan

Much of the land in the river valley and marshes is below the level of the embanked river channels, requiring pumping stations to lift water from the drainage ditches. The RADIS scheme involved raising river banks to increase the storage capacity of the river and designating 280 hectares in the Wet Level as a flood storage area to cater for extreme events. Extensive flooding has not been a major problem since the RADIS scheme was completed, but in recent years floods have occurred in 1985, 1987, 1990 (when even the Wet Level embankments were breached), 1992, 1993 and 1994.

The flood defence works need considerable maintenance, including weed control and dredging to maintain channel capacity, raising embankments to compensate for settlement, and servicing the pumps, many of which are now 20-30 years old and will soon need to be replaced.

When the Royal Military Canal was built during the Napoleonic wars it radically altered the natural drainage pattern. Some streams were intercepted, but many were routed under the canal through siphons. Today the canal is managed in three sections divided by dams at Appledore and West Hythe. In winter it is used as a high-level drain receiving water from the marsh via pumping stations at Shirley Moor, Appledore, Warehorne, Ruckinge and Bilsington. The western end of the Canal discharges to the River Rother through Iden Lock, at its eastern end the central section discharges to the sea at Hythe Ranges via the New Cut, and the eastern segment (which is separated from the rest of the Canal by West Hythe dam and is managed by Shepway District Council) has its outfall at Seabrook, between Hythe and Folkestone. There is concern regarding the condition of Glenfield Gate, which controls water levels between Appledore and West Hythe, and the sea outfall structure on the New Cut is in need of attention.

In summer the Canal acts as a reservoir supplying water to the marshes for irrigation and wet fencing, but in dry years there is barely sufficient for the purpose. Negotiations are in hand to augment the supply by diverting water through West Hythe Dam from the eastern section, which is fed by a number of small streams (see Section B2).

The drainage of low-lying land in the Rother catchment is largely the responsibility of five Internal Drainage Boards (IDBs) serving the Romney Marsh Levels, Walland Marsh, Denge and Southbrooks, Rother, and Pett areas. The boundary of an IDB area is set as a contour eight feet (2.43m) above the highest recorded flood level. Thirty seven pumps in the marshes raise water into high-level drains, the sea or the tidal Rother estuary. A number of gravity outfalls also drain to the sea.

The NRA is responsible for coastal defences to prevent flooding from the sea, extensive sea walls are maintained along the frontage between Hythe and Fairlight and the gravel beach is managed to provide protection against storms and high tides. A recent review has indicated that substantial investment is needed to counter the effects of sinking land levels, rising sea levels, natural settlement of earth banks and beach erosion by the weather and the sea. There is concern that overtopping of the beach at Denge would contaminate the gravel aquifer exploited by Folkestone and Dover Water Plc.

Without Scots Float Sluice at Playden the tide would flow up the River Rother to Bodiam. The sluice protects low-lying areas upstream from tidal flooding and includes a lock for pleasure boats (see Section B10. Recreation and Amenity) and a fish pass to allow the passage of sea-trout.

River Rother Catchment Management Plan

B7.3 Environmental Requirements

River Topography

- Inspect and maintain fluvial and coastal flood defences to ensure their continued effectiveness.
- Ensure that new development does not result in an unacceptable increase in flood risk.
- Resist development in the flood plain unless measures are taken to ensure that flood risk is not increased.
- Maintain drainage structures such as weirs and stops.
- Maintain long term channel capacity by dredging and desilting, if appropriate.

River Management

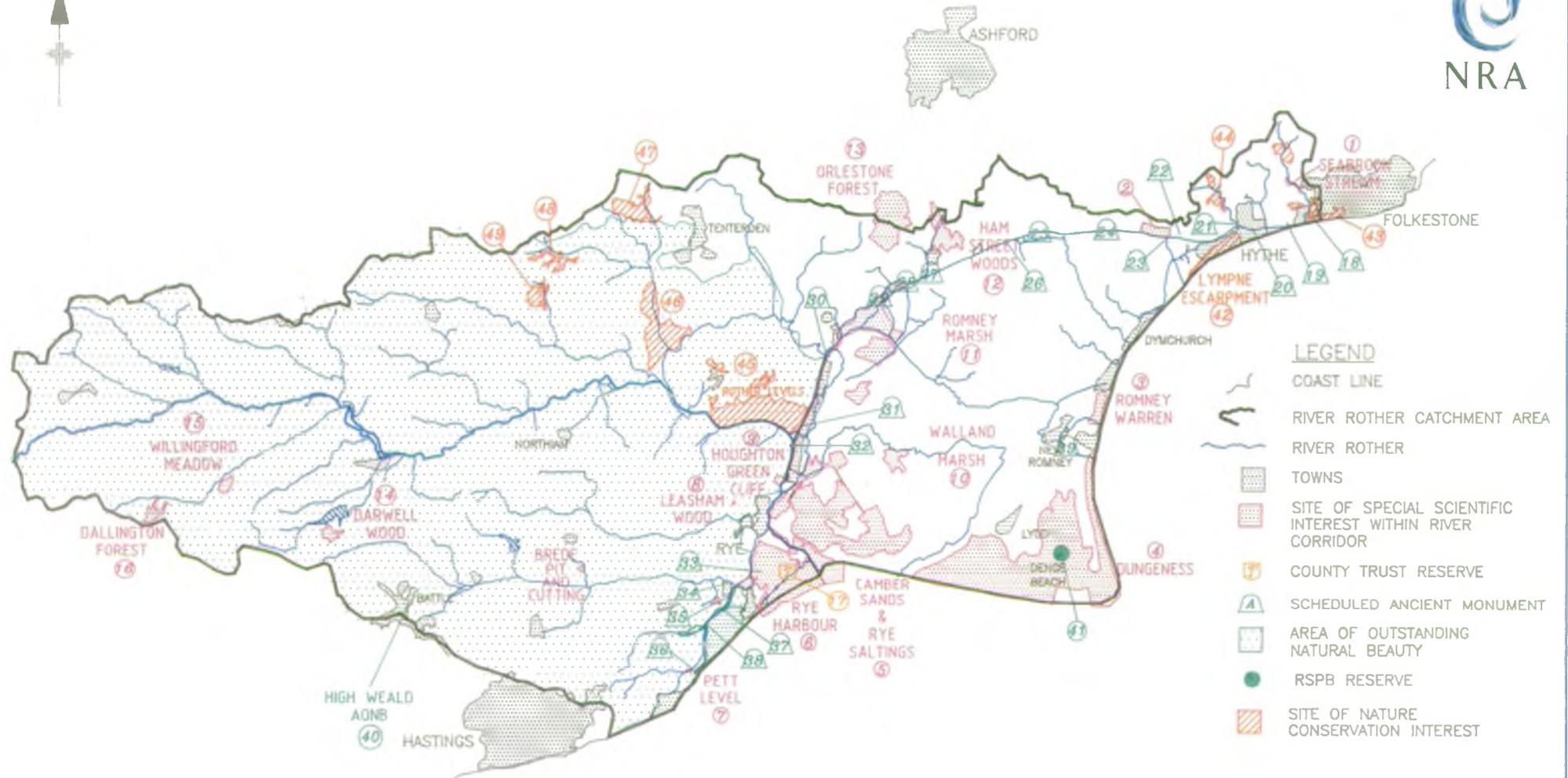
- Control weed growth to maintain water levels and channel capacity.
- Manage bankside trees to prevent channel obstructions.
- Maintain channel water levels appropriate to land use.
- Ensure operation of relevant sluice gates.
- Carry out flood defence works in a manner compatible with environmental needs and requirements.

Table B7.1 Land Use Bands

Land Use Band	Description of Typical Land Use	Typical Standard of Protection Return Period
A	Dense Urban Areas	At least 1 in 50 years
B	Suburban/Urban Areas (Less dense than Band A)	1 in 20 to 1 in 50 years
C	Limited numbers of communities and/or very intensive agriculture	1 in 10 to 1 in 50 years
D	Isolated and limited numbers of properties and/or arable farming	1 in 2 to 1 in 5 years
E	Very few properties and/or extensive grassland	Annual flooding
F	Any area to which a lower standard of service is offered for environmental or economic reasons	

River Rother Catchment Management Plan

B8 CONSERVATION



- LEGEND**
-  COAST LINE
 -  RIVER ROTHER CATCHMENT AREA
 -  RIVER ROTHER
 -  TOWNS
 -  SITE OF SPECIAL SCIENTIFIC INTEREST WITHIN RIVER CORRIDOR
 -  COUNTY TRUST RESERVE
 -  SCHEDULED ANCIENT MONUMENT
 -  AREA OF OUTSTANDING NATURAL BEAUTY
 -  RSPB RESERVE
 -  SITE OF NATURE CONSERVATION INTEREST



CONSERVATION

B8. CONSERVATION

B8.1 General

This use relates to the protection of the aquatic flora and fauna and ecology of the river corridor. This includes organisms which are dependent upon the river itself, and plants and animals which are able to exploit the river banks. A healthy river and adjacent corridor environment are characterised by ecologically diverse and abundant plant and animal communities which enhance the overall quality of the landscape.

