

RIVER MOLE
CATCHMENT MANAGEMENT PLAN

DRAFT
CONSULTATION REPORT

November 1995

RIVER MOLE CATCHMENT MANAGEMENT PLAN CONSULTATION REPORT

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ACKNOWLEDGEMENTS

- All those organisations, groups and individuals who responded to the NRA during the period of informal consultation.
- Ordnance Survey on whose maps some of the information shown on the synoptic maps is based (Crown Copyright Reserved Licence No. WU29859X).

NOTE:

- (1) Whilst every effort has been made to ensure the accuracy of information in this report, it may contain errors or omissions which we will be pleased to correct.
- (2) Information from this report may be freely used provided it is acknowledged.
- (3) Copies of the full Consultation Report will be circulated free of charge to all consultees. Further copies may be obtained on application to:-

River Mole CMP
National Rivers Authority
Riverside Works
Sunbury-on-Thames
Middlesex
TW6 6AP
(Tel: 01932 789833)

Price £25 per copy (including postage).

DRAFT CATCHMENT VISION

The impact of human activities, ranging from intensive development to agriculture, have varying degrees of impact on the water environment of the River Mole and its tributaries.

The National Rivers Authority's vision for the Mole catchment comprises the following:

- *Secure protection of the water environment in partnership with others and, increasingly through the process of land use planning, implement the principles of sustainable development;*
- *Continue the improvements to the water environment and seek to enhance the river corridor to become a valued asset for the whole of the community;*
- *Facilitate activities by various water users in appropriate locations and balance such activities through strong links and involvement with local communities so as to avoid conflict.*

An Action Plan will list the activities which will be formulated following public consultation on this Consultation Report. The activities will represent a firm commitment to embark upon securing the comprehensive protection and enhancement of the natural water environment of the catchment. The proposed activities alone will not achieve the vision. However, they will form a sound basis for further activities in the future and contribute towards the realisation of the vision.

Catchment Plans are dynamic documents. After 5 years (or sooner if circumstances dictate) the NRA will fully review the Catchment Management Plan (CMP). Furthermore, the NRA will produce an annual monitoring report to set out the progress in implementing the identified activities and describe any new issues raised and relevant activities.

Community involvement is the cornerstone of this approach to managing the local water environment, not only by raising awareness but also by promoting active participation in environmental enhancement. Greater community awareness of the issues will encourage more responsible citizenship. Environmental sustainability embodies this concept of stewardship and involves seeking consensus on decisions regarding future development in the light of the need to safeguard the water environment.

SECTION 1 MANAGING THE WATER ENVIRONMENT

1.1 The Water Environment

The quality of our water environment and the way in which it is managed matter to all of us. Our health depends on the availability and purity of water supplies and the way we dispose of waste water. Thames Region is heavily populated and sees the greatest use and reuse of water of any part of the country. These pressures call for the strict control of water abstractions and effluent quality.

Many householders and businesses rely on flood alleviation works and flood warning systems to reduce their risk of flooding. Visitors as well as local communities benefit from amenity, recreational and educational opportunities offered by the Region's rivers, canals and lakes.

The water environment also supports a wide variety of habitats which are home to a range of plants and animals whose monitoring, conservation and enhancement are vital to sustaining the Region's stock of natural resources.

This Consultation Report is the first step in a process called Catchment Management Planning initiated by the National Rivers Authority (NRA), which provides a focus for those concerned with the future well-being of the water environment within the River Mole catchment. The map on page 13 shows the geographic area of the catchment.

1.2 Sustainable Management

Established in 1989 the NRA is the principal agency responsible for safeguarding and improving the water environment in England and Wales with statutory responsibilities for water resources, water quality, pollution control, flood defences, fisheries, recreation, conservation and navigation.

The NRA places particular emphasis on planning for environmental sustainability and improvement through an integrated approach to river catchment management. An important aspect of this approach is the need to work in partnership with others, including local communities, landowners, industry, interest groups and other agencies.

Growing evidence of the extent to which global and local ecosystems are under threat has underlined the importance of the need to achieve sustainable development. The UN Conference on Environment and Development (the Earth Summit) held in Rio de Janeiro in 1992, agreed on "Agenda 21":- a comprehensive programme of action needed throughout the world to achieve a more sustainable pattern of development for the next century.

1 MANAGING THE WATER ENVIRONMENT

“Agenda 21” includes the following statement:-

By the year 2000 all states should have national action programmes for water management, based on catchment basins or sub-basins, and efficient water-use programmes. These should integrate water resource planning with land use planning and other development and conservation activities, demand management through pricing regulation, re-use and recycling of water.

The Government is committed to pursuing sustainable development and in January 1994 published the UK Strategy. The strategy indicates the importance the Government places on the land use planning system and in this respect planning guidance has been revised for local authorities to incorporate concepts of sustainability. One example of such revision is Regional Planning Guidance Note 9 which encourages local authorities to promote and support initiatives to conserve, restore and enhance the natural elements of river valleys and the water environment.

The NRA can contribute toward the pursuit of sustainable development through the catchment management planning process. A strategy for river catchment management based on environmental sustainability needs to recognise that sustainability is not purely about environmental matters alone or calling a halt to development. Sustainability is about quality of life not just economic wealth. Sustainability does not imply that meeting today's needs is less important than the needs for future generations.

To achieve sustainability the consultation on this report needs to:-

- recognise that some current non-sustainable activities are difficult, slow or costly to reverse;
- acknowledge that changes within the catchment can have an effect on other parts of the region;
- promote local actions, even though such actions may only make a small contribution to solving a given problem on a region-wide scale;
- weigh up alternative benefits of different courses of action;
- accept that whilst some issues can be tackled in the short term and have immediate effect, others will require longer term programmes of action;
- identify existing unsuitable practices within the catchment.

1 MANAGING THE WATER ENVIRONMENT

The most important change in the future management of the river catchment will be the increased opportunity for community involvement. Local community groups and individuals will be able to participate in all aspects of the vision. Greater appreciation of the environment will encourage more responsible citizenship as people become aware of their choices and the consequences of those choices. However, the NRA cannot act alone in pursuit of the vision, it requires careful planning, shared responsibilities amongst the local community and agreement with all agencies to work towards a common goal.

1.3 Catchment Management Plans

The water environment (e.g. estuaries, coastal waters, rivers, streams, lakes, ponds, aquifers, springs) is subject to a wide variety of uses which invariably interact and conflict with each other. The catchment management planning process has been developed to enable these interactions and conflicts to be better managed for the overall benefit of the water environment and its users. The process will also assist the multifunctional approach by the NRA.

The Catchment Management Plan (CMP) aims to:-

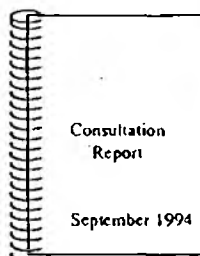
- focus attention on the water environment of a specific river catchment;
- involve all interested parties in planning for the well-being of the river catchment;
- agree a vision for the catchment which helps to guide all our activities over the next 10 to 20 years;
- establish an integrated strategy and action plan for managing and improving the catchment over the next 5 years;
- identify specific actions, to which the NRA is committed, for inclusion in its business plan.

The preparation of a CMP involves a number of steps and outputs which are detailed in the figure on page 9. This document, the Consultation Report, is the first output from the process.

1 MANAGING THE WATER ENVIRONMENT

STEPS IN THE CMP PROCESS

STEP 1



The NRA produce a Consultation Report. This will include:

- a full description of the catchment's resources, uses and activities
- a review of the status of the water environment
- identification of issues
- a draft vision, strategy and options to tackle the issues

STEP 2



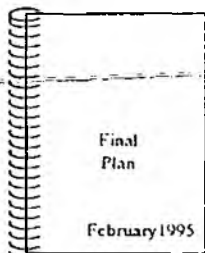
From September to December 1994 organisations, groups and individuals interested in the future of the catchment can make comments to the NRA.

STEP 3



During winter 1994/95 there will be discussions between the NRA and key groups and individuals over key issues.

STEP 4



The NRA will produce the Final Plan in February 1995.

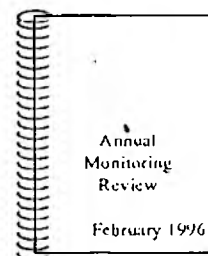
This will include:

- a summary of the catchment's resources, uses and activities
- an agreed vision, strategy and detailed action plans
- a description of future monitoring regime for action plans

STEP 7

After 5 years (or sooner if circumstances dictate) the NRA will fully review the CMP starting with consultation

STEP 6

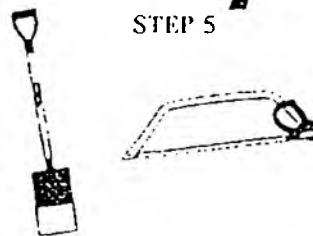


The NRA will produce a monitoring plan each year.

This will include:

- an update on the status of the water environment
- progress achieved on the Action Plans
- a review of the appropriateness of the Final Plan.

STEP 5



IMPLEMENTATION

The NRA will implement through its own actions and the persuasion of others the actions contained in the Final Plan.

1 MANAGING THE WATER ENVIRONMENT

1.4 The Consultation Report

This report does not firmly establish a vision for the catchment or define in detail the action plan and guiding policy objectives to tackle the key issues for the water environment. Rather, it describes the catchment, reviews the state of the water environment and presents the key issue which have been identified following informal consultation. The draft vision, supporting policy objectives and potential actions presented here will only be finalised after we have had an opportunity to consider your response to this Consultation Report.

This document has been produced following informal liaison with a wide range of organisations (see Appendix II for details) and a desk study of reports produced by other organisations.

1.5 The Consultation Process

Through this Consultation Report the NRA is seeking to obtain internal and external consensus on the future management of the River Mole catchment. We are particularly interested to hear peoples views on the following aspects of the consultation report:-

- the description of resources, uses and activities within the catchment;
- the assessment of issues arising within the catchment;
- the way forward for the Action Plan.

The consultation phase includes a formal launch to an invited audience and the distribution of this report and summary booklets to key organisations, individuals, libraries and other public areas. At the end of the consultation period we will consider all comments and produce an Action Plan. The Action Plan will define a strategy for the management of the catchment over the next five years and detail a series of actions for the NRA and others to implement. The resultant impact on the catchment will be monitored and an annual report will be published.

If you wish to comment on the Consultation Report please do so, in writing, by the1995. Please send your comments to:-

Mark Hodgins
Catchment Manager (SE)
National Rivers Authority
Riverside Works
Fordbridge Road
Sunbury-on-Thames
Middlesex TW6 6AP

SECTION 2 CATCHMENT OVERVIEW

Extent and location

Situated to the south of the River Thames the Mole catchment has a total area of 487 square kilometres and is largely rural. The River Mole rises in the hills of North Sussex near Rusper and flows northwards to join the River Thames at Molesey. Between its source and the River Thames the fall in the river is approximately 95 metres. In dry weather the river has been known to flow underground, leaving a dry bed between Dorking and Thorncroft springs at Leatherhead.

The major tributary streams are to be found above Dorking. Of these the Gatwick Stream rises in the Pease Pottage area and flows north through Crawley to its confluence with the River Mole near Horley. The Burstow Stream rises near Crawley Down and joins the River Mole at Meathgreen.

Geology and Landform

The Mole catchment covers part of the two main geological units of south-east England, the Weald and the London Basin. The topography of the area is shown on the map on page 15. The landscape of the catchment has not only been influenced by geological factors but also by human activities.

Land Use

Approximately 25% of the catchment is urban, 8% woodland and the remainder agricultural. Development over recent years on the headwaters, particularly in Crawley and Horley, has had a significant impact on water quality and the increase in urban storm water run-off.

Pressures on the Catchment








The area has good road and rail links with London and contains Gatwick International Airport which is located in southern part of the catchment between Crawley and Horley. These factors have resulted in significant and constant pressures for various forms of development. Such pressures have implications for the water environment and must be considered in the light of the need to achieve sustainable development.

Local Authorities

The catchment falls within the administrative boundaries of the following local authorities:


- Surrey County Council
- West Sussex County Council
- Crawley Borough Council
- Elmbridge Borough Council
- Epsom and Ewell Borough Council
- Guildford Borough Council
- Horsham District Council
- Mid Sussex District Council
- Mole Valley District Council
- Reigate and Banstead District Council
- Tandridge District Council
- Royal Borough of Kingston-upon-Thames.



	Catchment Plan Boundary		Gatwick Airport				
	Urban area		Neighbouring Catchment Boundary				
	Watercourses						
	Motorway						
	Major A Road						

Scale (approx)

0 5 Km



KEY CATCHMENT STATISTICS:**GENERAL**

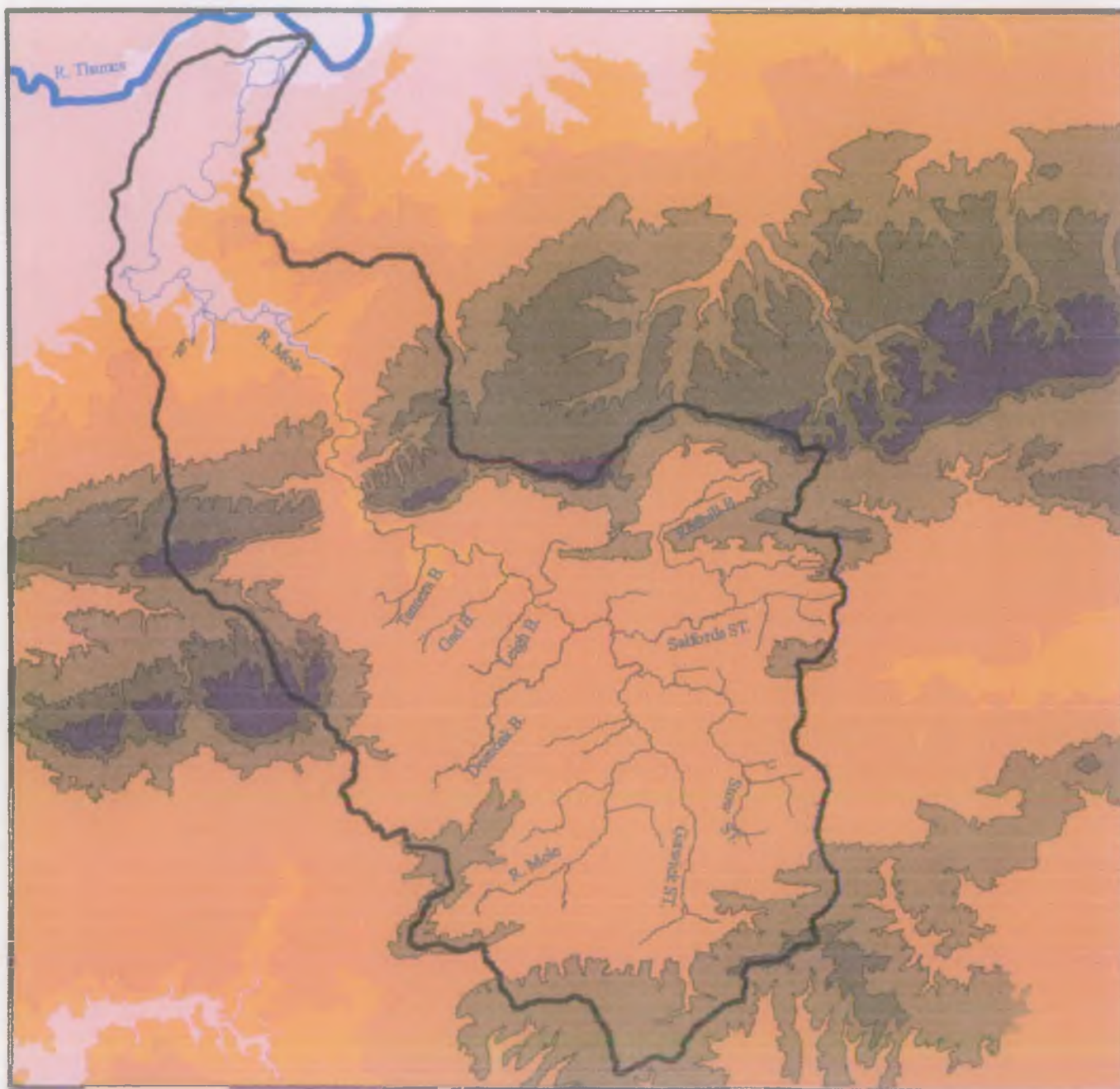
Catchment area	487 sq km
Urban area	120 sq km (25%)
Length of River Mole (source to River Thames)	80 km

WATER RESOURCES









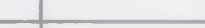
Average annual rainfall	768 mm
Average flow at Esher	460 Ml/d
Total licensed water abstraction	81.7 Ml/d

WATER QUALITY (GQA 1992 - 1994)

GQA Classification	Length of watercourse
Class A	12.4 km
Class B	64.3 km
Class C	71.4 km
Class D	19.8 km
Class E	5.1 km
Extent of EC designated cyprinid fishery	30.4 km



KEY

	Catchment Plan Boundary		50 - 100 m				
GROUND LEVELS			100 - 150 m				
	0 - 10 m		150 - 200 m				
	10 - 30 m		Over 200 m			Scale (approx)	
	30 - 50 m						

SECTION 3 DESCRIPTION OF RESOURCES, USES AND ACTIVITIES

3.1 GEOLOGY AND HYDROGEOLOGY

The catchment straddles part of the two main geological structural units present in south-east England; the Wealdon anticline or dome to the south, and the London Basin to the north. The Wealdon anticline or dome, is highly faulted and formed of sandstone, silts and clay. The London Basin is essentially an elongated trough containing younger deposits of sands, silts, gravels and clays.

The River Mole rises to the south of Crawley on the Cretaceous Weald Clay and from small springs from the Hastings Beds. These strata dip gently northwards as part of the northern limb of the Wealdon anticline. The river flows for several kilometres over Weald Clay to just south-east of Dorking where it crosses the outcrop of the Lower Greensand, which form an east to west range of hills, before flowing across the narrow outcrops of Gault Clay and Upper Greensand onto the Chalk at the southern end of the "Mole Gap" in the North Downs. From Dorking to Leatherhead the river flows northwards across the Chalk in this impressive "Gap" with Box Hill to the east and Ranmore Common to the west.

In dry weather the river loses water into a series of swallow holes in the chalk river bed in the southern part of the gap; northwards as far as Mickleham. Occasionally the river dries up completely and the water flows underground in the Chalk, to emerge at powerful springs in the river bed along a two kilometre length of the watercourse south of Leatherhead. This natural phenomenon has been recorded many times through written history. Substantial Chalk springs also exist at Fetcham and flow into the river north of Leatherhead. Apart from a modest input from the Lower Greensand outcrop, the Chalk aquifer represents the only major input of groundwater to the flow of the River Mole; this input maintains flows north of Leatherhead in dry weather periods.

North of Leatherhead the River Mole flows across Tertiary strata, namely the London Clay and the Bagshot Beds of the London Basin syncline, before reaching the River Thames. In the lower Mole valley substantial drift deposits, comprising silty sand and gravel cover much of the Tertiary strata.

Substantial groundwater resources exist within the catchment; the Chalk of the North Downs being the major aquifer. Large abstractions of groundwater for public water supply take place in the Leatherhead area. The Lower Greensand is also important with several abstractions taking part along the foot of the Chalk escarpment. The drift deposits in the Lower Mole are mainly sand and gravel with very shallow groundwater levels; these are used locally for minor water supplies only.



KEY

	Catchment Plan Boundary		Thanet Sand		Folkestone Beds		Tunbridge Wells Sand
	Middle Bagshot Beds		Upper Chalk		Sandgate Beds		
	Lower Bagshot Beds		Middle Chalk		Hythe Beds		
	London Clay		Lower Chalk		Atherfield Clay	Scale (approx) 0 ————— 5 Km	
	Reading / Woolwich Beds		Gault		Weald Clay		












3.2 SOILS

The soils of the catchment are developed to depths of one to two metres in a wide variety of geological substrates. For the purpose of catchment management, soils may be characterised by their texture, drainage status and permeability. Table 1 together with the soils map indicate the distribution of the various soil types in the catchment.

Table 1. Characteristics of Soil Types

Soil Type	Description	Depth to impermeable layer	Depth to rock	Wetness class	Water storage capacity	Likelihood of land drains	Soil water flow mechanisms ¹
1	Shallow well drained loamy soils over chalk	none present	<0.3	I	Large	Low	Vertical micropore and fissure flow to chalk
2	Well drained sandy and coarse loamy soils	>1	>1	I	Large	Low	Vertical micropore flow dominant
3	Well drained coarse loamy and sandy soils, some very acid	>1	>1	I	Moderate	Low	Vertical micropore flow dominant
4	Well drained coarse loamy and some sandy soils, commonly over gravel	>1	>1	I	Large	Low	Vertical micropore flow dominant
5	Silty soils over soft siltstone, slowly permeable subsoils cause slight seasonal waterlogging, some well drained	0.4	>1	II - IV (some I)	Variable	High	Vertical micropore flow ----- Saturated lateral or drain flow in most subsoils
6	Loamy over clayey, variably flinty soils; some with slowly permeable subsoils causing slight seasonal waterlogging	>1	>1	I	Moderate	Low	Micropore and fissure flow to chalk
7	Naturally very acid sandy over clayey soils, locally of variable texture with some peat, slowly permeable with seasonal waterlogging	0.5	>1	IV	Variable	Low (High if farmed)	Vertical micropore flow ----- Saturated lateral flow within local groundwater or drains
8	Slowly permeable, seasonally waterlogged fine loamy over clayey and clayey soils	0.4	>1	III - IV	Small	High	Saturated lateral or drain flow
9	Stoneless clayey soils in river alluvium	<0.3	>1	III - IV	Small	High	Vertical micropore and fissure flow to local groundwater or drains
10	Fine loamy and fine loamy over sandy soils with a seasonally high groundwater table	>1	>1	III - IV	Small	High	Vertical micropore flow ----- Saturated lateral flow within local groundwater or drains



	Catchment Plan Boundary	Soil Type			
		 Type 1	 Type 7		
		 Type 2	 Type 8		
		 Type 3	 Type 9		
		 Type 4	 Type 10		
		 Type 5	 Water Body		
		Type 6			

3.2 SOILS

South of Crawley in the High Weald the soils (Type 5) are of locally variable permeability and hydrology due to frequent springs controlled by the underlying impermeable strata. The land is extensively forested with commons of semi-natural vegetation. North of Crawley the soils (Type 8) are impermeable and of clayey texture; where farmed, the soils are tile-drained but remain susceptible to winter waterlogging. Close to the river, the soils (Type 10) are much sandier in texture. However their low-lying position causes these soils to remain waterlogged for much of the winter and farmed land is artificially drained.

To the north of Dorking the river passes through the chalk Downs. The soils on steep slopes (Type 1) are shallow with chalk or rubble at 30 cm depth. On the backbone of the Downs fine loamy and clayey soils are developed in Plateau drift (Type 6). North of Leatherhead, there is a further belt of clayey and fine loamy impermeable, seasonally waterlogged soils (Type 8) with stoneless clayey alluvial soils bordering the river (Type 9). Farmed land in both these units is likely to be artificially drained. As the river passes into the urban area south of the River Thames it is bordered by coarse-textured soils with gravel subsoil on river terraces backed by very acid sandy heathland soils (Type 7).

River flows and the quality of both ground and surface waters are strongly influenced by soil conditions and within the catchment there is a wide range of soil types. Stream response to rainfall will be most marked in areas dominated by the impermeable soils (Type 8) where low water storage capacity and subsoil permeability inhibit vertical percolation and lead to the lateral movement of soil water either across the surface or within the soil. If in agricultural use, these soils normally contain land drains to enhance lateral flow. On freely draining soils natural infiltration rates should be higher although, with repeated cultivation, soil compaction and surface crusting can lead to artificially high rates of run-off from arable fields under autumn cultivation.

Whilst rapid vertical soil drainage contributes most to aquifer recharge it can also transport dissolved substances out of the soil to groundwater. Soils that are shallow and/or very permeable (Types 1 - 4) exhibit high rates of infiltration and percolation.

3.3 HYDROLOGY

The average annual rainfall across the catchment is 768mm with a considerable amount of variation in different parts of the catchment. In the area south of Dorking, which accounts for about two thirds of the catchment, average rainfall is approximately 800mm. North of Leatherhead average rainfall is approximately 660mm and in the area between Dorking and Leatherhead, where the chalk aquifer is unconfined, average rainfall is about 780mm.

A substantial proportion of the rain that falls is lost in evaporation and transpiration before it can enter the rivers and aquifers. The average annual effective rainfall across the catchment, after allowing for such losses, is approximately 310mm. South of Dorking the effective rainfall is approximately 350mm per year whereas north of Leatherhead the effective rainfall is approximately 170mm per year.

Because of the impermeable nature of the strata most of this water flows straight into the river system resulting in a fairly flashy river, very responsive to rainfall events. Only in the intermediate area where the chalk is unconfined does most of the 310mm of effective rainfall percolate through the soil and recharge the aquifer. The hydrograph below illustrates the flashy characteristic of the river.

"HYDROGRAPH"

Rainfall and effective rainfall also vary over time. The histograms below demonstrate how much variation there has been since 1961 in the southern part of the catchment.

"RAINFALL HISTOGRAM"

"PERCOLATION HISTOGRAM"

MAP
"HYDROLOGY"

3.4 ECOLOGY

The ecology of streams and rivers reflects both the natural influences associated with the physical and chemical characteristics of the catchment from which they derive water and the artificial influences resulting from human activities. The NRA seeks to conserve and enhance the ecological value of streams and rivers as part of a general duty under Section 16 of the Water Resources Act 1991 to "further the conservation and enhancement of natural beauty and conservation of flora and fauna and geological and physiographic features of special interest".

All the Local Authorities within the catchment have specific policies within their Development Plans to protect and enhance the conservation value of river corridors. NRA-TR will continue to work closely with these authorities and other organisations such as the Lower Mole Countryside Management Project Team and the Horley Crawley Countryside Management Project Team. In addition the NRA seeks to be involved with other interest groups and the local communities in promoting conservation initiatives.

A river corridor survey was undertaken in 1992 for NRA-TR by the Environmental Consultancy at the University of Sheffield. Routine macroinvertebrate sampling is also undertaken by NRA-TR. The results of both these studies are summarised below:

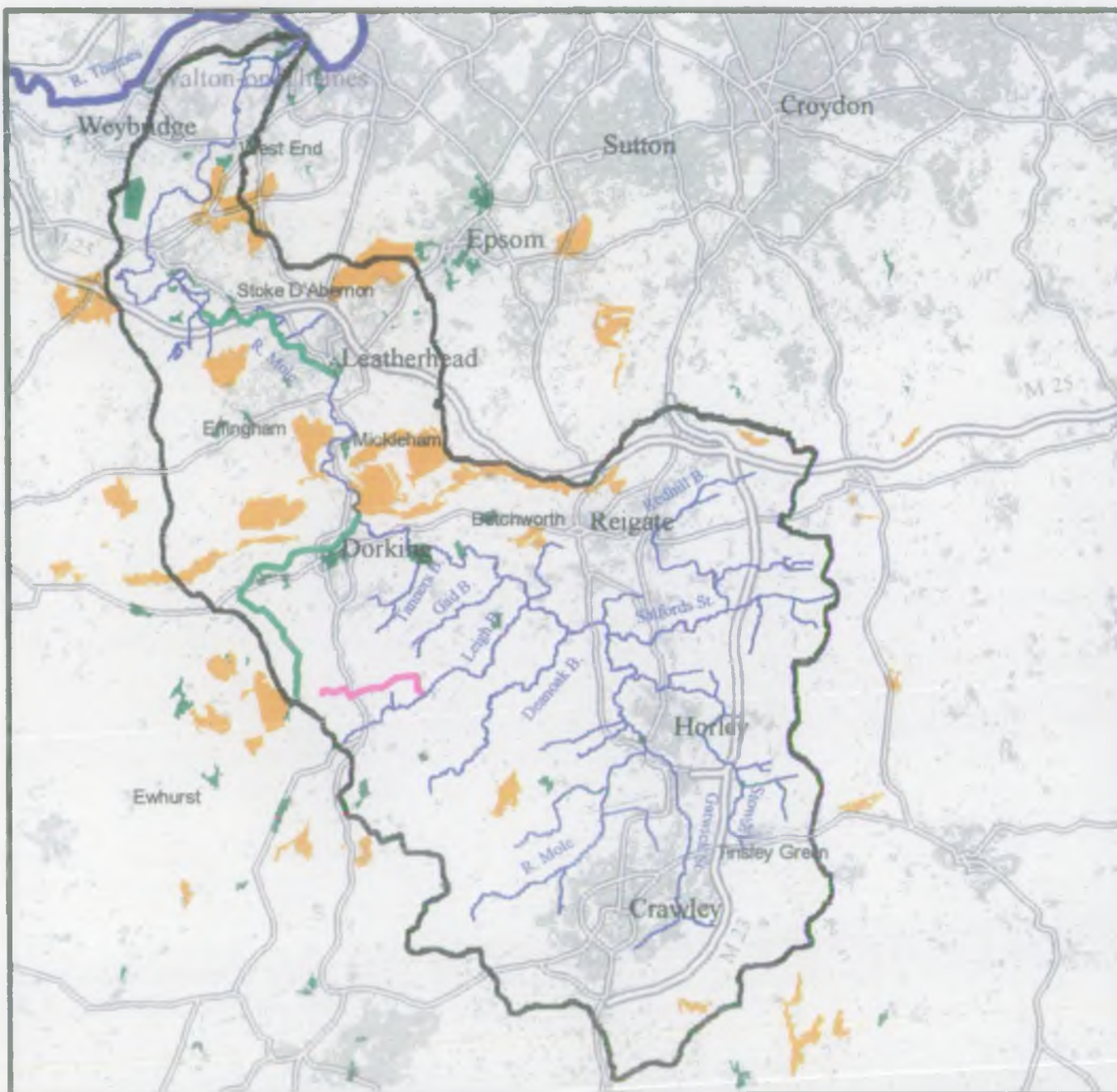
General Ecology of the River Mole

Instream biological diversity in the Mole catchment is restricted naturally by the dominance of clay in the catchment, typified by wide fluctuations in flow and steep shaded banks. The effects of treated sewage effluents and other human impacts continue to restrict biological diversity in the River Mole even as it passes across chalk outcrops. In a NRA assessment of macroinvertebrate density there are no reaches in the Mole catchment appearing in the top 10% of the UK sites.






General Tributary Ecology

Many of the tributaries are choked with bankside vegetation; nettles and Himalayan Balsam being especially common. In the reaches running through dense areas of woodland and scrub the in-channel vegetation is inhibited due to the effects of shading. In these cases the retention of woody debris is vital to maintain the invertebrate populations. The Holmwood Stream is one of only five sites in the Thames Region where NRA biologists have found Capniid stoneflies.