The character of the river and its corridor is highly dependent on the adjacent land use and the type and frequency of river works undertaken. Rivers have been managed and used by man for thousands of years. The creation of water meadows and wet pasture, pollarded willows and mills, all added to the diversity and quality of the environment, both ecologically and visually. However, more recent measures like realignment, removal of bankside trees and draining of wetlands have significantly altered parts of this environment. Modern farming has often led to the removal of riverside vegetation and utilisation of the land up to the banks of the water course. This practice effectively removes beneficial shading and cover from the river and can often result in increased soil erosion and siltation of the river bed.

The NRA's conservation duties are set in Sections 16 and 17 of the Water Act 1991, and require the NRA, whilst carrying out its own functions or dealing with proposals by others, to further the conservation of flora, fauna, geological and physiographical features of special interest, and the enhancement of natural beauty. Consideration of the impact of all proposals is also required to encompass the impacts on the man made environment including buildings, and sites and objects of architectural or historic interest.

Many other statutory and voluntary bodies have roles and responsibilities regarding conservation. English Nature is the official body primarily responsible for nature conservation and has the functions of establishing, maintaining and managing National Nature Reserves (NNRs); advising the Government; providing general information and advice; giving grants and supporting research. English Nature is also required to notify Sites of Special Scientific Interest (SSSIs) which are protected by the Wildlife and Countryside Act 1981. County Trusts for Nature Conservation (or Wildlife trusts) look after County Trust Reserves (CTR's), Local Nature Reserves (LNRs) and Sites of Nature Conservation Interest (SNCIs). The Royal Society for the Protection of Birds also plays an important part in protecting wildlife and has established many reserves.

The Countryside Commission is responsible for conserving and enhancing the natural beauty and amenity of the countryside. It is empowered to designate, for confirmation by the Secretary of State for the Environment, National Parks and Areas of Outstanding Natural Beauty (AONBs). The Commission operate the Countryside Stewardship Scheme which offers grants to landowners for the preservation and re-creation of natural landscapes and wildlife habitats, including waterside areas.

The Commission also advise the Government on the Environmentally Sensitive Areas programme which has similar aims and is managed by the Ministry of Agriculture, Fisheries and Food.

Lists of buildings of special architectural or historical interest are compiled by the Secretary of State for the Environment. English Heritage is responsible for protecting and conserving the architectural and archaeological heritage through managing Ancient Monuments and providing advice and information. Local planning authorities can also designate for special protection 'conservation areas' of particular

interest.

The National Trust, an independent charity, owns and protects a variety of properties and areas of natural beauty and/or interest and makes these open to the public.

B8.2 Local Perspective

The upland tributaries of the Rivers Rother, Tillingham and Brede generally rise in small, steep-sided, wooded valleys which broaden into semi-improved pasture downstream. The middle reaches are rural in character and are used for mixed farming, whereas the coastal marshes are open and windswept, have been extensively drained and are now used for arable farming in addition to the traditional sheep grazing.

The upper catchment has few designated sites of special conservation value and its character is dominated by the impact of modern farming. A hay meadow beside the River Dudwell has been notified as an SSSI, but only two other designated sites, ancient woodlands in steep-sided valleys, impinge directly on the main rivers. All the remaining designated areas in the catchment are in the lower reaches around Rye, and comprise either unimproved grazing marsh or more recent marine formations; shingle, sand dune and saltmarsh. The extensive grazing marshes of Walland Marsh and Pett Level are of interest both for their terrestrial and aquatic habitats, which support nationally rare plants and insects (especially dragonflies and beetles).

The area from Dungeness to Pett Levels has been designated a Ramsar site and Special Protection Area (SPA) and includes SSSIs notified for their shingle, sand dune, saltmarsh and ornithological interest. A recent enhancement has been the provision of 16 barn owl nesting boxes in a joint project of the Hawk Trust and the NRA. Rye Harbour Local Nature Reserve extends from Winchelsea Beach to the Rother estuary and includes large blocks of land owned by the NRA and Sussex Wildlife Trust.

There are many Scheduled Ancient Monuments in the catchment including Roman remains at Lympne, monastic foundations, the mediaeval towns of New Winchelsea and Rye, Bodiam Castle, Camber Castle, Martello towers along the beach, and the Royal Military Canal with its associated structures.

B8.3 Environmental Requirements

Water Quality

- Waters should comply with the minimum standards for amenity protection and aesthetic criteria (listed in Section B10) and comply with the controls on List I and II substances in EC Directive 76/464/EEC for the general protection of the aquatic environment. Biological standards will also be applied in future, as outlined in Section B4.

River Flow

- A variable flow regime where the monthly averages reflect the natural flow conditions in the river. A variable flow regime is required to conserve the natural characteristics of the river such as submerged and emergent vegetation, river bed gravels, river margins and any associated wetland habitats.
- Spate flows to inundate wetlands and to achieve natural cleansing of the river channel.

River Rother Catchment Management Plan

River Topography

- Maintenance of existing fringes of tree or marshland vegetation, and the encouragement of such vegetation in areas where they are currently of poor quality.
- Maintenance and enhancement of natural river features such as submerged and emergent vegetation, meanders and pool:riffle sequences.
- Channels to be of appropriate cross-section for the flow regime.
- Controlled access for livestock to the river corridor to minimise damage caused by excessive trampling.
- Avoid damage to habitats due to too much public access.
- Consider archaeological constraints before carrying out any potentially damaging works and, where appropriate, enhance archaeological sites.

River Management

- Operate sluices and weirs to maintain channel water levels and protect adjacent wetland habitats.
- Maintain and clear ditches in a way which encourages rather than diminishes ecological diversity.
- Agree a river bank mowing programme which will contribute to the success of the barn owl project.
- Determine the conservation value and requirements of river reaches.
- Co-operate with local authorities and riparian landowners to ensure banks and surrounding areas are free of litter and waste material.
- Encourage the take-up of the Countryside Stewardship Scheme for the preservation and re-creation of natural landscapes and wildlife habitats.
- Recognise the importance of the County and District Sites and Monuments Records.