The ecological value of conservation sites can also be threatened by lack of water. The identification of minimum groundwater level requirements for sustaining sites of conservation interest will be aided by MAFF proposals for the production of Water Level Management Plans (WLMP). Priority is to be given to Sites of Special Scientific Interest (SSSIs). Within the catchment one such area requiring urgent attention is Reigate Heath SSSI.



KEY

	Catchment Plan Boundary	Critical Habitats					
	SSSI		Native Crayfish				
	Conservation Area		Capniid Stoneflies				
						Scale (approx)	
						0	5 Km

Three reaches of the River Mole (from River Lane, Leatherhead to the confluence with the River Thames) have been designated as cyprinid waters under the EC Directive on the Quality of Fresh Water Needing Protection or Improvement to Support Fish Life. The NRA have also recommended a reach of the Gatwick Stream for designation as a cyprinid water from Clay Lake to Crawley.

A fishery survey in 1986 revealed fair or good fisheries with recruitment below Mickleham. However, above Dorking recruitment was poor and the fishery was maintained in part by regular restocking. Five tributaries were surveyed and only two made any significant contribution to the River Mole.









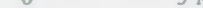



By the late 1980's the situation had begun to improve. The now Thames Water Utilities Limited decided to rebuild the Crawley and Horley STWs and the NRA instigated a limited fishery survey around Crawley, Horley and Esher STWs. During the 1989-90 survey fish biomasses were higher than at all comparable 1986 sites. Of greater significance was the fact that recruitment could be observed in some of the major riverine species in the lower Gatwick Stream and Upper Mole. Fish mortalities had also fallen by two-thirds.

A protracted drought between August 1998 and July 1992 had fairly dramatic effects on gravel spawning species such as dace and chub. The latest survey (1992-93) is the largest yet undertaken on the catchment with 21 sites on the River Mole and 15 sites on the tributaries. This survey demonstrates the significant recovery made by this river system since 1985 and caught the fish populations part way through a period of expansion and recolonisation.

The 1992 survey described the catchment as being of three parts:-

- The Upper Mole characterised by improving chemical water quality, recovering high biomass and density fish populations of recruiting young fish dominated by roach. Biological indices were also improving, especially below Meath Green, although a depressed fauna is still present around Crawley;
- In the tributaries, colonising and in some cases high populations of young fish dominated by dace, chub and brown trout.
- In the Lower Mole (below Leatherhead) which has had consistently high chemical water quality over a long period, the fishery is now dominated by low densities of large ageing predators. Chub, pike and eel predominate. This section of the River Mole is biologically consistent, with all routine sites close to their predicted scores.



Fishery Type (right hand looking downstream)		Fishery Quality (left hand looking downstream)		Moderate Biomass / diversity / recruitment		Catchment Plan Boundary	
	Salmonid		High Biomass / diversity / recruitment		Poor diversity or recruitment		
	Mixed Cyprinid / Salmonid		High Biomass / low diversity / recruitment	EC Fisheries Directive Reach Designations			
	Cyprinid Only		Good Biomass / diversity / recruitment		Cyprinid	Scale (approx) 0  5 Km	
	Minor Species		Good Biomass / low diversity / recruitment				
	No fish						

3.6 EFFLUENT DISPOSAL

Effluent discharges to the aquatic environment are controlled by means of discharge consents. These are legal documents issued by the NRA which impose conditions on both quality and quantity of a discharge. The NRA has powers to monitor the quality and quantity of these effluents and to take appropriate action where adequate compliance with consent conditions is not being achieved.

There are currently 15 major Thames Water discharges, 24 private STW discharges, 53 trade effluent discharges and 5 STW discharges to ground. Each of these consented discharges are 5 cubic metres per day or greater.

The NRA have identified the need to make changes to existing consents and/or plant at some sewage treatment works in order to accord with EC Directives and to improve the downstream water quality. The proposed changes have been included in the TWUL Asset Management Plan (AMP2) approved by the Office of Water Services (OFWAT).

Her Majesty's Inspectorate of Pollution (HMIP) also play an important role in the control of releases to land, air and water from industrial processes within the catchment through the mechanism of Integrated Pollution Control (IPC). Under the Environmental Protection Act 1990 a system of IPC is being phased in to control releases from potentially harmful industrial processes which require HMIP authorisation.



	Catchment Plan Boundary						
	Location of TWUL STW						
	TWUL STW with proposed investment						

Scale (approx)

0 5 Km

3.7 LANDSCAPE AND HERITAGE

Landscape is the product of all processes which act upon all areas of land, a combination of physical, chemical, biotic and human impacts which together create a distinctive environment as perceived by the human senses; primarily visual.

The River Mole Catchment Assessment (NRA/WS Atkins 1993) distinguishes fourteen sub-regional landscape types in the Mole catchment, these are shown on the map on page 33.

The high ground landscapes (Sandstone Ridge, Greensand Hills, Greensand Ridge, Chalk Scarp Vale, Chalk Plateau) correspond with the Areas of Outstanding Natural Beauty (AONB) and Areas of Great Landscape Value (AGLV) designations for landscape quality. These areas are of course largely devoid of rivers and streams. A notable exception is the Chalk Gap landscape (Mole Gap), the only riparian landscape in the catchment designated as an AONB.

The vast majority of the catchments watercourses are found in six landscape types and these are described below:

Rural floodplain (Upper Mole)

The upper course of the River Mole collects together a number of small tributaries to form an attractive pastoral landscape between the Weald Clay plain and the Greensand Ridge. The farmland is subject to flooding and is given over to permanent pasture. Public access is limited.

Chalk Gap (Mole Gap)

The Mole passes through the chalk escarpment in a steep wooded valley. The floor of the valley has been an important line of communication since Roman times. The valley has dramatic scenery which has attracted the notice of many authors. Several landscape parks were created here in the 18th century and Box Hill, at the entrance to the gap, is one of the most popular viewpoints in southern England. The largest vineyard in England has recently been planted on the historic Denbies Estate.

Suburban floodplain (Lower Mole)

The lower reaches of the river form a broad valley floor which acts as a green finger of countryside separating the prosperous suburbs of south-west London. The floor of the valley has a series of terraced deposits of river alluvium which support mixed farming and market gardening. The flat valley floor is also used for sports fields on the edge of settlements. The valley has been severed by major roads and overhead power lines.

MAP
"LANDSCAPE TYPES"

3.7 LANDSCAPE AND HERITAGE

Suburban fringe

The farmland on the outskirts of the suburbs adjoining the river valley has been converted into a range of different land uses. These include golf courses, riding schools, hospitals, schools, institutions and low density housing. In places, serious degradation of the landscape has occurred and Motorways/trunk roads have had a dominant impact.

Urban areas

The landscape of the Mole floodplain near its confluence with the River Thames has been completely shaped by human activities, in particular decades of sand and gravel extraction. The river is channelised due to a major flood alleviation scheme. The landscape is dominated by the embankments of large reservoirs and railways. Fragments of farmland exist between industrial premises, sewage and water works, landfill sites and gravel workings. The pressures of these urban fringe activities combine to create a degraded and open landscape requiring positive management.



	Catchment Plan Boundary					
	ACONB					
	Area of Great Landscape Value					
						Scale (approx) 0  5 Km

The NRA have powers to provide flood defences on main rivers. The powers are permissive and not responsibilities. The majority of the Mole catchment is essentially of a rural nature with specific major urban conurbations at Crawley and Gatwick in the upper part and Molesey at the lower end. The River Mole and its tributaries have a history of flooding and associated drainage works as detailed below.

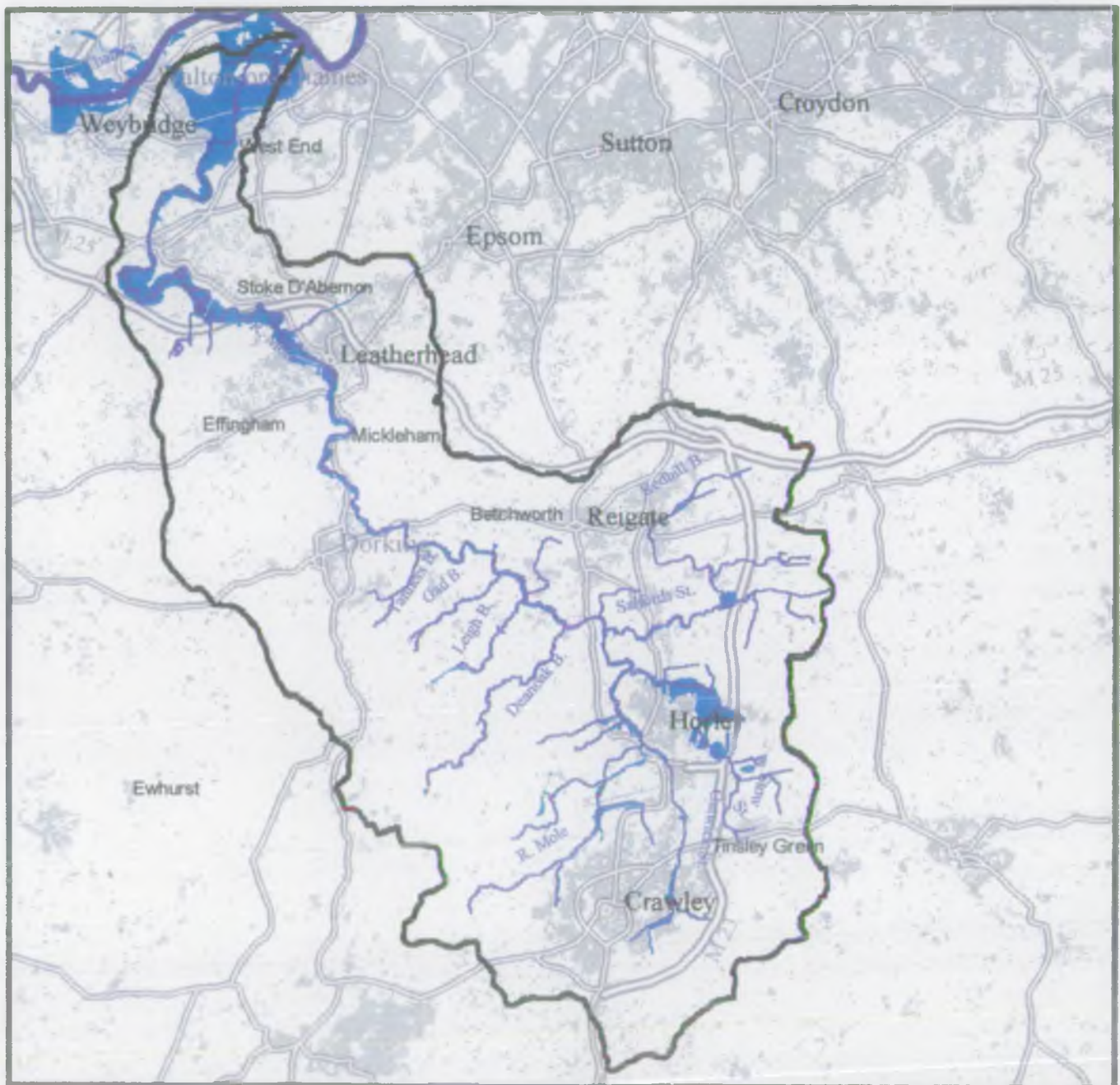
The worst floods in living memory occurred in September 1968 caused by rainfall in excess of 175mm in forty eight hours. Large parts of the South East were flooded, especially the valleys of the River Mole and River Wey in Surrey. The principal area affected was Molesey and the lower end of the catchment. Public reaction was so strong that work immediately commenced to prevent a recurrence of the flooding; construction started in 1974 and the scheme completed in 1991 at a total cost of £25 million.

It is interesting to note that several previous attempts at preventing flooding had taken place in the early 1930s by Surrey County Council and subsequently by the Thames Conservancy between 1955 and 1958. Some of these works can still be seen in operation today, notably at Royal Mills in Esher. Further details about the Lower Mole Improvement Scheme can be obtained from the NRA offices at Sunbury on Thames.

The development at Crawley New Town in the late 1950s and early 1960s and to a lesser extent Gatwick Airport, put pressure on the River Mole leading to a potential increase in flood risk. Careful design of the drainage of Crawley and Gatwick utilising large surface water storage ponds and local re-modelling of the River Mole and its principal tributaries, namely the Gatwick Stream, Crawters Brook and the Ifield Stream ensured that the flood risk was not exacerbated. The legacy of these works is evident both in the appearance of these river channels, some of which are concrete lined, and in the amount of maintenance required to ensure their continued efficiency in draining Crawley. Maintenance typically requires the removal of tonnes of urban detritus, particularly shopping trolleys, on a monthly basis. However, access for these activities is not very good and needs improving.

Other areas of concern regarding flooding include Horley, especially with the pressure for further development. The Replacement Surrey Structure Plan includes an allocation of 1300 additional dwellings at Horley between 2001 and 2006, with potential for a further 1300 dwellings after that period. There are also sewerage capacity problems at Horley, particularly on the Burstow Stream which has given rise to flooding. A flood alleviation scheme was implemented on the Burstow Stream following flooding in 1974, but since this has resulted in considerable maintenance liability, further work may be required. South Nutfield has a flooding problem which could prove difficult to resolve as the financial benefits do not compare favourably with the costs. There are other similar areas involving small numbers of properties principally on ordinary watercourses.

The majority of the upper reaches of the River Mole are protected from development in respect of surface water run-off by the requirement for attenuation. Gatwick Airport and Crawley New Town have been mentioned above. In this regard, surface water source control is a major feature being discussed by the steering group set up by Reigate and Banstead Borough Council to take forward the Horley Master Plan. The NRA wish to promote this approach which accords with the sustainability of water resources.



KEY

	Catchment Plan Boundary						
	Recorded Flooding						

Scale (approx)

0 5 Km

3.9 AMENITY AND RECREATION

The River Mole and its associated river The Ember do not have rights of public navigation, although in 1664 an Act was passed, but never executed, granting permission for the River Mole to be made navigable from below Reigate to the River Thames. Public access to the river is therefore very limited with very few continuous stretches of footpath or towpath adjacent to the river. This restricted access also has implications for water based recreation. Angling is a popular activity with clubs operating within the catchment. Areas of public open space afford the opportunity to view the river; the most notable being Box Hill and Painshill.

Within the Mole Gap a footpath winds its way down the valley between Leatherhead and West Humble. The path only runs next to the river however in short sections. The North Downs Way and the Pilgrim's Way cross the river at the Stepping Stones at the foot of Box Hill.

In the lower reaches of the Mole between Leatherhead and Cobham footpaths criss-cross the valley linking settlements but, apart from Common Meadow at Leatherhead there is no public access alongside the river. Between the A3(T) on the edge of Cobham and the A244 at Esher there are no public footpaths within the valley. However, the river can be viewed from "The Ledges" on Esher Common.

In the final section of the river between Esher and the River Thames there is again restricted access. There is no public access along the Lower Mole Improvement Scheme and the only public footpath next to water runs along the dead river on the southern edge of East Molesey and for short sections of the River Mole. The Lower Mole Countryside Management Project have carried out waymarking and improvements to the footpaths in this area.

Several long distance paths and bridleways traverse the Downs and Weald.

- **North Downs Way:** a National Trail running for 230 km from Farnham eastwards along the Downs of Surrey and Kent to Dover. The trail crosses the River Mole by means of stepping stones below Box Hill on the site of the old ford;
- **Pilgrim's Way:** follows the foot of the North Downs and is an ancient trackway. The route joins the North Downs Way at the stepping stones;
- **Greensands Way:** the Surrey section runs 90 km across the Greensand Hills from Haslemere to Limpsfield Chart. The route runs near the River Mole between Brockham and Betchworth;
- **Sussex Border Path:** this 240 km route, developed by the Ramblers' Association, follows public rights of way approximately tracing the Sussex border with Hampshire, Surrey and Kent. It crosses several tributaries of the River Mole and runs close to the river itself around the northern perimeter of Gatwick Airport;
- **Worth Way:** this 10 km path follows the disused railway line from Crawley to East Grinstead where it links with the Forest Way and Sussex Border Path. It runs close to the Gatwick Stream near Worth on the edge of Crawley.



	Catchment Plan Boundary						
	Footpaths						
	Gatwick Airport						
						Scale (approx) 0  5 Km	

3.10 AGRICULTURE

The land cover map opposite represents a composite of winter and summer imagery using data gathered from the Landsat satellite between 1989 and 1992.

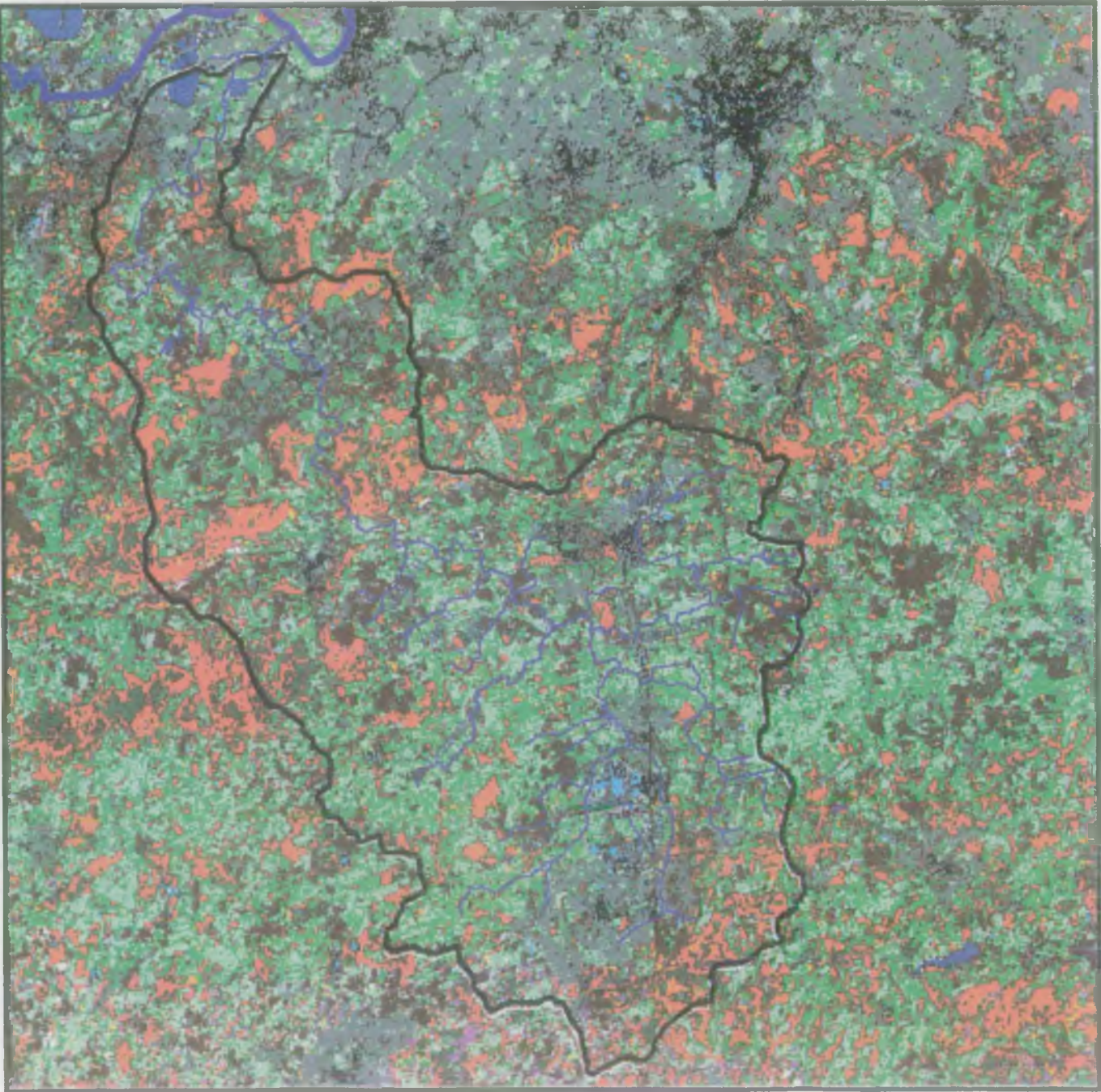
The Ministry of Agriculture Fisheries and Food (MAFF) annually carry out an Agricultural Census Data. The following is based on information collected in respect of the River Mole catchment.

The Agricultural Land Classification system, which covers the whole of England and Wales, classifies land according to the degree to which certain physical characteristics impose long term limitations on agricultural use. The system classifies land into 5 Grades, with Grade 1 representing excellent quality agricultural land and Grade 5 representing very poor quality agricultural land. Within the catchment there are 25,410 hectares of agricultural land of which only 0.8% is classified as Grades 1 and 2.

The major agricultural land use within the catchment is for grass. Since 1983 there has been a decline in the area used for crops and fallow and an increase in farm woodland. Between 1983 and 1993 the growing of barley has declined, particularly spring barley. The area of wheat has also declined although this is still the major cereal with 1,971 hectares of the total 6,217 hectares used for crops and fallow. During the same period there has been a substantial increase in the area given over to non cereal crops of field beans, oilseed rape and linseed.

1,530 hectares of agricultural land within the catchment is now in Set-Aside as defined by the Common Agricultural Policy (CAP). This term is given to land in arable crop rotation which the CAP requires to be taken out of agricultural production altogether, and used for non-agricultural purposes or left fallow. The CAP demands that a minimum of 10% of a farmers land in arable rotation be taken in to Set-Aside each year. There is an option for greater areas to be included, up to a maximum of 50% of arable land. Farmers are encouraged to manage land they have set aside in environmentally friendly ways. To this end MAFF give free conservation advice to farmers with set-aside and also run a Habitat Scheme to conserve significant nature conservation interest arising on former long term set-aside land.

MAFF has an important role in conserving the countryside, and together with other Government Departments and Agencies, has developed policies and schemes to help achieve a proper balance in the use of our countryside and rivers. Many of those policies and schemes, which involve the voluntary co-operation of the farmers, have the potential to make a significant contribution to the protection and enhancement of the water environment. The MAFF Habitat Scheme has an option for the conservation of water fringe habitats, with a major objective of enhancing aquatic flora and fauna and also water quality. The Water Fringe option is currently running as a pilot scheme on the River Beult, in Kent, and on five other sites in England.



KEY

	Catchment Plan Boundary	Land Class Value	
		Inland Waterway	Deciduous Woodland
		Grass/Heath	Coniferous Woodland
		Mown/Grazed Turf	Tilled Land
		Meadow/Verge/Semi Natural	Ruderal Weed
		Rough Grass/Marsh	Suburban
		Bracken	Urban
		Dense Shrub/Heath	Inland Bare Ground
		Scrub/Orchard	Open Shrub Heath

Scale (approx)

0 5 Km

3.11 MINERAL EXTRACTION AND SOLID WASTE DISPOSAL

Mineral Extraction

In addition to the excavation of sand and gravel within the catchment, clay is excavated for brick making at two works south of Dorking. The main areas of mineral extraction within the catchment are:

the Lower Greensand formation between Redhill and Godstone in the east and Reigate and Buckland in the west;

the chalk in the vicinity of Betchworth;

the River gravels around West Molesey.

To the east of Redhill extensive excavation takes place for good quality building and industrial sands from the dip slope of the Lower Greensand. Excavation at several sites has been undertaken below the water table by dewatering to lower groundwater levels. Because of the high porosity and low permeability of the formation the dewatering, to date, has not resulted in widespread changes to the groundwater regime. Some current proposals, however, are for deeper digging and more extensive dewatering which may have a greater effect on the groundwater resources of the area. Some of these sites now exist as lakes after cessation of pumping whilst others, restored by landfill and with limited protection, have the potential to cause deterioration in the quality of groundwater.

In addition a further three sites have the benefit of planning permission and are designated in the Surrey Minerals Plan for working and restoration by landfilling.

Solid Waste

The quantities of solid waste currently generated in the catchment are approximately:

household	125,000 tonnes
civic and amenity	50,000 tonnes
construction	250,000 tonnes
industrial and commercial	150,000 tonnes

The majority of this solid waste is disposed to landfill sites in Surrey and West Sussex with only about 10% being recycled. The major landfill site at Redhill, which has capacity anticipated to cater for the next fifteen years, takes approximately 400,000 tonnes per annum. However, the site is unlined and Surrey County Council are therefore reviewing the existing licence to accord with the requirements of the Environmental Protection Act 1990, in the interests of protecting the underlying aquifer against contamination.

The growing regional pressure for landfill and the increased perception that this is not a sustainable way of managing waste, raise important fundamental issues.

The NRA is currently reviewing, in conjunction with Surrey County Council, changes in approach to waste disposal operations with the long term aim, among others, to minimise the potential harmful effects on groundwater resources.

MAP

"MINERAL EXTRACTION AND SOLID WASTE DISPOSAL"



	Catchment Plan Boundary						
	Green Belt						
	Motorways						
						<p>Scale (approx)</p> <p>0  5 Km</p>	

NRA-TR is well placed to influence some of the factors responsible for the protection and enhancement of the water environment within the catchment area but has little more than an advisory role with regard to development planning. This is largely the responsibility of the twelve Local Authorities shown on the map opposite.

The ongoing pace of urban development within the SE area of Britain has caused the NRA TR to adopt a more proactive approach, seeking to promote land use policies to Local Authorities which reflect our concerns, rather than solely reacting to planning applications on an ad hoc basis. A set of Model Land Use Policies (MLUP) has been developed following extensive public consultation based on both the NRAs statutory responsibilities and our concern with defining and promoting the concept of environmentally sustainable development.

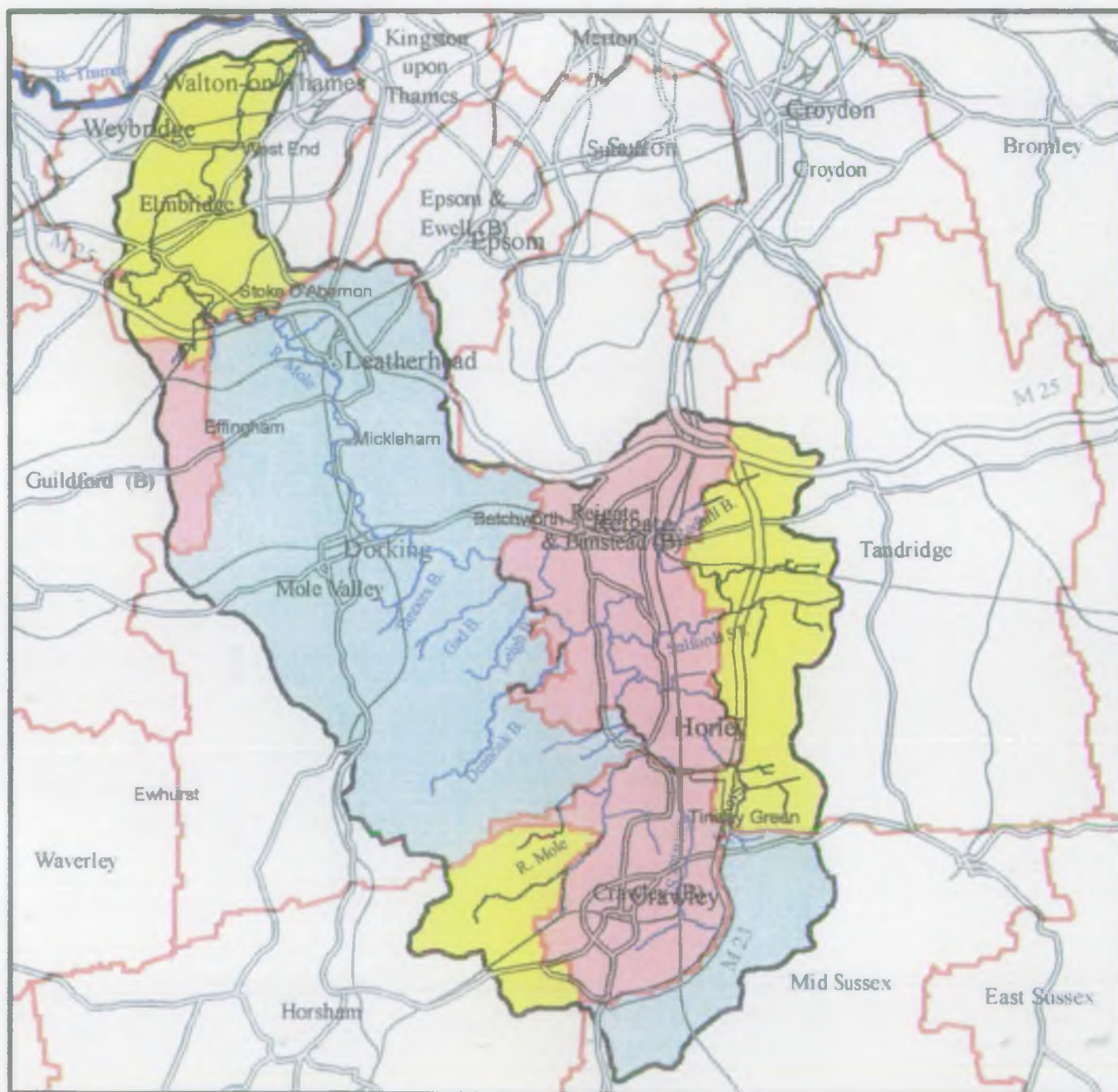
Promotion of environmentally based land use policies both safeguards the stock of environmental resources and conforms to Policy Planning Guidance Note 12 'Development Plans and Regional Planning Guidance' which advocates that development plans should contain specific NRA policies for protecting the interests of future generations ability to enjoy clean water, nature and landscape conservation.

The uptake of MLUPs within statutory development plans varies significantly between the Local Authorities within this catchment. Following informal consultation with the Local Authorities on this Consultation Report a need was clearly identified to link the general MLUP with agreed key issues at a local level. These are policies which the NRA favour and would encourage Local Authorities to include within their development plans when next reviewed. It is anticipated that such an approach represents the most appropriate way forward for both NRA TR and Local Authorities to work more effectively together towards achieving the catchment vision.

The promotion of mutually supportive land use policies by both the NRA TR and the relevant Local Authority will also provide an improved service to potential developers within the river catchment resulting in fewer instances when NRA objections would be carried through to public enquiry.

The coverage of such issues in statutory development plans also makes it less likely that developments which have an unsustainable impact on the water environment within the river catchment will be granted consent.

Local Authorities are seen by NRA TR as key partners in developing an integrated approach to river catchment management via sustainability programmes as part of Local Agenda 21.