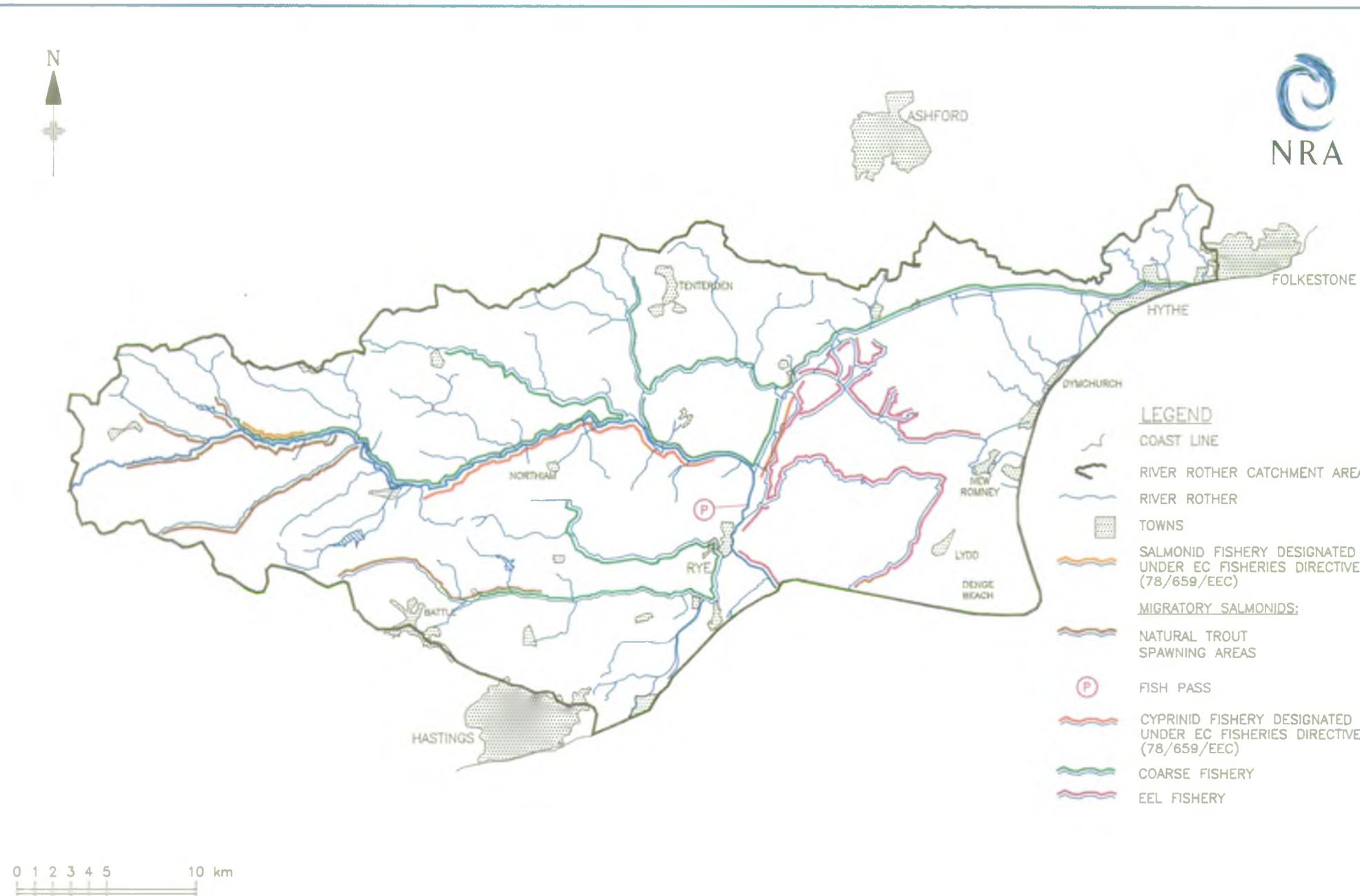
River Rother Catchment Management Plan

Table B8.1 - Schedule of Designated Sites

Map Ref No.	Name	Designation	Reasons for Designation
1	Seabrook Stream	SSSI	
2		SSSI	
3	Romney Warren	SSSI	
4	Dungeness	SSSI	
5	Camber Sands & Rye Saltings	SSSI	Extensive sand dune system invertebrates, birds
6		SSSI	Biologically & geologically important
7	Rye Harbour Pert Level	SSSI	Wetland flora & fauna, rare aquatic plants & invertebrates
8		SSSI	Heronry, plant diversity
9	Leasam Heronry Wood	SSSI	
10	Houghton Green Cliff Walland Marsh	SSSI	Unimproved permanent grassland, diverse flora & fauna
11		SSSI	
12	Ham Street Woods	SSSI	
13	Orlestone Forest	SSSI	Broadleaved Woodland
14	Darwell Wood	SSSI	
15	Willingford Meadow	SSSI	Ancient woodland
16	Dallington Forest	SSSI	
17	Brede Pit & Curting	CTR	
18		SAM	
19	Shorncliffe Battery	SAM	
20	Wall	SAM	
21	Section of R.M.C.	SAM	
22	Section of R.M.C.	SAM	
23	Section of R.M.C.	SAM	
24	Section of R.M.C.	SAM	
25	Section of R.M.C. Section of R.M.C. Section of R.M.C.	SAM	

Note: *SSSI* *Site of Special Scientific Interest*
 LNR *Local Nature Reserve*
 SAM *Scheduled Ancient Monument*
 SNCI *Sites of Nature Conservation Interest*
 SPA *Special Protection Area*

B9 FISHERIES



LEGEND

-  COAST LINE
-  RIVER ROTHER CATCHMENT AREA
-  RIVER ROTHER
-  TOWNS
-  SALMONID FISHERY DESIGNATED UNDER EC FISHERIES DIRECTIVE (78/659/EEC)
- MIGRATORY SALMONIDS:**
-  NATURAL TROUT SPAWNING AREAS
-  FISH PASS
-  CYPRINID FISHERY DESIGNATED UNDER EC FISHERIES DIRECTIVE (78/659/EEC)
-  COARSE FISHERY
-  EEL FISHERY

FISHERIES

B9. FISHERIES

B9.1 General

This use relates to the maintenance of breeding populations of coarse and game fish and the use of the river by anglers. Game fish (also referred to as Salmonids) and coarse fish (Cyprinids) are protected under the EC Fisheries Directive (78/659/EEC) which sets water quality criteria to protect fish life in designated freshwater reaches. Additional reaches may be designated periodically or existing reaches upgraded.

Fish are sensitive to general conditions in the river since they are near the top of the aquatic food chain. They are distributed in a catchment according to geographical parameters, principally bed gradient and river flow, but modified by the quality of the water, which relates to the inputs of pollutants and nutrients. They are therefore important not just for their own presence but also as an indicator of the overall health of the river.

Anglers pursue their quarry, whether game or coarse fish, wherever they are found. Whilst their primary aim is to catch fish, they also enjoy outdoor activity in a harmonious environment. Both types of angling require a mixture of open and dense instream and bankside vegetation to provide variety for both the fish and the anglers.

B9.2 Local Perspective

B9.2.1 Game Fisheries

Native brown trout and juvenile sea trout are found in the upper reaches of most rivers in the catchment. Migratory sea trout are found from Rye Harbour to Etchingam, entering the freshwater river through the fish pass at Scots Float Sluice. Sea trout are also known to run the Rivers Brede and Tillingham and to breed in the River Rother upstream of Etchingam. These reaches are designated as salmonid fisheries under the EC Freshwater Fisheries Directive (78/659/EEC). Sea trout also breed on the Dudwell, although this river carries no designation. Brown trout are stocked in the Powdermill and Darwell Reservoir fisheries.

Salmonids require gravel beds on which to breed, but in recent years drought flows have led to increased siltation, reducing the value of these gravels. Reduced flows also tend to suppress the growth of in-stream vegetation and provide less dilution for effluent discharges, both factors reducing the dissolved oxygen and adversely affecting the salmonid population.

Under the RADIS flood defence scheme many of the natural channels in the lower reaches were enlarged to provide flood storage channels with uniform trapezoidal sections, reducing the ecological diversity of the river and its value as a habitat for salmonid fish. The NRA intends to maintain the Rother as a migratory fishery and seek to enhance the salmonid fisheries of the catchment.

B9.2.2 Course Fisheries

The rivers Rother, Brede and Tillingham and the Royal Military Canal contain good coarse fisheries. The Rother from Iden Lock to Robertsbridge and the Royal Military Canal from Iden Lock to the Reading Sewer are designated as cyprinid fisheries under the EC Freshwater Fisheries Directive (78/659/EEC).

Bullhead, stone loach and brook lamprey occur in the upper reaches with dace, roach, chub and pike in the middle reaches. The lower reaches, with slower-moving water, are populated with pike, eels, carp, bream and tench. Bass, mullet and flounder are found in the tidal reaches from the river mouth to Scot's Float Sluice.

Poor water quality and excessive weed growth have been known to cause problems to the fisheries, and fish kills have been recorded in recent years. In particular, many miles of the Royal Military Canal have experienced low dissolved oxygen concentrations following blanketing of the surface by growths of floating weeds. There has also been concern over the increase in predation of fish by pike, eels, mink, and heron at times when water levels are reduced for flood defence reasons. Fears have been expressed that the speed of operation of sluice gates and the removal of boards on other watercourses can lead to the "washing out" of fish.

An eel fishery exists in Rye Harbour and in marshland drains and dykes. Illegal fishing for eels and elvers is a problem and the NRA nationally are investigating the regulation of such fisheries.

B9.3 Environmental Requirements

Water Quality

- Water quality in designated reaches not to deteriorate below the limits specified in the EC Fisheries Directive (78/659/EEC).
- Designation under the EC Freshwater Fisheries Directive to be sought for reaches where significant fisheries occur.