KEY

	Catchment Plan Area						
	Local Authority Boundary						
						<p>Scale (approx)</p> <p>0  5 Km</p>	

SECTION 4 STATUS OF THE WATER ENVIRONMENT

4.1 INTRODUCTION

The purpose of this section is to compare the current status of the Mole catchment, or condition of the catchment, with overall standards/targets (where they have been developed) in respect of water quality, water quantity, ecology, recreation and amenity.

The issues identified are based on information held within the NRA and the result of informal consultations with Local Authorities and other organisations. Preliminary options for resolving these issues are suggested in Section 4 of this report.

We are particularly interested to receive your views during the consultation period, not only in respect of the issues and preliminary options, but also regarding any other issues which you consider should be addressed by the Catchment Management Plan.

4.2 WATER QUALITY

Introduction

A principal aim of the NRA Water Quality Strategy is to achieve a continuing overall improvement in the quality of rivers through the control of pollution. To achieve this aim, the NRA seeks to maintain waters that are already of high quality; to improve waters of poorer quality and to ensure that all waters are of an appropriate quality for their agreed uses.

Water quality improvements cost money and in many cases it is the community who pay the bill for these improvements either directly or indirectly. Consequently, when deciding whether or not individual schemes should go ahead it is important to relate the cost of any improvement to their benefits. Cost benefit analysis will also be used in helping to assign priorities for improvement schemes.

Assessment of Surface Water Quality

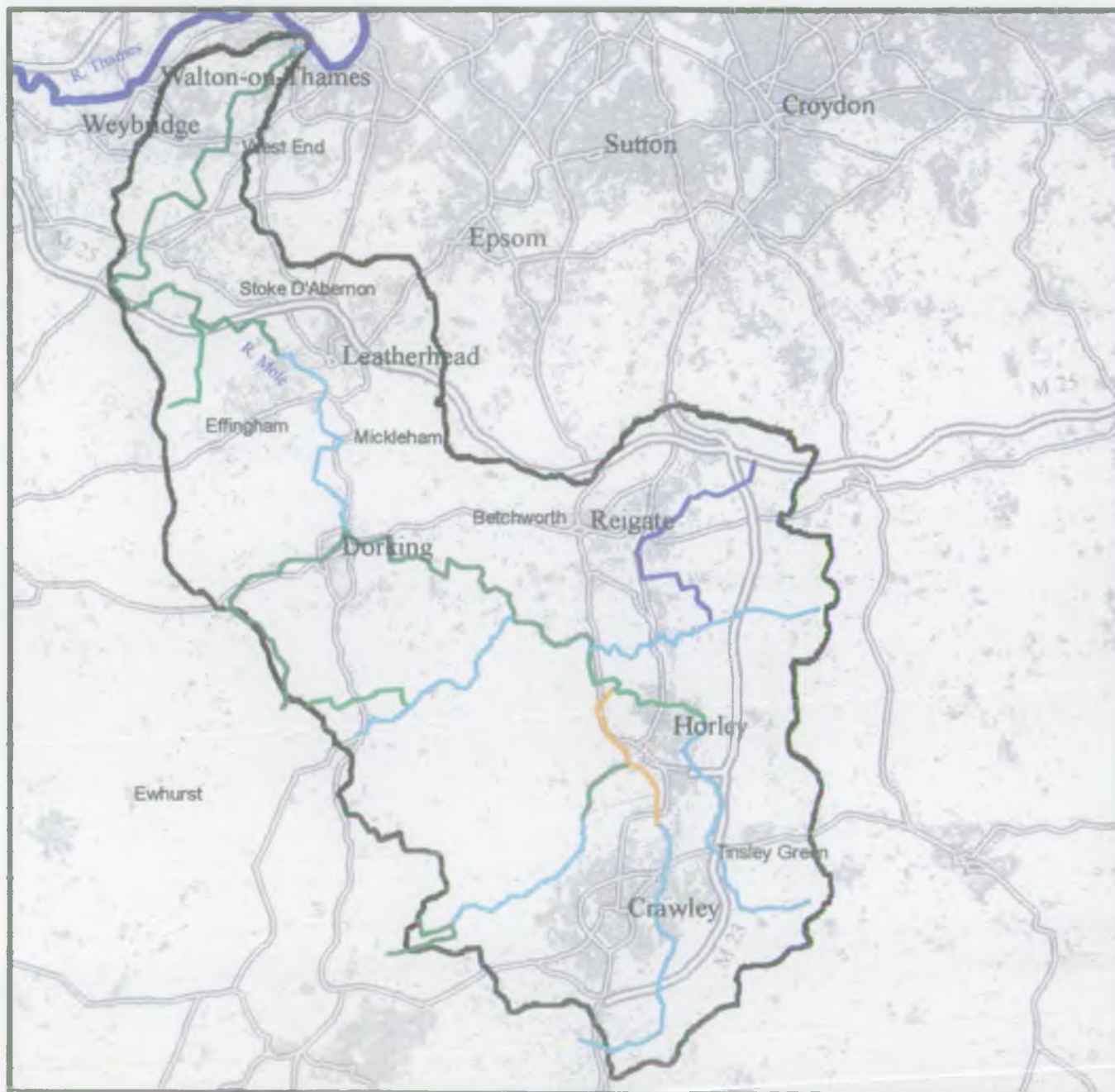
The NRA uses two schemes for the reporting and management of river water quality: the general quality assessment (GQA) scheme which allows monitoring of changes in river quality over time and in different areas, and the water quality objectives (WQO) scheme which is used to set water quality objectives based on uses.

General Quality Assessment

The GQA scheme is used to make regular assessments of the quality of rivers to monitor trends over time and to compare rivers in different areas. Four components are currently being developed for the GQA assessment - general chemistry, nutrients, aesthetics and biology - each providing a discreet "window" on the quality of the river stretches.

Water Quality Objectives

The WQO scheme establishes quality targets based on the uses of the watercourse, to provide a commonly agreed planning framework for regulatory bodies and dischargers. The proposed GQA scheme is based upon the recognised uses to which a river stretch may be put. These uses include: River Ecosystem, Special Ecosystem, Abstraction for Potable Supply, Agricultural/Industrial Abstractions, and Watersports.



KEY

Catchment Plan Boundary	GQA Grade (1992-94)				Scale (approx)
		Grade A		Grade E	0 5 Km
		Grade B		Grade F	
		Grade C			
		Grade D			

4.2 WATER QUALITY

The standards defining the five River Ecosystem (RE) classes, which address the chemical quality requirements of different types of aquatic ecosystems, were introduced by The Surface Waters (River Ecosystem)(Classification) Regulations 1994. For each stretch of river an RE class will be assigned together with a date by which this level of water quality should be achieved. Until WQOs become statutory, which will be established by legal Notice served by the Secretary of State, they will be applied on a non-statutory basis with appropriate RE classes and dates when the objectives are to be achieved.

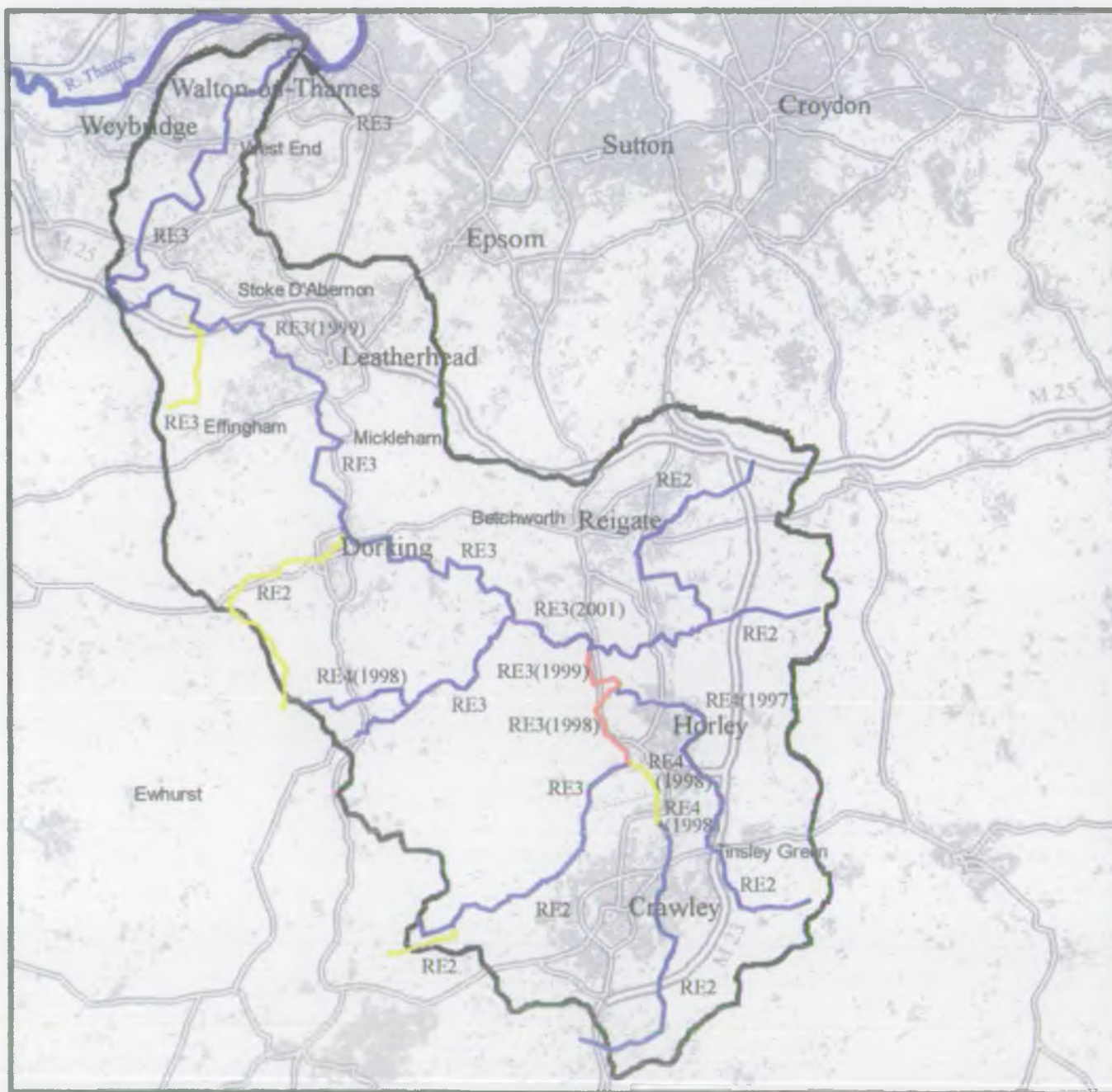
The WQO scheme also allows for long-term objectives. These are objectives we hope to attain beyond the next ten years. In order to set long-term objectives it is important to determine the need for further water quality improvements within the catchment.

Description of the Five River Ecosystem Classes





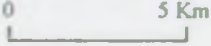
- Class RE1: Water of very good quality suitable for all fish species.
- Class RE2: Water of good quality suitable for all fish species.
- Class RE3: Water of fair quality suitable for high class coarse fish populations.
- Class RE4: Water of fair quality suitable for coarse fish populations.
- Class RE5: Water of poor quality which is likely to limit coarse fish populations.
- Unclassified: Water of bad quality in which fish are unlikely to be present or insufficient data available by which to classify water quality.

Chemical standards have been derived for each of these classes and details are given in Appendix III.

The new RE classes were used to set objectives for the Mole catchment. The water quality objectives have been set taking into account current and future uses of the watercourses in the catchment. The compliance of watercourse reaches with their objectives is judged using data for a rolling three year calendar year period. In this report compliance was judged using the years 1992 to 1994.



KEY

	Catchment Plan Boundary	Compliance with proposed short term objectives (1992 - 1994)		
		 Compliant		
		 Marginally Compliant		
		 Failure		
				Scale (approx) 

4.2 WATER QUALITY

The objectives have been set by the NRA to assist in planning work pending the scheme becoming statutory. Since the system is new, several of the objectives may need to be reset as further information on the watercourse is gathered. This will be done over the next few years before statutory objectives are implemented. Once the objectives become statutory the NRA will review them at least once every five years.

During recent years there have been some improvements to water quality within the catchment. However, the Gatwick Stream downstream of Crawley Sewage Treatment Works (STW) and the River Mole downstream of Gatwick Stream are of "poor" quality. Further improvements are under consideration in the Assessment Management Plan (AMP2).

ISSUE 1:

Poor water quality of the Gatwick Stream downstream of Crawley STW, and the River Mole downstream of Gatwick Stream.

EC Directives

The EC Directive on the Quality of Fresh Waters Needing Protection or Improvement to Support Fish Life (78/659/EEC).

Three reaches of the River Mole, from River Lane Leatherhead to its confluence with the Thames, are designated as cyprinid waters under this directive. The NRA have also recommended a reach of the Gatwick Stream for designation as a cyprinid water from Clay Lake to Crawley. The reaches designated as cyprinid waters are shown on the map on page 31.

The EC Urban Waste Water Treatment Directive (91/271/EEC).

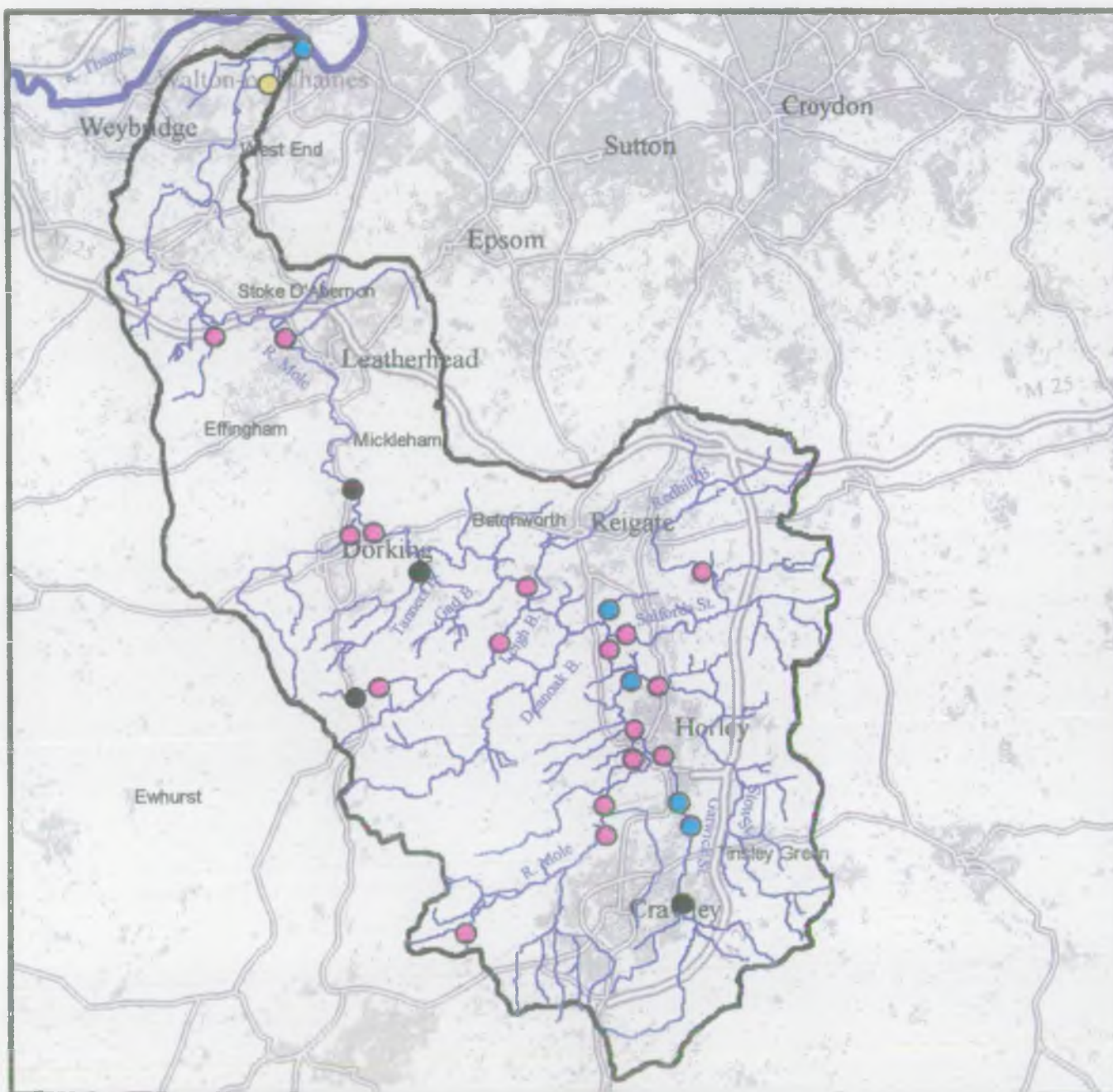
The directive sets priorities for the treatment of sewage according to the size of the discharge and the type and sensitivity of the receiving waters. Receiving waters which may be subject to eutrophication problems are to be designated as sensitive areas (eutrophic) by the Government under the directive and phosphorus removal at sewage treatment works discharging into these receiving waters is to be considered. The River Mole has not been designated as a sensitive area (eutrophic). However, information on the eutrophic status of the river from Crawley to Reigate and Esher STW to the Thames is being collected. This will be presented for a review of designated areas to be carried out by the Government in 1997.

ISSUE 2:





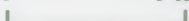

Eutrophication due to nutrients discharged in sewage effluents.

The EC Directive on Pollution caused by certain Dangerous Substances discharged into the Aquatic Environment of the Community (76/464/EEC).

This directive is concerned with reducing pollution caused by substances known to be particularly hazardous to aquatic life. The substances which come under the control of the directive have been selected mainly on the basis of their toxicity, persistence and potential to accumulate in biological organisms. The substances include specific organic compounds such as pesticides and solvents, and specific metals.



KEY

	Catchment Plan Boundary	Dangerous Substances Monitoring Sites				
			General Water Quality Site (GQA)			
			European Community Site (EC)			
			Combined GQA + EC Site		Scale (approx) 0  5 Km	
			Regional Operational Monitoring Site			

4.2 WATER QUALITY

Within the catchment thirteen sites are monitored for compliance with this directive, six are Thames Water Utilities Limited (TWUL) sewage works, and seven are river sites. Environmental quality standards were not exceeded in any of the samples taken during the three year period 1992-94.

Biological Status

The health of rivers is reflected in the variety and abundance of animal and plant life they support. The NRA routinely sample various classes of aquatic organisms which act as indicators of the effects of water quality. Biological monitoring provides an assessment of water quality integrated over a time period of similar scale to the organisms' generation time. The principal indicator organisms monitored are families of macroinvertebrates which have been assigned a score from 1 to 10 according to each family's sensitivity to organic pollution. A Biological Monitoring Working Party (BMWP) score for a sample is the cumulative score for all families present. The presence of pollution-sensitive families will produce a high BMWP score and sites scoring more than 150 are considered to have a high water quality.

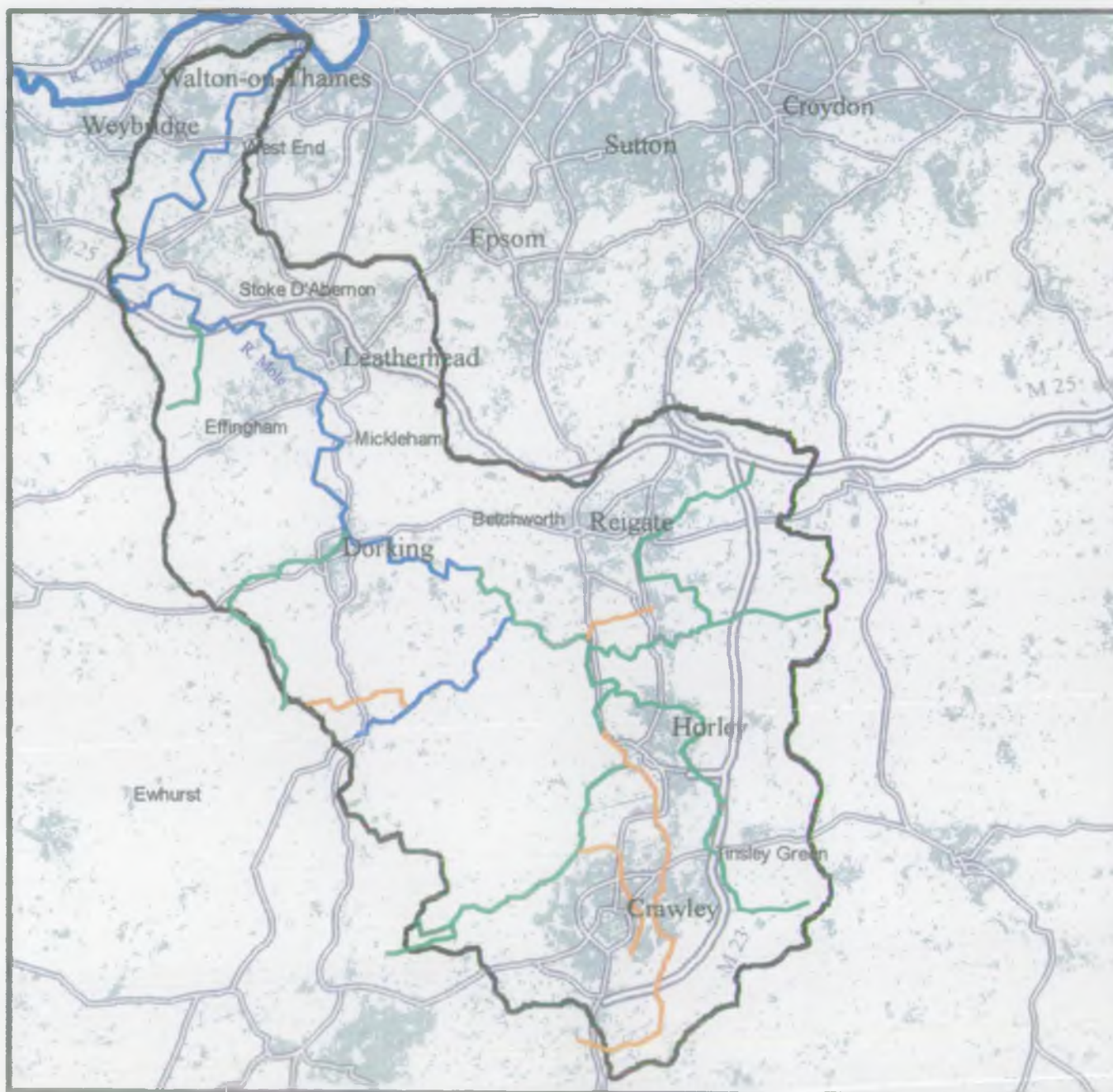
In the Upper Mole catchment, pollution-sensitive macroinvertebrates have been consistently absent from the Gatwick Stream (above and below Crawley STW) and Crawters Brook. BMWP scores in the River Mole just above Gatwick Stream were in the 20's after it was rechannelled in 1984. The score has steadily risen to 77 in 1994 as habitat diversity at the site has improved. Gatwick Airport has six balancing ponds which collect site drainage from the airport. These ponds have consent to discharge into the River Mole and Gatwick Stream. During winter months these discharges can have a marked de-oxygenating effect on the river, primarily due to the de-icing chemicals used at the airport.

To alleviate the impact on the river, Gatwick Airport Ltd. have recently constructed a lagoon at Crawley STW in order that the polluting site drainage from the airport can be treated prior to discharge to the Gatwick Stream. Once the lagoon is fully operational the largest pond will be diverted to Crawley STW. Similarly it is planned to divert a further two ponds in the near future.





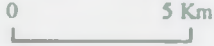
ISSUE 3:

Intermittent poor water quality downstream of Gatwick Airport.

Except for the Leigh Brook catchment, the River Mole and its tributaries below Gatwick have a poor water quality until Dorking. The River Mole at Horley has, however, significantly improved in water quality since the late 1980's when sewage fungus was prevalent across the river bed and the site had a BMWP score of 12. Improvements at Horley STW have resulted in the complete disappearance of sewage fungus for several years and BMWP scores as high as 89. The River Mole has maintained reasonably high BMWP scores of 130-140 in the Dorking area during recent years. The River Mole through Esher is too deep and wide for conventional biological sampling methods to accurately represent the macroinvertebrate assemblage present. Despite these difficulties, the sampling point just before the confluence with the River Thames usually has a BMWP score exceeding 100, and in 1994 had a score of 141.



KEY

	Catchment Plan Boundary	Mean BWMP Score (1992-94)				
			B Good (101 - 150)			
			C Fair (51 - 100)			
			D Poor (21 - 50)			
						Scale (approx) 

4.2 WATER QUALITY

A primary cause of restricted biological quality is the poor chemical water quality due to the discharges from sewage treatment works during storm conditions. During storm conditions STWs are often unable to fully treat all the sewage entering the works. As a consequence dilute settled sewage may be discharged directly into the river. Often paper, plastic and other sanitary items may be discharged with sewage giving rise to aesthetic problems below STWs. Some areas of the catchment also appear to be prone to foul sewer/pumping station overflows during wet weather.

Thames Water Utilities Limited are already addressing this matter by carrying out a number of improvements to major STWs in the catchment, including the installation of fine screens at Burstow, Crawley, Dorking, Horley and Leatherhead STWs between 1995-98.

ISSUE 4:

The adverse impact on the aquatic environment of sewage derived material discharged from STWs during storm conditions.

The routine monitoring of macroinvertebrates has inspired further investigations which are currently being undertaken. One investigation involves macroinvertebrate data obtained from the catchment being analysed for relationships with the physical and chemical attributes of the sites at the time of sampling. This multivariate analysis should enable the NRA to separate the effects of habitat (physical) from the effects of pollution (chemical). Such information would be of significant benefit particularly since the catchment has a broad range of geological and land use variations which result in marked spatial changes in water quality. The other investigation stems from the difficulty of sampling macroinvertebrates from the River Mole above and below Esher STW using conventional techniques due to the width and depth of the river. A sampling technique has been employed providing representative collections of midges from all available habitats in deep river sites. The investigation will highlight the effect Esher STW has on the Ember channel compared with the Old River Mole channel which is free from sewage effluent. Chemical sampling of this area cannot reveal what effects the effluent is having on the biota.

ISSUE 5:

Effect of Esher Sewage Treatment Works on the Mole/Ember channel.

Surface water run-off from urban areas and frequent pollution incidents also contribute to poor biological scores. Some chemical pollution incidents may have long term effects on biological quality. The extensive areas of urban development, particularly in the upper Mole, result in considerable surface water run-off during storm conditions. Data collected reveals some reaches with low fish biomasses and/or species diversity. Potentially this could be a consequence of sporadic pollution incidents occurring following the initial flush of surface water to the river.

ISSUE 6:

The impact of urban storm water run-off on the river ecosystem.

4.2 WATER QUALITY

Bacteriological Status

Analysis of river water for the presence of bacteria that are common in guts of warm-blooded animals (coliforms) provide us with evidence of faecal contamination and the possibility that pathogenic bacteria and viruses may also be present. There are no statutory bacteriological standards yet available for coliform bacteria levels in our rivers that can be used to assess health risks associated with river water contact.

Mole Valley District Council are concerned that the NRA should have standards for the River Mole that will protect human health and the environment as well. In the Mole catchment coliform bacteria are routinely monitored at Mill Lane, Cobham; duplicate samples are taken four times a year. There have been high numbers of coliforms present on all occasions sampled, indicating the continual presence of sewage.

ISSUE 7:

Conflict between the request for increased access to rivers and public health considerations.

Blue-green Algae

Blue-green algae (cyanobacteria), which occur naturally in inland waters, are organisms with some properties characteristic of both bacteria and algae. During spells of warm weather they can multiply sufficiently to form blooms which colour the water green, blue-green or greenish-brown. Under suitable physical and chemical conditions, particularly in still waters, algal populations may grow to extremely high densities and form a scum which can produce chemicals toxic to mammals, including man. There is a 60-70% chance of a bloom being toxic. The NRA is supporting the National Lake Classification Scheme Research and Development Project to improve our knowledge of blue-green algal blooms and to minimise their detrimental effects.

Regularly occurring blooms interfere with the amenity value of Priory Park Lake, Reigate.

ISSUE 8:

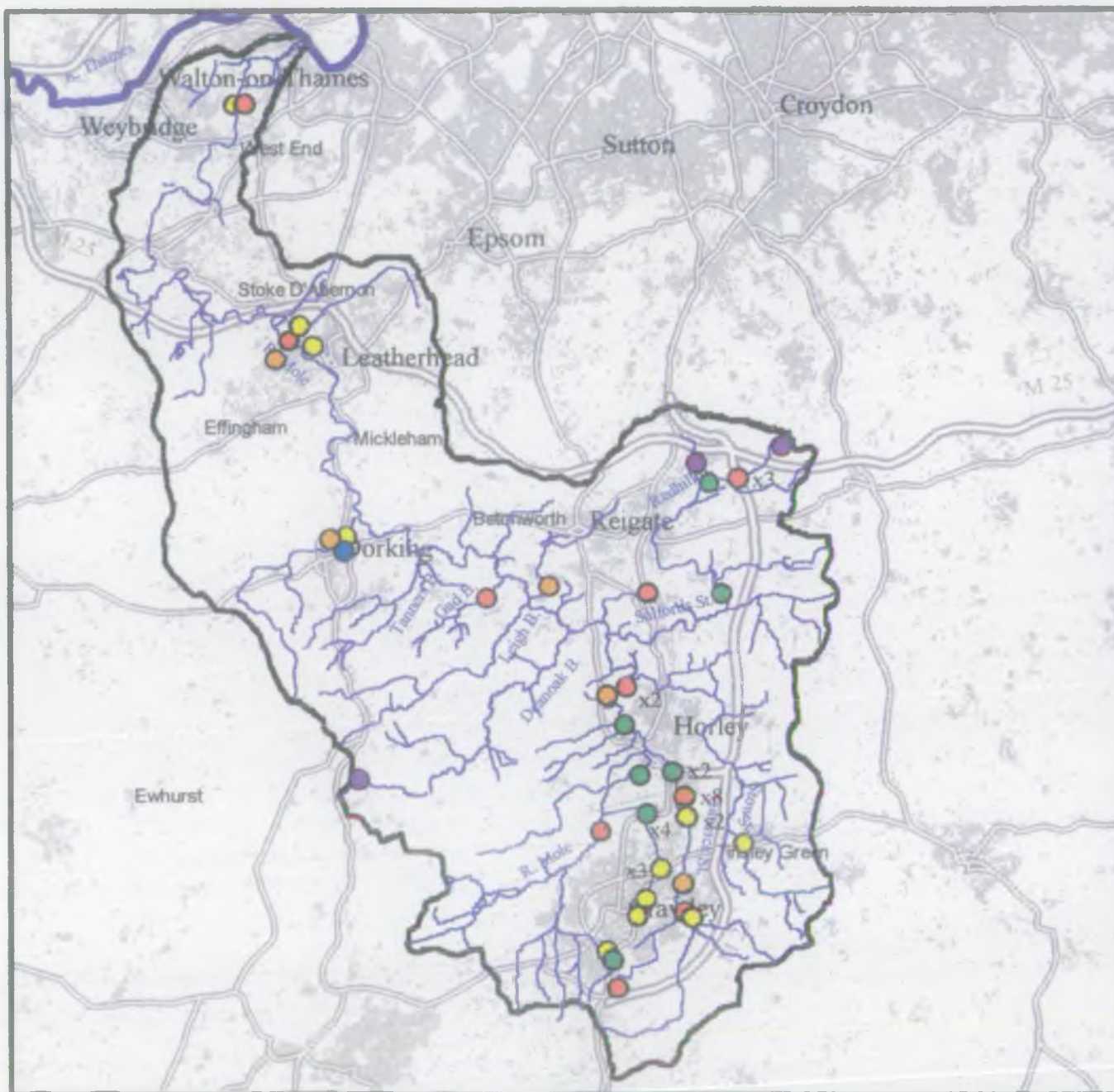
The presence of blue-green algae in Priory Park Lake, Reigate.