River Flow

- To maintain the baseflow and level in watercourses to maximise the production of fish, aquatic fauna and flora (see Section B8).
- The natural flow regime should not be altered in a way which significantly inhibits fish migration.

River Topography

- Provide and maintain fish passes at identified obstructions to ensure the free passage of migratory fish. All barriers should be passable at low river flows.
- Maintain natural river features to ensure a variety of spawning and feeding areas.
- Maintain a mixture of open and dense instream and bankside vegetation to provide adequate

River Rother Catchment Management Plan

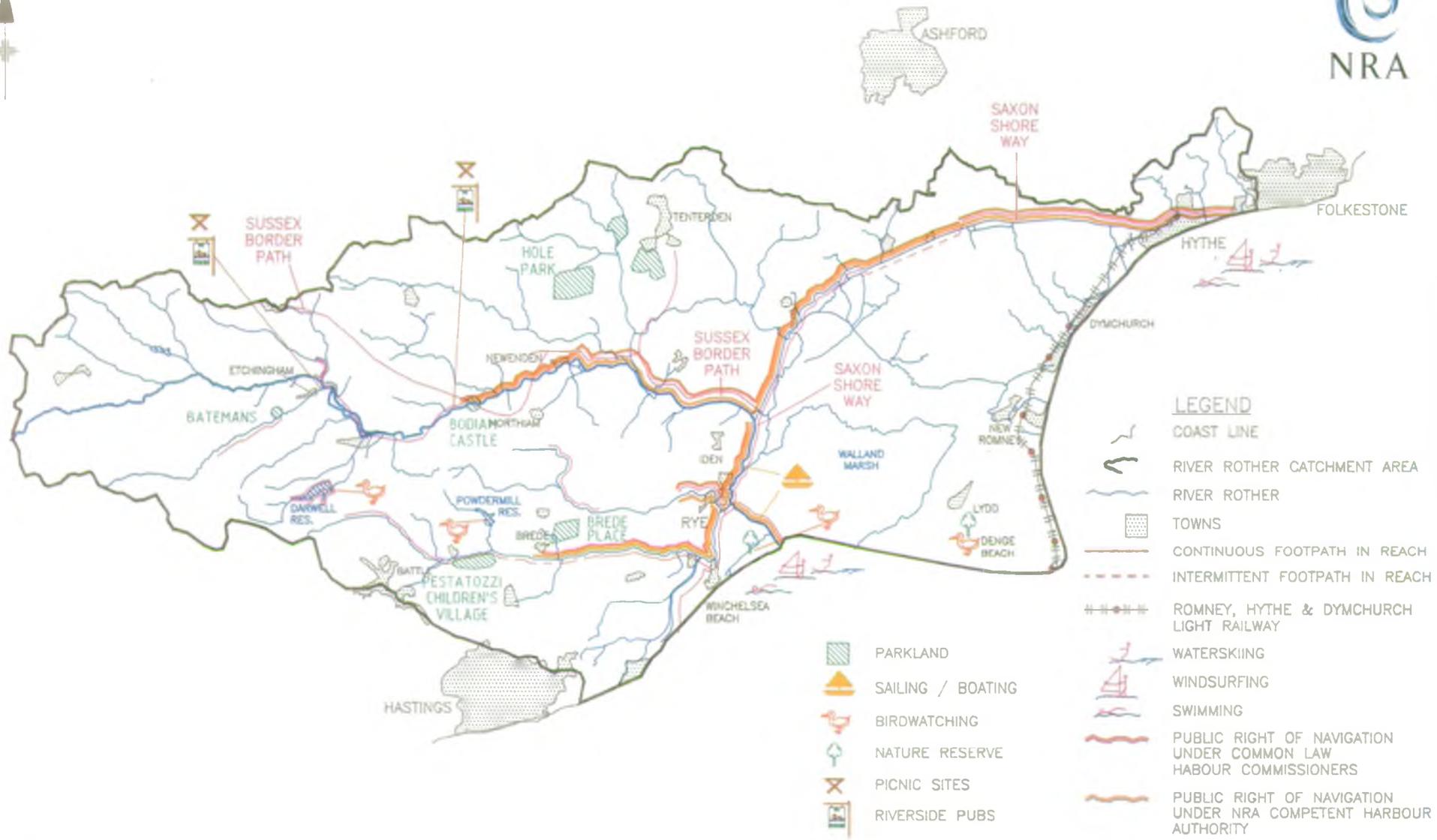
shade and cover.

River Management

- Appropriate water levels for the maintenance of fish populations to be achieved by the use of weirs and stop boards.
- Avoid rapid reduction in water levels where this may endanger fish.
- Manage fish stocks in a healthy state by stocking with appropriate numbers and species, or removing excess fish.
- Maintain suitable spawning areas for fish.

River Rother Catchment Management Plan

B10 RECREATION AND AMENITY



LEGEND

-  COAST LINE
-  RIVER ROTHER CATCHMENT AREA
-  RIVER ROTHER
-  TOWNS
-  CONTINUOUS FOOTPATH IN REACH
-  INTERMITTENT FOOTPATH IN REACH
-  ROMNEY, HYTHE & DYMCHURCH LIGHT RAILWAY
-  WATERSKIING
-  WINDSURFING
-  SWIMMING
-  PUBLIC RIGHT OF NAVIGATION UNDER COMMON LAW HARBOUR COMMISSIONERS
-  PUBLIC RIGHT OF NAVIGATION UNDER NRA COMPETENT HARBOUR AUTHORITY

-  PARKLAND
-  SAILING / BOATING
-  BIRDWATCHING
-  NATURE RESERVE
-  PICNIC SITES
-  RIVERSIDE PUBS



RECREATION AND AMENITY

NOTE.
CANOEING OCCURS ON ALL WATERWAYS WITH A PUBLIC RIGHT OF NAVIGATION

B10. RECREATION AND AMENITY

B10.1 General

This use relates to those activities which attract people to the river corridor. Examples include walking, canoeing, swimming, boating and bird watching. The principal areas of concern are general aesthetic acceptability, access to the water course and, in the case of immersion sports, the health risk.

The Recreation and Amenity duties of the NRA are set out in Section 8 of the Water Act 1989 which generally empowers the NRA to conserve and enhance the natural beauty and amenity of inland and coastal waters and associated land, as well as the use of such waters and land for recreational purposes. The NRA is also required to have regard to the desirability of preserving public freedom of access and to take into account, either as a matter of its own activities or those of others, the likely effect specific action would have on any such freedom of access. The NRA may also actively promote proposals for recreational and amenity development where it is considered desirable.

This use also relates to commercial or recreational navigation. In tidal rivers there is a public right of navigation and there may also be the right to moor for unloading and loading, taking shelter from the weather or awaiting changes in the tide.

Generally there is no right of navigation over non-tidal stretches of water unless one has been established through historical usage, by dedication from the riparian owners or by statute. The extent of freshwater rights are not as substantial as those prevailing on the tidal lengths of the same river. For instance there may be restrictions on the parts of rivers over which navigation can be exercised or on the type of craft. Generally, there is no right of landing except by custom or grant, since the banks above tidal limits are owned by individuals rather than the Crown.

B10.2 Local Perspective

Access to water courses is good throughout the catchment; the Sussex Border Path follows the River Rother from Iden to Newenden, crossing the river again at Bodiam Castle. The Saxon Shore Way follows the Royal Military Canal from Rye to Hythe, and the NRA plans to extend this to follow the reaches of the canal controlled by the Authority. Other improvements to the footpath network are planned by Kent County Council in collaboration with local landowners. Guided walks are organised along the Brede and Tillingham valleys, and there are footpaths around Powdermill and Darwell reservoirs.

There are facilities for birdwatching (including hides) on Denge Beach, Winchelsea Beach, Darwell Reservoir and Powdermill Reservoir, and nature trails are provided on Winchelsea Beach (the Rye Harbour Nature Reserve) and Denge Beach. Parkland areas are associated with watercourses at Battle, Brede, Tenterden, Bodiam Castle (NT) and Batemans (NT, Kipling's House at Burwash).

Canoeing is the only immersion sport in the freshwater catchment although dinghy sailing, water-skiing and windsurfing take place in Rye Harbour and along the coast.

River Rother Catchment Management Plan

Angling on the River Rother is an important use with coarse fishing predominating, but Powdermill and Darwell Reservoirs are managed as stocked trout fisheries. The Royal Military Canal is a popular venue for angling matches and in 1990 was home to a national competition with more than 680 entrants. The catchment supports small populations of wild trout and sea trout, but is not a major salmonid fishery.