Pollution Incidents

Between 1990 and 1994, 828 pollution incidents were reported in the Mole catchment. Of these, one was a Major Category 1 incident, 47 were Significant Category 2 incidents and 780 were Minor Category 3 incidents. The predominant pollutants were oil and sewage and their geographical distribution is shown on the map opposite. The NRA continues to place the highest priority on attending and dealing with pollution incidents and following a review of past incidents pollution prevention surveys are being conducted in targeted industrial estates. Pollution incident categories are described in Appendix III.

ISSUE 9:

Frequent pollution incidents cause significant effects on water quality and ecology.



KEY

Catchment Plan Boundary	Pollution Incidents 1990 - 1992 (Category 1&2)	●	Not Known		
	● Oil	●	Agricultural		
	● Sewage				
	● Chemical				
	● General				

Scale (approx)
0 5 Km

4.2 WATER QUALITY

Groundwaters

Along the southern margin of the catchment, groundwater emerging as springs and seepage zones from the more permeable sandy deposits of the Hasting Beds, provide headwater flow to the upper tributaries of the River Mole. The water is moderately soft in character but variable in quality. Locally high yields are produced.

The Lower Greensand comprises two formations, the Hythe Beds below and the Folkstone Beds above. This is an important aquifer yielding water of very good quality although moderately hard in character and often enriched with iron. These strata can provide natural filtration and the degradation of some pollutants can occur. This aquifer is utilised extensively for public supply.

The chalk of the North Downs is part of the Region's most important aquifer. Being highly permeable and fissured it is, in places, vulnerable to groundwater pollution although with few exceptions its quality is consistently good. The Chalk can produce large yields and groundwater is abstracted locally for public supply, for example at Leatherhead.

To the north, the chalk is concealed beneath younger deposits the most important of which is the impermeable London Clay. This offers considerable protection to the quality of water in the underlying chalk. In turn, in the far north of the catchment a series of Drift deposits conceal the London Clay. These River Terrace deposits, comprising silty sands, gravels and clays, are utilised locally for groundwater supply although their quality can be variable being prone to local contamination from past and current industrial activity and misuse.

There is a need to ensure that local abstractions, used principally for public supply purposes, are adequately protected. Developments and activities which may prejudice this quality will be controlled or opposed such that a high standard can be maintained. Reference should be made to the NRA's document "The Policy and Practice for the Protection of Groundwater" which sets out the approach to controlling and preventing the pollution of groundwater. It introduces the idea of source protection zones, which are areas which may restrict activities/development around major groundwater abstractions, and also the concept of vulnerability. Policy statements relate to specific activities and how they may be interpreted by the Authority.

Source protection zones have been defined for seven public supply sources within the catchment. These zones are based on the most reliable information currently available. However, these zones will be redefined if more precise and accurate data becomes available.

The vulnerability of groundwater towards pollution is dependent on the presence and nature of overlying soils and drift deposits, the geology and depth to the water table. The NRA has published a 1:1,000,000 scale map of England and Wales which illustrates the general vulnerability of groundwater. Larger scale 1:100,000 maps are also scheduled for publication. Sheet No.39 titled West London has been published; this covers the extreme northern part of the catchment. Sheet No.46, covering the Mole Valley will be published in May 1996.

4.2 WATER QUALITY

The NRA currently monitors the quality of groundwater from a number of sources within the catchment in order that changes may be detected and action taken as necessary. Such changes, due to the slow rate of movement of groundwater, may take long periods of time to manifest themselves and may have resulted from activities undertaken several decades ago. It is important therefore to use this information to assess the potential effect of present day activities on groundwater quality.

ISSUE 10:

Vulnerability of groundwater to pollution.

During low flows the chalk aquifer between Mickleham and Leatherhead is recharged by water from the River Mole. There is the potential for reduction in the groundwater quality due to mixing with the poorer quality river water which receives a high proportion of treated sewage effluent. The groundwater from the chalk is abstracted at Leatherhead for public supply and therefore needs to be safeguarded. Investigations are required to determine the extent of the problem and the water quality standards required to protect the resource.

ISSUE 11:

Potential reduction in groundwater quality in the Mickleham/Leatherhead area during low flows resulting from infiltration of poorer quality water from the River Mole.

A Nitrate Vulnerable Zone (NVZ) has been proposed to protect the Dorking public supply abstraction from nitrate derived from agricultural activity, under measures for UK compliance with the EC Nitrate Directive. However, the proportion of agricultural land in Dorking is low and therefore, the potential effect of non-agricultural source of nitrate needs to be considered carefully. Consequently, the status of the zone has been postponed at this stage.

Any assessment needs to be carried out by 1997, in time for the first review of nitrate vulnerability zones.

ISSUE 12:

The need to identify the source of nitrate in the groundwater at Dorking.

Whilst mineral extraction on its own may have little if any affect on the quality of surrounding ground or surface water, restoration by using controlled wastes, unless carefully and sensitively undertaken, may create long term deterioration of groundwater and could have implications for water resources. Of particular concern is the area to the east of Redhill where extensive quarrying from the Lower Greensand aquifer both in the past and to a lesser degree currently, with restoration by landfill using a wide range of controlled wastes, has the potential to cause a deterioration in the quality of groundwater. The present position is further exacerbated due to the potential impact of three other sites which have the benefit of planning permission and are designated in the Surrey Minerals Plan for mineral working and restoration by landfilling.

4.2 WATER QUALITY

The principal concern is the protection of the five public water supply stations in the area operated by East Surrey Water Company which take groundwater from the confined Lower Greensand just north of the two main areas of quarrying.

ISSUE 13:

The potential adverse effect on groundwater resources used for public water supply resulting from extensive quarrying and landfilling in the Lower Greensand.



	Catchment Plan Area					
	Groundwater Monitoring Site					

Scale (approx)

0 5 Km

4.3 WATER QUANTITY

Water Resources Management

In managing water resources the NRA seeks to achieve a sustainable balance between the needs of the environment and the needs of abstractors for public and private water supply. In carrying out water resource activities we have general duties to further the conservation and enhancement of the natural environment and have particular regard for the statutory obligations of the water undertakers.

Abstraction Licensing Policy

The NRA's regulatory role in the management of abstraction is governed by the Water Resources Act 1991 which sets out a system of Abstraction Licensing. Licences enable the NRA to control abstractions by setting limits on the amount which may be taken, the purposes for which water may be used and any condition necessary to protect the environment. The Act also sets out those matters which the NRA must take into account when considering an application for a licence (e.g. whether the requirements of the applicant are reasonable; the impact on other water users; the impact on river flows) and describes the procedures which must be followed when applying for a licence. Some small operations, such as those to supply a single household, are exempt from the need to obtain a licence.

In response to its duties under the Water Resources Act the Thames Region of the NRA has developed a set of formal policies for handling applications for licences and changes to existing licences (see Appendix III). These policies do not in general allow the abstraction of water from rivers (or nearby groundwater) for a consumptive use in the summer months, and encourage the development of winter storage for uses such as spray irrigation. The Water Resources Act also establishes the power to specify Minimum Acceptable Flows in rivers. The NRA, in response to this, is carrying out research into **Ecologically Acceptable Flows**, which will help our understanding of what a living river needs to survive. Many new licences, particularly for consumptive use, will include a prescribed flow condition limiting abstraction below defined river flows in order to protect the water environment.




Public Water Supplies

There are currently thirty nine licences in force in the catchment. Eight of these are for public water supply purposes which account for 95% of all licenced abstraction. Virtually all of this water is supplied from groundwater sources. The principal water supply company in the catchment is East Surrey Water Plc; Thames Water Utilities Ltd. and North Surrey Water provide supplies in the lower reaches of the catchment.


Water Resources Development

Future water resources needs to be considered in the context of London as a whole given the conjunctive management of resources outlined above. Growth in demand for water may be influenced by a number of factors for example, increasing water use in the home, population growth and local development pressures, and economic trends which may affect commercial water usage. In June 1994 the document 'Future Water Resources in the Thames Region' was published; it sets out a strategy for the future planning and sustainable management of water resources to meet the reasonable of public water supplies, industry and agriculture in the region. Managing growth in demand for water is a key element of the strategy. Managing leakage and encouraging more efficient use of water at work and at home can significantly affect growth in demand for water delaying the need for major new strategic water resource schemes and perhaps avoiding their development for the foreseeable future.



	Catchment Plan Boundary	Abstraction Source					
			Ground				
			Surface				

Scale (approx)

0  5 Km

4.3 WATER QUANTITY

East Surrey Water Plc already operate an active leakage management programme and this is seen as an essential element of the Company's strategy for meeting future demands. As a result of success to date, the Company anticipate that future demands for water (to 2015) should be met by existing licenced resources. New development pressures, such as those for Horley, will require enhancements to the existing water supply infrastructure to ensure resources can be made available to meet new demands. The timescale for new developments, therefore, can be a critical issue for water resources and supply, and should be borne in mind by planners and developers.

ISSUE 14:

Potential impact of further development on available water resources.

Should the limits of leakage management prove less successful, growth in demand for water in the longer term may contribute to the need to develop new water resource schemes. "Future Water Resources in the Thames Region" identifies a number of schemes which may be developed in this respect; these include:-

- on a local basis, possible additional abstraction from groundwater at Leatherhead, but constrained by a prescribed minimum flow in the River Mole;

or, strategic schemes such as:

- a transfer of water from the River Severn to the River Thames at times of low flow;
or, the proposed South-West Oxfordshire reservoir scheme.

Further investigations are being carried out into potential strategic water resource schemes but their promotion should not be seen as a foregone conclusion because of the significant environmental impacts and planning constraints.

4.3 WATER QUANTITY

Flood Defence

Reducing the risk of flooding from surface waters in the catchment forms an important part of the NRA's work. 'Standards of Service for Urban and Rural Flood Defence' provides the NRA with the basis for a consistent and programmed approach towards service provision which involves all land types within the flood plain being expressed in terms of house equivalents (HE). This unit system is based on the average cost of damage to an average house when flooded. A house will therefore score 1 HE and the relative potential damage caused to other land uses gives a score of 64.6 HE for a factory, 57.3 for a motorway and 0.2 HE for a garden. The number of HE units are totalled within an individual river reach and placed within one of five land use bands, each with a target range of flood defence service levels (see Appendix III). By comparing target standards of service against actual monitored flooding events it is possible to identify inadequately protected reaches.

ISSUE 15:

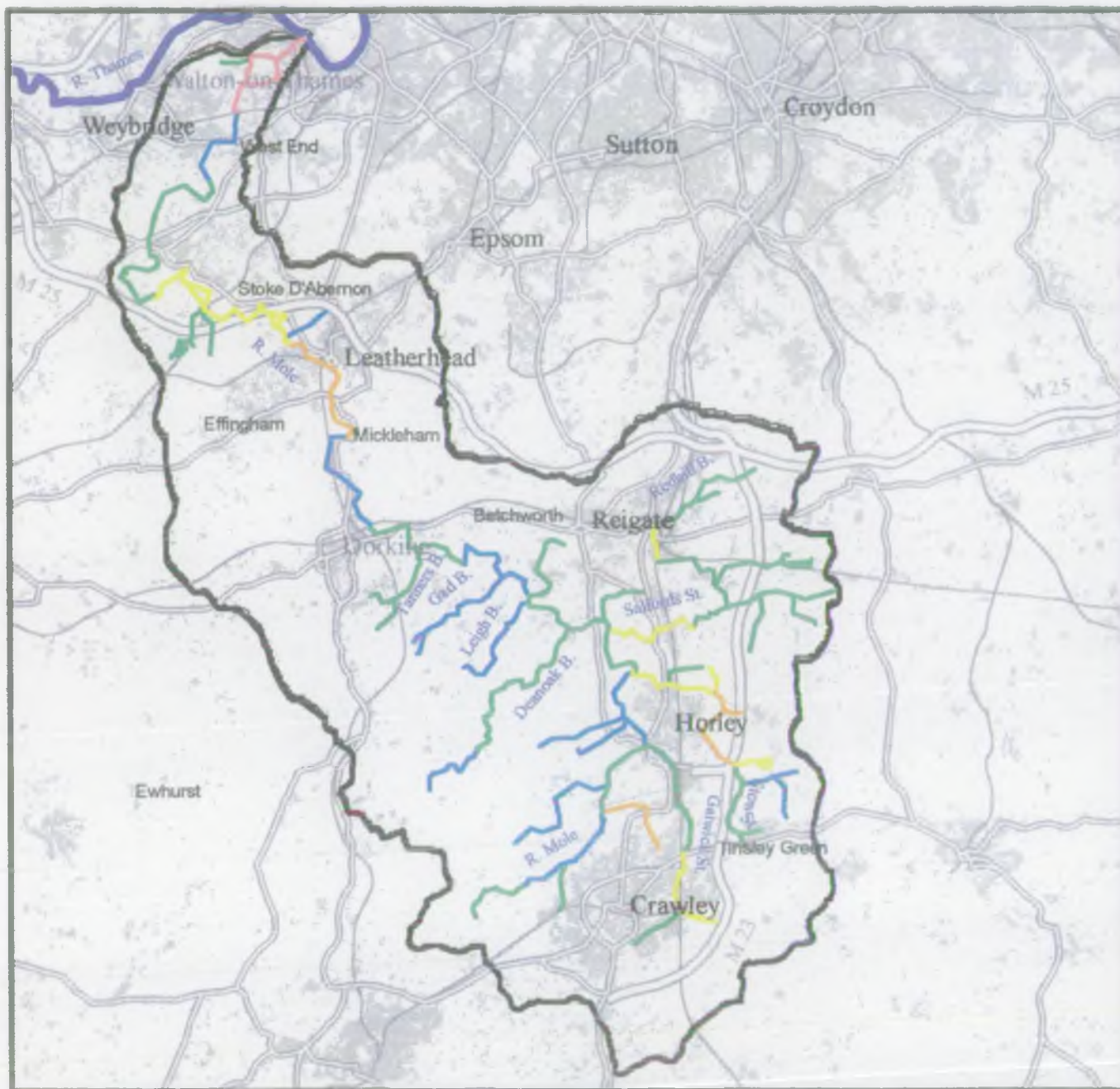
Above the upper limit of the Mole Flood Alleviation Scheme actual Standards of Service remain to be consistently defined and compared against targets.