There is a public right of navigation on the River Rother from Bodiam to the sea and this may also extend to the reaches of the River Brede which were tidal before the construction of Brede sluice. Navigation on the Royal Military Canal is restricted to canoes and rowing boats, which are also permitted on the River Tillingham as a public right dating from "time immemorial". Scots Float lock at the head of the Rother estuary can be used by craft up to 10 metres in length, but the lock is unmanned, has limited headroom and passage depends on favourable tidal conditions. For these reasons twenty four hours' notice is required for its operation (please enquire at the Harbour office, the NRA office at Scots Float, or phone (0797) 225225).

The NRA is the Harbour Authority for the Harbour of Rye, which in 1992/3 was used by 118 commercial vessels carrying 125,000 tonnes of cargo. This doubled the cargo volume of the previous year, due largely to the expansion of the aggregate trade. Ship movements are expected to increase up to a maximum of 500 visits per year. In addition, some 450 pleasure craft to 10 metres in length are berthed within the Harbour and a further 800 vessels visit Rye each year. The great majority of these craft are used in the tidal reaches below Scots Float Sluice; canoes are the most frequent users of the navigable fresh water river.

The harbour mouth is impeded by a sand bar which restricts the movement of larger vessels to the period around high water. Pilotage is available, the Harbour Office keeps watch on VHF channel 16 from 0900 to 1700 and when vessels are due, but users are advised to ring the Harbour Master on (0797) 225225 for navigational details and information about berths.

B10.3 Environmental Requirements

Water Quality

- Waters to be free from surface films and unnatural floating material, discolouration and unpleasant odours.
- Waters to be aesthetically acceptable for participants. Guidelines on public health implications are awaited.

River Flow

- The basic flow regime to minimise detriment to recreation and amenity is met by the requirements detailed in Section B8.

River Topography

- Maintenance of existing footpaths and access points.
- Sympathetic management and renovation of historical riverside structures (eg. mills, weirs and bridges).

River Rother Catchment Management Plan

- Maintenance of existing landing and launching points, mooring facilities and storage areas for equipment.

River Management

- Co-operation with local authorities and riparian landowners to ensure banks and surrounding areas are free of litter.
- Promote clear understanding of access rights.
- Cut weeds for flood defence purposes according to an agreed timetable consistent with conservation requirements, to minimise interference with other river uses from floating debris.

SECTION C : TARGETS

C1. RIVER FLOW TARGETS

This section considers the requirements for river flows to sustain the various river uses. Flow targets are set related to specific river uses and are stated below:

- The flow regime should reflect the natural seasonal variations to conserve the character of the river. Specific flow targets should be set to protect vulnerable interests such as the maintenance of water quality, wildlife conservation or migratory fisheries. These may be expressed as operating rules to control abstractions, or as specified flows (eg Minimum Residual Flows) at sensitive locations where flow is a significant influence on the river corridor.
- Where migratory fish occur (eg salmon, sea-trout, mullet, smelt, flounder, eels, lamprey) the natural flow regime should not be altered in a way which significantly inhibits their passage.
- There should be no diminution of the flow regime below that assumed in setting effluent discharge consents.
- Minimum Residual Flows should be set for reaches of the river as the basis for Prescribed Flows for incorporation into abstraction licences.

C2. WATER QUALITY TARGETS

The water quality requirements for identified uses are combined to provide overall targets for the entire catchment. Clearly the quality requirements that apply to a particular reach of river are equal to the strictest requirements of any of the uses of the reach identified in this Plan.

In addition to standards for specific uses, the following more general requirements are considered to be targets for the catchment :

- To meet the NRA objective class for individual reaches as detailed in Section B4.
- To meet the general requirement to conserve the wildlife and amenity value of the river corridor, as detailed in Sections B8 and B10.
- To implement the NRA Policy and Practice for the Protection of Groundwater.
- To monitor water quality by implementing a programme of routine sampling throughout the catchment.
- To seek designation for appropriate river reaches under EC Directives.

C3. RIVER TOPOGRAPHY TARGETS

This section considers the general requirements for the topography of the river and its corridor as well as the provision and maintenance of permanent facilities and access. The nature of features included under the term River Topography means that the targets involved can vary widely in scale. The intention here is not to identify detail but to indicate major requirements in relation to the uses concerned.

There are a number of specific uses with their own River Topography requirements. These are detailed in Table C1 overleaf. In addition, the following more general requirements are considered to be targets for the catchment:

- To achieve the Flood Defence Target Levels of Protection shown in Section B7.
- To maintain flood defence structures to ensure their continued effectiveness.
- To control new development, especially development in the flood plain, to prevent a significant increase in flood risk.
- To encourage the management of a strip of uncultivated vegetation alongside the river to enhance the landscape, to act as a buffer against siltation and diffuse pollution, and to provide habitats, shade and cover for wildlife.
- To preserve the diversity of natural river features so as to conserve the river corridor and enhance the quality of the landscape.
- To control access to the river by livestock to prevent excessive trampling of the banks.
- To ensure that exhausted quarries and waste disposal sites are restored to an acceptable environmental standard.
- To control new development so that the conservation value of the river corridor is not reduced.
- To maintain the integrity of river banks and channels adjacent to mineral extraction sites.
- To provide a public footpath alongside the Royal Military Canal for the whole of its length.

C4. RIVER MANAGEMENT TARGETS

This section considers the regular management activities needed to maintain and enhance the river and its bankside features. The intention is not to provide a maintenance schedule but rather to indicate the major requirements of the uses concerned.

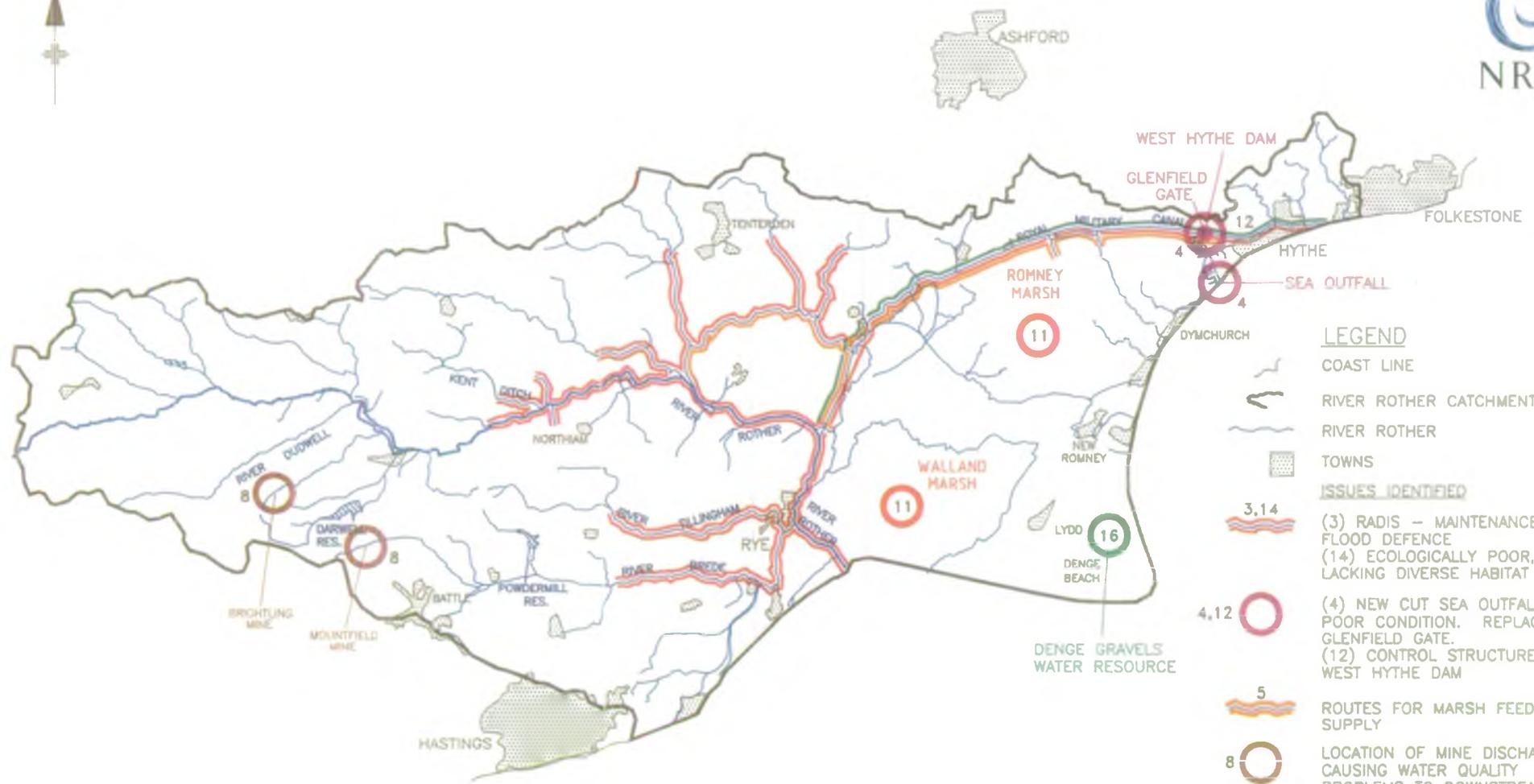
A number of specific uses with their own requirements for River Management are detailed in Table C2 and, in addition, the following more general requirements are considered to be targets for the catchment:-

- To achieve co-operation between Local Authorities and riparian landowners to ensure that river banks and surrounding areas are free from litter.
- To determine the conservation value and management requirements of river reaches.
- To control aquatic weeds in a way which provides adequate flood protection and ensures that conservation objectives are not compromised.
- To manage trees to prevent them obstructing river channels.
- To maintain ditches in a way which encourages rather than diminishes ecological diversity.
- To maintain appropriate instream and marginal plant communities.
- To operate sluices in a way which minimises fisheries problems.

SECTION D : CATCHMENT ISSUES

ISSUES IDENTIFIED

1. Whilst the overall water resource of the Rother catchment is lightly used, the impermeable geology results in most of the rainfall draining rapidly to the sea, creating winter floods and naturally low summer flows. Subject to environmental safeguards, there is potential for storing additional surplus water to balance river flows and to make a significant contribution to the projected short fall of water for public supply in Kent and East Sussex.
2. The groundwater resources of the catchment are limited and need careful management.
3. Flood defence in the lower catchment depends on maintenance of the RADIS scheme, but this is costly. Much of the mechanical plant is due for replacement and the height of some embankments is a cause for concern. Significant capital expenditure is needed to ensure the continued effectiveness of the scheme.
4. The New Cut sea outfall for the Royal Military Canal near Hythe is in poor condition and Glenfield Gate, which controls flows down this channel, needs to be replaced. Failure of the outfall could result in extensive flooding in Romney Marsh.
5. There are problems providing sufficient water for the marshes during dry summers. These arise from seasonal shortages of water in the river, and from inefficiencies within the marsh feeding distribution system.
6. Farming activities cause localised water pollution incidents which are exacerbated by the nature of the catchment.
7. In dry years water quality problems have been caused by discharges from small, but cumulatively significant sewage works serving a dispersed population.
8. Discharges from the Mountfield and Brightling gypsum mines result in high sulphate concentrations in rivers downstream, causing quality problems for the public water supply source at Sedlescombe.
9. In some summers excessive growths of submerged and floating water weeds cause deoxygenation and water quality problems on the Royal Military Canal and marsh drains.
10. The control of water weeds to maintain the flow capacity of drainage channels is a major problem, with implications for water quality, fisheries, conservation, navigation and amenity interests. Mechanical cutting entails the removal of cut weeds and the benefits are short-lived: the use of herbicides may result in deoxygenation of the water, and is restricted on conservation grounds as much of the area is designated as an SSSI. The weeds found in the Royal Military Canal are particularly vigorous and marsh feeding may be spreading the problem more widely.



LEGEND

-  COAST LINE
-  RIVER ROTHER CATCHMENT AREA
-  RIVER ROTHER
-  TOWNS
- ISSUES IDENTIFIED**
-  3,14
(3) RADIS – MAINTENANCE FOR FLOOD DEFENCE
(14) ECOLOGICALLY POOR, LACKING DIVERSE HABITAT
-  4,12
(4) NEW CUT SEA OUTFALL IN POOR CONDITION. REPLACE GLENFIELD GATE.
(12) CONTROL STRUCTURE FOR WEST HYTHE DAM
-  5
ROUTES FOR MARSH FEEDING SUPPLY
-  8
LOCATION OF MINE DISCHARGES CAUSING WATER QUALITY PROBLEMS TO DOWNSTREAM REACHES
-  9
EXCESSIVE WEED GROWTH ON THE ROYAL MILITARY CANAL CAUSING WATER QUALITY PROBLEMS
-  11
MARSH AREAS WITH POTENTIAL CONFLICT OVER CONTROL OF WATER LEVELS
-  16
VULNERABLE TO SALINE CONTAMINATION



CATCHMENT ISSUES



River Rother Catchment Management Plan

11. In the management of water levels on the marshes there are conflicts between the interests of conservation, fisheries and agriculture, and between those of pastoral and arable farming.
12. The eastern end of the Royal Military Canal is isolated from the rest of the system by the dam at West Hythe and discharges direct to the sea at Seabrook. A control structure at West Hythe would enable this water to be managed as part of the Rother resource, making it available for marsh feeding when required.
13. Fluctuating levels and strong currents caused by the operation of sluices to maintain the seasonal water-level regime in the lower catchment (high in summer and low in winter) impact on fisheries and conservation interests.
14. The uniform profile of the RADIS drainage channels lacks habitat diversity, making them ecologically poor with a sparse flora and fauna.
15. Cultivation of fields to the very edge of drainage ditches results in soil erosion, bank slips, river siltation, eutrophication of surface waters, loss of wildlife habitat, impoverishment of the landscape and access problems for channel maintenance.
16. The Denge Gravel water resource is vulnerable to saline contamination if over-abstracted, or if sea water penetrates the inland ditch system. Its yield could be reduced if gravel winning expanded in the area.
17. There is a need for close control of development in flood risk areas such as river and coastal flood plains.
18. Rising sea levels and the effects of climate change must be taken into account in future planning.

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SECTION E : MANAGEMENT OPTIONS

This section of the Plan represents NRA thinking at the time this Consultation Report was prepared, but does not constitute NRA policy, which will not be finalised until the public consultation process is complete.

Comments on these options and alternative suggestions are positively encouraged.

As many of the actions suggested are outside the responsibility of the NRA, other organisations with appropriate interests are identified. The Catchment Management Plan which evolves from this consultation report will involve all interests working together to fulfil a common strategy.

ISSUE 1 Increasing demand for public supply, seasonal shortages	
MANAGEMENT OPTIONS	
*	Control leakage from the water supply system. (Water Companies).
*	Apply demand management measures to ensure that water is used efficiently. (Water Companies).
*	Determine the priorities for allocating water resources between uses and between conflicting centres of demand. (NRA).
*	Import water from the Medway via Bewl Water. (SWS, NRA).
*	Manage the resources of the Rother catchment as part of an integrated regional system. (NRA, Water Companies).
*	Investigate additional surface water storage options. (NRA, Water Companies).

Abbreviations

The following are used in the Management Proposals and refer to those bodies that are relevant to the particular proposals.

CC	Countryside Commission
EN	English Nature
IDB	Internal Drainage Board
LA	Local Authority
NRA	National Rivers Authority
MAFF	Ministry of Agriculture, Fisheries and Food
NFU	National Farmers Union
RADIS	Rother Area Drainage Improvement Scheme

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ISSUE 2

Need to conserve groundwater resources

MANAGEMENT OPTIONS

- * Investigate the potential for developing the groundwater resource, but license any new abstractions within the limits imposed by the NRA Kent Groundwater Policy. **(NRA, Abstractors).**

ISSUE 3

RADIS Scheme in need of overhaul

MANAGEMENT OPTIONS

- * Carry out asset survey of RADIS and produce a management plan. **(NRA)**
- * Implement asset management plan. **(NRA).**

ISSUE 4

New Cut and Glenfield Gate

MANAGEMENT OPTIONS

- * Reconstruct the New Cut sea outfall and tidal gates. **(NRA)**
- * Replace Glenfield Gate. **(NRA)**

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ISSUE 5 **Insufficient water for marsh feeding**

MANAGEMENT OPTIONS

- * Review marsh feeding system, improve structures, coordinate management and assign costs to the beneficiaries. **(NRA, IDBs, Farmers)**
- * Encourage the use of on-site winter storage for irrigation water. **(NRA, Abstractors)**
- * Modify W.Hythe Dam to enable water currently lost through Seabrook outfall to be diverted into the marsh feeding system. **(NRA, Shepway Council)**

ISSUE 6 **Agricultural Pollution**

MANAGEMENT OPTIONS

- * Continue the farm inspection programme to advise farmers on best practice for waste management. **(NRA, Farmers)**
- * Encourage the public to report pollution incidents. **(NRA)**
- * Maintain the capability to make an appropriate response to pollution incidents. **(NRA)**

ISSUE 7 **Localised Water Quality Failures**

MANAGEMENT OPTIONS

- * Ensure effluent compliance with discharge consents. **(NRA, Dischargers)**
- * Review discharge consents where appropriate. **(NRA)**

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ISSUE 8

Sulphate contamination downstream of gypsum mines

MANAGEMENT OPTIONS

- * Investigate sources, including mine drainage systems, and take action to minimise the problem. **(NRA, Discharger)**

ISSUE 9

Excessive weed growth causes water quality problems

MANAGEMENT OPTIONS

- * Encourage farmers to use fertiliser in a way which minimises losses to the aquatic environment. **(NRA, Farmers)**
- * Promote the use of a buffer strip of uncultivated land between arable fields and watercourses to attenuate the run-off of nutrients. **(NRA, MAFF, CC, EN, Farmers)**

ISSUE 10

The control of water weeds in drainage channels

MANAGEMENT OPTIONS

- * Carry out a botanical survey to establish where herbicides may be used with minimum risk to conservation interests. **(EN, NRA)**
- * Use approved herbicides only in appropriate areas under strictly controlled conditions and in accordance with approved guidelines. **(NRA, IDBs)**
- * Investigate other methods of weed control. **(NRA)**

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ISSUE 11 Water Levels in Marsh Drains

MANAGEMENT OPTIONS

- * Improve consultation procedures and communication between interest groups whose objectives may conflict. **(NRA, Farmers, EN, Anglers)**
- * Investigate the potential for managing blocks of land as separate units to enable appropriate water levels to be maintained in different areas. **(NRA)**

ISSUE 12 Management of West Hythe Dam

MANAGEMENT OPTIONS

- * Install a control structure in the RMC at W.Hythe Dam to enable excess water in the Hythe reach to contribute to marsh feeding in the summer months. **(NRA, Shepway Council)**
- * Agree an integrated water management plan for the whole of the Royal Military Canal. **(NRA, Shepway Council)**

ISSUE 13 Fluctuating Water Levels

MANAGEMENT OPTIONS

- * Establish guidelines for the sensitive operation of sluices. **(NRA, IDBs)**

ISSUE 14 Lack of Ecological Diversity in RADIS Channels

MANAGEMENT OPTIONS

- * Incorporate conservation features in new river engineering works. **(NRA, IDBs)**
- * Investigate the feasibility of remedial works for existing channels. **(NRA)**

ISSUE 15
Cultivation to the Stream Edge

MANAGEMENT OPTIONS

- * Discourage the use of fertilisers or agricultural chemicals in close proximity to watercourses. **(Farmers)**
- * Promote the use of a buffer strip of uncultivated land beside watercourses to attenuate the run-off of nutrients, to act as a wildlife refuge and to enhance the landscape. **(NRA, MAFF, Farmers)**
- * Encourage the take-up of Government agricultural/conservation grant schemes and their use to enhance the conservation value of wetlands. **(MAFF, CC, EN, NFU, Farmers)**

ISSUE 16
Denge Beach Aquifer Prone to Saline Contamination

MANAGEMENT OPTIONS

- * Ensure that the abstraction regime does not result in sea water being drawn into the aquifer. **(Water Company, NRA)**
- * Maintain sea defences and outfall structures to control the incursion of sea water into the freshwater drainage system. **(NRA)**
- * Review the impact of gravel winning, which diminishes the value of the beach deposits as a water resource. **(NRA, Water Company, LA, Mineral Companies)**
- * Monitor the quality of surface and groundwater in the sensitive area. **(NRA, Water Company)**

ISSUE 17
Development control in the flood plain

MANAGEMENT OPTIONS

- * Promote good liaison between the NRA and Local Authorities to ensure that unsuitable development does not occur. **(NRA, LA)**

ISSUE 18
Rising Sea Levels

MANAGEMENT OPTIONS

- * In forward planning, take account of changing sea levels. **(All)**

APPENDIX 1 : STATISTICS FOR THE ROTHER CATCHMENT

1. GENERAL INFORMATION

Catchment area 97,083 Ha

Topography

Maximum Level 197 m AOD
 Minimum Level 0 m AOD

Geology

Hastings Beds and Weald Clay, with Recent deposits in the marsh areas

Estimated Catchment Population

Year	Population	Change per decade
1991	170,300	
2001	188,000	+10.4%

Districts and Estimated Population (1991)

District	Persons per Ha	Ha in catchment	% area of catchment	Population in catchment
Sussex CC		48,900	50.4%	80,900
Hastings	5.2	500	0.5%	2,600
Rother	1.6	40,600	41.8%	65,700
Wealden	1.6	7,800	8.1%	12,600
Kent CC		48,160	49.6%	89,400
Ashford	1.1	19,100	19.6%	20,900
Shepway	2.1	22,300	23.0%	47,500
Tun. Wells	3.1	6,800	7.0%	21,000

Note: The population figures are approximate and portray overall trends rather than precise values.

River Rother Catchment Management Plan

2. WATER RESOURCES

Resource Areas

	Number	Ha in catchment	% area of catchment
Romney Marsh	15	20,670	21.3%
Lower Rother	16	55,880	57.6%
Upper Rother	17	20,530	21.1%

Rainfall (mm)

	Mean Year	1:10 yr Drought
Mean Annual Total	754	596
Effective Rainfall	246	133

Abstraction

Licensed Abstraction	210 Ml/day
Actual Abstraction (1989)	77 Ml/day
Actual as % of Licensed	37%

Licensed abstraction from groundwater	46 Ml/day
Percentage from groundwater	22%

Percentage in High/Med Loss category	41%
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River Flow (cumecs):

		R.Rother
Mean Flow	(Q50)	0.90
95 percentile Flow	(Q95)	0.21

Water Supply Companies serving the catchment

	Area (Ha)	% Catchment
SEW (Eastbourne)	28,000	28.8%
SEW (Mid Sussex)	5,900	6.1%
SWS (Sussex)	13,700	14.1%
Mid Kent Water Plc	36,300	37.4%
Folkestone & Dover	13,200	13.6%

River Rother Catchment Management Plan

Water Supply Reservoirs	Area (Ha)	Vol (MI)	Reliable yield (Mld)
Darwell (SWS)	73	4,728	21.9
Powdermill (SWS)	21	856	2.1

3. WATER QUALITY

Length of River in each Quality Class (Km)

Class	Description	Target	Achieved 1993
1A	Good	40.6	28.7
1B	Good	120.3	143.8
2	Fair	44.7	28.9
3	Poor	1.0	3.6
4	Bad	0.0	1.6
TOTAL		206.6	206.6

Length Designated under the EC Freshwater Fisheries Directive (Km)

	Freshwater	Tidal
Cyprinid Designation	27.9	10.0
Salmonid Designation	3.5	0.0

Sewage Discharges

	Number	Consented Vol.(Ml/day)
To rivers	82	13.76
To estuary	1	1.18
To sea	1	2.70

4. FLOOD DEFENCE

Length of Main River (Km) 324.0 (includes tidal lengths)

Length of Coastline (Km)

Schedule 4	55.2
Main Tidal Waters	55.2 (included in Schedule 4)
Sea Defences (NRA)	40.0
Tidal Banks (NRA)	10.8

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Internal Drainage Districts (Ha)

Romney Marsh Levels	10,451
Denge and Southbrooks	3,021
Pett	3,403
Rother	6,597
Walland	8,923

5. CONSERVATION

Number of Designated Sites in the Catchment

Type	Total	Water Dependent
Ramsar/SPA	1	1 (Dungeness-Pett Levels)
NNRs	1	1
SSSIs	21	18

6. NAVIGATION

Harbour of Rye (NRA). Commercial and pleasure craft.

Rother Estuary & Rye Harbour (NRA)	7.0 km
Rother, Scots Float - Bodiam (NRA)	20.0 km
Royal Military Canal (NRA)	23.8 km
(LA)	7.3 km
TOTAL	58.1 km

APPENDIX 2. GLOSSARY OF TERMS AND UNITS

1:10 YEAR DROUGHT/FLOOD

A drought/flood event with a statistical probability of occurring once in a ten year period (other periods may be specified in a similar way).

ABSTRACTION LICENCE

Licence to abstract water from a surface or underground source. The maximum annual, daily and hourly abstraction rates are set by the licence.

ABSTRACTION - ACTUAL

Individual abstraction records are reported to the NRA each year but under the Water Resources Act 1991 these data are confidential. Actual abstraction figures reported in the Plan are area annual totals expressed in Ml/d.

AONB

Area of Outstanding Natural Beauty, notified by the Countryside Commission.

BOD

Biochemical Oxygen Demand. A measure of the polluting potential.

COARSE FISH

See FRESHWATER FISH, CYPRINIDS, SALMONIDS

CONSUMPTIVE USE

Water which is abstracted but not returned to the catchment, either because it evaporates (as in spray irrigation) or is exported for use in another catchment.

COUNTY STRUCTURE PLANS

Statutory documents produced by County Councils outlining their strategy for development over a 10-15 year timescale.

CYPRINIDS

Fish of the carp family. (See also COARSE FISH, FRESHWATER FISH, SALMONIDS)

DISTRICT LOCAL PLANS

Statutory documents produced by District or Borough Councils to implement the development strategy set out in County Structure Plans. Specific land use allocations are identified.

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DROUGHT ORDER

Order issued by the Secretary of State for the Environment allowing the terms of abstraction licences to be varied and/or the levels of service to water company customers to be reduced at times when the resource is under stress.

EFFECTIVE RAINFALL

Total rainfall minus direct evaporation and the water used by plants for transpiration. This is equivalent to the total resource of a catchment.

EIFAC

The European Inland Fisheries Advisory Commission. An agency of the United Nations Food & Agriculture Organisation (FAO).

EMERGENT VEGETATION

Plants with roots in the river bed but which emerge from the water. Examples include reeds, iris and bullrush.

EPHEMERAL FLOW

River flow which dries at some times of the year (eg winterbournes).

FLOW MEASUREMENT UNITS

m ³ /s	Cubic metres per second
l/s	Litres per second
Ml/d	Megalitres per day. A megalitre is equivalent to a ten metre cube (approximates to a 4-bedroom detached house).
mgd	Millions of gallons per day

FLOW CONVERSION TABLE

<u>m³/s</u>	<u>Ml/d</u>	<u>mgd</u>
0.012	1	0.224
0.06	5	1.12
0.12	10	2.24
0.24	20	4.48
0.6	50	11.2
1.2	100	22.4

FRESHWATER FISH

For the purposes of the Salmon and Freshwater Fisheries Act 1975, fish other than Salmon, Brown Trout, Sea-Trout, Rainbow Trout and Char (see also COARSE FISH, FRESHWATER FISH, SALMONIDS).

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HECTARE

Unit of area 100m x 100m, equal to 2.471 acres.

HIGH SEAS RIGHTS

Common law rights of navigation and fisheries on tidal waters where no specific authority exists.

IDB

Internal Drainage Board. A local land drainage authority with powers to raise finance and do works.

IMPOUNDMENT RESERVOIR

Surface water storage area formed by construction of a dam and supplied only by natural inflow from the upstream catchment.

ISOHYETALS

Contours of equal mean annual rainfall.

LOCAL NATURE RESERVE

A nature reserve designated by a Local Authority, frequently owned or managed by a voluntary conservation organisation.

mAOD

A measure of altitude. Metres above ordnance datum.

MARSH FEEDING

Supply of water from the river to marsh areas during the summer for wet fencing and abstraction (usually for spray irrigation).

MEAN LICENSED ABSTRACTION

In this Plan the mean licensed abstraction is the total annual abstraction permitted within the terms of a licence, expressed as an average daily volume in terms of megalitres per day (Ml/d).

MHWS

Mean High Water Spring Tides. A datum level used in mapping.

MINIMUM RESIDUAL FLOW (MRF)

The flow set at a river gauging station to protect downstream uses and below which controlled abstractions are required to cease. (see also PRESCRIBED FLOW)

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NATIONAL NATURE RESERVE

A nature reserve of national importance, designated and managed by English Nature.

NATURAL FLOW REGIME

The river flow pattern experienced prior to the influence of man, with no abstraction from or discharges to the catchment.

PERENNIAL FLOW

River flow present through the entire year. (See also EPHEMERAL FLOW)

POTABLE WATER SUPPLY

Water supplied for domestic use, including human consumption.

PRESCRIBED FLOW (PF)

A river flow incorporated as a condition in an abstraction licence, such that abstraction must cease once the flow falls below this value. Prescribed flows are set at or above the MRF (qv) which applies to the river where the abstraction takes place.

In many instances the PF applying to new licences is increased incrementally in step with the total licensed abstraction to protect the interest of existing abstractors: ie. newer abstractions have to cease at higher river flows. (see also MINIMUM RESIDUAL FLOW)

PRIMARY GAUGING STATION

A permanent river flow gauging installation included in the National Surface Water Archive.

PUMPED STORAGE RESERVOIR

Surface water storage area where the natural inflow is supplemented by water pumped from a separate source, typically a nearby river.

POOL:RIFFLE

A stretch of river with alternate sections of shallow fast-flowing water and deeper slow-moving pools.

Q95

River flow that is exceeded for 95 percent of the flow record (a low flow, the Q5 flow would be a high flow).

RAMSAR SITE

A wetland site of international significance for conservation, notified under international treaty.

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SALMONIDS

Fish classified by the Salmon and Freshwater Fisheries Act 1975 as belonging to the salmon family - Salmon, Brown Trout, Sea-Trout, Rainbow Trout and Char. (Summer-spawning salmonid species such as Grayling are classified by the Act as Freshwater Fish) (see also COARSE FISH, FRESHWATER FISH, CYPRINIDS).

SPATE FLOWS

Episodic fresh water flood flows.

SSSI

Site of Special Scientific Interest. A site designated by English Nature as being in need of protection to conserve its outstanding ecological or geological features. Land use and management operations within SSSIs are subject to control.

SNCI

Site of Nature Conservation Interest. A site of local importance for wildlife or geology, identified by the County Wildlife Trust or the County Council.

STW

Sewage Treatment Works.

TOTAL RAINFALL

Rainfall as measured by a rain gauge.

TOTAL RESOURCE

See EFFECTIVE RAINFALL

WET FENCING

Water-filled ditches used as field boundaries or to control the movement of livestock.

APPENDIX 3 : FURTHER READING

EC Directives

Quality of Surface Water for Abstraction as Drinking Water:	(75/440/EEC)
Pollution Caused by the Discharge of Dangerous Substances:	(76/464/EEC)
Quality of Fresh Waters for the Support of Fish Life:	(78/659/EEC)
Protection of Groundwater Against Pollution:	(80/68/EEC)
Urban Waste Water Treatment:	(91/271/EEC)
Protection Against Pollution by Nitrates from Agriculture:	(91/676/EEC)

Acts of Parliament

Salmon and Freshwater Fisheries Act 1975
Wildlife and Countryside Act 1981
Water Act 1989
Environment Protection Act 1990
Land Drainage Act 1991
Water Resources Act 1991

NRA Publications

NRA Corporate Plan (Annually)
Water Resources Development Strategy: A Discussion Document. 1992
Sustaining our Resources. Southern Region Water Resources Development Strategy: NRA Southern Region 1992
River Itchen Catchment Management Plan, Phase I: NRA Southern Region 1992

Other Publications

Conservation and Land Drainage Guidelines: Water Space Amenity Commission 1980
Nature Conservation and River Engineering: Nature Conservancy Council 1983
Rivers and Wildlife Handbook: RSPB 1984
Changing River Landscapes: Countryside Commission CCP238 1987
Code of Practice on Conservation, Access and Recreation: MAFF, DoE & Welsh Office. HMSO 1989
Nature Conservation and the Management of Drainage Channels: Nature Conservancy Council & Association of Drainage Authorities 1989
Conservation Guidelines for Drainage Authorities: MAFF, DoE & Welsh Office. 1991
Solving the Nitrate Problem: MAFF 1993