Arising from the Memorandum of Understanding with Local Authorities, the NRA is committed to carrying out surveys of areas at risk of flooding in accordance with Section 105 of the Water Resources Act 1991. Eventually all the catchments in the South East Area of Thames Region will be surveyed and in this respect the programme and budget have yet to be finalised. Section 105 surveys are likely to involve hydrological (run-off and flow volumes) and hydraulic (water levels/flow paths) data collection and modelling.

The Mole catchment is regarded as high priority for Section 105 survey work in the South East Area. The data obtained from such surveys increases the effectiveness of the NRA and is of considerable benefit when responding to land use planning applications and when promoting the NRA's interests in local authority statutory Development Plans. This is important, especially in view of the development pressure areas of Gatwick, Crawley and Horley.

ISSUE 16:

The need to carry out Section 105 surveys for the Mole catchment.



KEY

Catchment Plan Boundary	LAND USE BAND	Band E	
	Band A		
	Band B		
	Band C		
	Band D		

Scale (approx)

0 5 Km

4.3 WATER QUANTITY

Development can exacerbate the risk of flooding by reason of loss of flood plain storage, impedance of flood flow routes and increased surface water run-off. In accordance with Department of the Environment Circular 30/92 "Development and Flood Risk" the NRA endeavours to ensure that, in the event of planning permission being granted, adequate flood alleviating/compensation measures are provided in all appropriate cases as part of the development. Such measures must also be designed and constructed to maximise their potential for wildlife habitat and minimise the impact of pollution.

There is a general misconception that Gatwick Airport creates flooding problems on the River Mole; this is not the case. However, the airport, by reason of its international status, can be expected to act as a nucleus for additional development and this could create problems with regard to surface water drainage infrastructure.

ISSUE 17:

The potential impact of development proposals on flooding.

The potential development of up to 2600 new dwellings at Horley could have significant implications for increased risk of flooding. Reigate and Banstead Borough Council have recently published the "Horley Master Plan Outline Project Brief" based upon the land allocation identified in the Replacement Surrey Structure Plan. Since a substantial part of the site lies within the flood plain, such development would not only increase surface water run-off but could also result in loss of flood plain storage. The Borough Council has consulted the NRA and negotiations are currently in hand.

ISSUE 18:

The potential impact of additional development at Horley.

The Burstow Improvement Scheme was designed and constructed to protect properties in Smallfield Road, Horley, from a reoccurrence of the flood event of 1974. That event was of a low order compared with the flood event of 1968. The Scheme, which involved the widening and deepening of the river channel, has a high maintenance requirement. Irrespective of any proposals for further development in the area the efficacy of the Burstow Improvement Scheme needs testing (through hydrological and hydraulic modelling).

ISSUE 19:

The need to evaluate the efficacy of the Burstow Improvement Scheme.

4.3 WATER QUANTITY

Flooding is a major problem particularly on minor main river tributaries such as Mans Brook, Nutfield Park Stream and the Rye. This is also the case on many ordinary watercourses such as Pipp Brook at Dorking. Flooding is frequent in the Upper Mole itself but generally confined to agricultural land. This flooding directly effects several properties. However, the NRA has difficulty promoting alleviation schemes due primarily to financial constraints.

ISSUE 20:

The difficulty of promoting alleviation for properties currently receiving an unacceptable level of service.

4.4 ECOLOGICAL STATUS

The current status of the conservation value of river channels and adjacent habitats are shown on the map opposite. Urbanisation increases pressure on the water environment and can cause degradation in quality due to the combination of loss of flood plain and river corridor habitats, increased surface water run-off and trade effluent disposal causing poorer water quality, and increased flashiness of rivers. The landscape and ecological status is assessed by the NRA in the following ways; landscape assessments, river corridor (landscape and river habitat) surveys, biological surveys (aquatic macroinvertebrate and habitat surveys) and fisheries surveys. Further ecological information concerning chemical water quality, hydrology and geomorphology is also collected by the NRA. An integrated approach towards the assessment of landscape and ecological status and in the design and implementation of measures directed towards restoring or protecting landscape or ecological value is recognised as the most effective approach.

Based upon an assessment of overall landscape and ecological quality the three management strategy options as defined by NRA landscape assessment methodology, are as follows:

Conservation	Emphasis on conservation of existing character and on appropriate management of particular features which contribute to this character.
Restoration	Emphasis on restoring landscape character where this is being degraded.
Enhancement	Emphasis on the enhancement of landscapes which have completely lost their former character and are downgraded, derelict or otherwise damaged. There may be opportunities to create new types of landscape as a result of enhancement.

ISSUE 21:

The ecological status of the rivers cannot be assessed by one method in isolation.



	Catchment Plan Boundary						
	Critically important for wildlife						
	Important for wildlife						

Scale (approx)

0 5 Km



4.4 ECOLOGICAL STATUS

Within the catchment there are in-stream and river corridor habitats which are not only intrinsically important but essential for the continuing presence of certain important/rare species of flora and fauna. The species concerned include:-

- Relic populations of native brown trout (Stanford Brook, Pipp Brook and Gatwick Stream);
- Native crayfish (Pipp Brook and the River Mole at Leatherhead);
- Capniid stoneflies (Holmwood Stream);
- Kingfishers (occurs throughout the catchment);
- The greater dodder (this nationally rare plant occurs along the River Mole).

There is also a need to protect the sparse gravels which are essential to gravel spawning fish. The most recent fish survey undertaken on the River Mole was carried out in 1992-93. The survey was the largest yet undertaken in the catchment and recorded the significant recovery this river system has made since 1985. Many factors have the potential to effect fisheries, including agricultural practices and increased surface water run-off. To determine the extent to which these factors may effect the catchment would require detailed survey work to be carried out.

ISSUE 22:

The need to protect important in-stream and river corridor habitats.



	Catchment Plan Boundary						
	Native Crayfish						
	Capniid Stoneflies						

Scale (approx)

0 5 Km



4.4 ECOLOGICAL STATUS

A great variety of land form, land use and landscape features exist within the Mole catchment. In 1993 WS Atkins Planning Consultants were commissioned by the NRA to carry out a strategic landscape assessment to define the landscape quality and establish the sensitivity of the riparian landscape to change. The completed study titled "River Mole Catchment Landscape Assessment" was published in September 1993. The requirements addressed by the document include:-

- to provide a database of environmental character and quality, which can be used in catchment planning;
- to act as a post-project/post management appraisal document to assist with other NRA studies;
- to indicate where in the catchment the NRA should initiate detailed landscape assessments with a view to identifying environmental enhancement opportunities.

The strategic landscape assessment identifies eleven top priority areas for environmental conservation, enhancement and restoration. These areas have been selected to address a broad range of environmental issues including landscape, ecology and recreation.

ISSUE 23:

The need to secure appropriate conservation, enhancement and restoration of key riverine landscapes as identified by the landscape assessment.

In 1994 the NRA produced the report "Lower Mole - Enhancement Proposals" which extended the study carried out by WS Atkins on the landscape assessment. The report identified a five year programme of enhancement and work commenced in September 1994. The work will contribute towards the repair of natural habitat in areas of the Lower Mole where the degradation is on a large scale. However, there is also a need to address the overall problem of habitat degradation throughout the catchment.

ISSUE 24:

The degradation of natural habitat.

4.4 ECOLOGICAL STATUS

Reigate Heath Site of Special Scientific Interest (SSSI) is an important habitat which supports southern marsh orchids on the wetland component of the site. However, the southern marsh orchid population is in decline and it is reasonable to assume this is due partly to lack of water. In July this year the NRA appointed consultants to prepare a Water Level Management Plan (WLMP) to determine the extent and cause of the decline. The WLMP will be completed by the end of the current financial year. A WLMP is a written statement produced by the operating authority (in this case the NRA) which it is intended other bodies will be able to endorse as a written agreement. It is a reference document drawn up in accordance with guidance published by MAFF. The Plan should take into account the aims of all interests, such as flood defence, water resources, agriculture/forestry, conservation and amenity.

ISSUE 25:

The need to safeguard Reigate Heath SSSI.

As a consequence of flooding, particularly in the urban areas, the historic response has been the straightening and reinforcement of river channels. This has led to the loss of natural channel features and habitats and has reduced the biological potential, particularly where concrete channels occur. The Lower Mole Improvement Scheme was built following the serious flooding of the River Mole and River Ember during 1968. The large flood alleviation channel was constructed during the 1970's and 1980's when environmental issues were afforded less consideration than they are now. As a result the channel, although providing a satisfactory solution in engineering terms, does not encourage natural riverine habitats to become established. Such habitats are essential for the river channel ecosystem and the river corridor.

ISSUE 26:

The flood alleviation channel of the Lower Mole Improvement Scheme has seriously damaged the river channel and river corridor.

In addition to the need to safeguard the water environment it is also the duty of the NRA to seek enhancement where appropriate. This applies not only to new development and redevelopment undertaken by others but also to the activities of the NRA itself. The opportunity to have full regard to the multifunctional role of the NRA can be exercised for example during the execution of flood defence maintenance works. NRA Thames Region have produced "Flood Defence Guidance for Conservation in Watercourse Maintenance Works" (August 1994) for use internally and as a benchmark for external contractors.

ISSUE 27:

The need to undertake flood defence maintenance works in an environmentally sensitive manner.

4.4 ECOLOGICAL STATUS

The multifunctional approach does not just have implications for the manner in which flood defence works are carried out. The balance and mix of activities at a site can increase the level of sensitive maintenance necessary. Such is the case at Leatherhead where public access to the River Mole, combined with the need to conserve the character of the area, are leading to an increase in demand for maintenance. This represents an opportunity for co-ordinated flood defence, amenity and recreation management.

ISSUE 28:

The increase in demand for maintenance at Leatherhead.

The recently restored Cobham Mill is a Grade II Listed Building. Originally constructed as a house, this 16th century timber frame building has an 18th century front. The prominence of the site and the frequent flooding of the adjacent highway require a co-ordinated approach to maintenance and landscape of the area. Cobham Mill is owned by the NRA and leased to the Cobham Mill Preservation Trust. Liaison with the Cobham Mill Preservation Trust and the Cobham Conservation Group will be an essential element of the management.

ISSUE 29:

The management of Cobham Mill and adjacent land.

There is a significant number of weirs and other water control structures within the catchment. These frequently act as barriers to fish movement and disrupt the continuity of aquatic habitats along a rivers length. Effective re-establishment of good coarse fisheries will continue to be restricted in the absence of the provision of fish passes at significant water control structures. Furthermore, impoundment's which result in degradation of rifle and pool adversely effect fisheries and invertebrates.

ISSUE 30:

The environmental impact of water control structures.

4.5 RECREATION AND AMENITY STATUS

Public access to the River Mole is limited and there are few continuous stretches of footpath or towpath adjacent to the watercourse. For the majority of visitors to the countryside the river is only seen from viewpoints such as Box Hill, Painshill and bridging points. Some of the most attractive sections of the river, for example the Upper Mole between Horley and Betchworth, have no access at all.

Within the Mole Gap a footpath winds its way down the valley between Leatherhead and West Humble but only short sections of the path abut the river. The North Downs Way and the Pilgrim's Way cross the river at the Stepping Stones at the foot of Box Hill. In the lower reaches of the River Mole between Leatherhead and Cobham, footpaths criss-cross the valley linking settlements but there is no public access along the river from Common Meadow at Leatherhead. Between Esher and the River Thames access is also restricted. Furthermore, there is no public right of way along the Lower Mole Improvement Scheme.

ISSUE 31:

The limited opportunities for public access to and along the rivers, particularly in the urban areas.

In 1664 an Act of Parliament was passed (but never executed) granting permission for the River Mole to be made navigable from the River Thames to below Reigate. Navigation currently extends from the River Thames up to Ember sluice for larger craft; at the sluice a set of rollers facilitate the onward journey of smaller craft. The main difficulties of providing navigation over a greater length of the River Mole are the extent of private ownership and the lack of public access. These difficulties also limit the opportunity for other forms of water based recreation. The NRA Recreation Strategy fully supports improving access and encouraging the safe use of open waters for recreational purposes. However, wherever such recreational uses are promoted they should take into account the ecological value of the river channel, banks and corridor.

ISSUE 32:

The limited opportunities for navigation and water based recreation on the River Mole.

4.5 RECREATION AND AMENITY STATUS

The channel and adjacent land of the Lower Mole Flood Alleviation Scheme is owned by the NRA and is largely landlocked by a variety of other institutional ownerships.

The landscape is degraded and fragmented, a lack of positive management creates an ambience of neglect and, as a result, the area suffers the full range of problems associated with the urban fringe, including vandalism and unauthorised occupation.

ISSUE 33:

Vandalism and unauthorised occupation of National Rivers Authority owned land.

The depositing of rubbish and litter on riverbanks and directly into water is an important issue especially in urban areas. Such activities not only encourage vermin but also have a significant potential impact on flooding, water quality and safety. Where the NRA are the landowners litter is removed on a routine basis. On other stretches of riverbank the responsibility lies with the riparian owner.

ISSUE 34:

The impact of rubbish and litter on the water environment.

The potential benefit of formal education as a means of promoting the importance of protecting and enhancing the local water environment is recognised by the NRA. At a national level the NRA has developed RIVERWORK, an educational resource pack about the water environment for teaching Geography at Key Stage 2 of the National Curriculum. The NRA also supports National RiverWATCH, an educational project developed by WATCH, the junior section of RSNC the Wildlife Trust Partnership, and sponsored by National Power.

ISSUE 35:

The need to promote water environment issues at a local level within the catchment, especially via formal education.

SECTION 5 DRAFT MANAGEMENT OPTIONS

CATCHMENT ISSUES AND OPTIONS

The following 35 issues have been identified as a result of information held within NRA:TR and following informal consultation with Local Authorities and other organisations. Preliminary options for resolving these issues are suggested.

ISSUE 1: Poor water quality of the Gatwick Stream downstream of Crawley STW, and the River Mole downstream of Gatwick Stream.

- Revised discharge consents and implement changes to plant.

ISSUE 2: Eutrophication due to nutrients discharged in sewage effluent.

- Designate eutrophication sensitive areas.
- Complete eutrophication study on the River Mole.
- Improve methods of identifying eutrophication.

ISSUE 3: Intermittent poor water quality downstream of Gatwick Airport.

- Monitor the ponds at Gatwick Airport which are not yet on-line.

ISSUE 4: Adverse impact on the aquatic environment of sewage derived material discharged from STWs during storm conditions.

- Upgrade/install additional screening at major STWs.

ISSUE 5: Effect of Esher Sewage Treatment Works

- Continue to evaluate the benefits of different methods of investigation.

ISSUE 6: The impact of urban storm water run-off on the river ecosystem.

- Ensure that flow balancing requirements for all new developments are designed to optimise water quality.
- Investigate the potential for substituting porous surfaces for impervious ones where appropriate.

ISSUE 7: Conflict between the request for increased access to rivers and public health considerations.

- NRA:TR and Local Authorities to inform the public of associated risks.
- Investigate the cost/benefit of improving bacteriological quality of treated sewage effluent.

ISSUE 8: The presence of blue-green algae in Priory Park Lake, Reigate.

- NRA:TR to continue to monitor on a reactive basis and inform Local Authority of bloom conditions.
- Promote the use of preventative measures.

ISSUE 9: Frequent pollution incidents cause effects on water quality and ecology.

- Carry out publicity campaign to promote awareness of the consequences of pollution.
- Undertake programme of inspections of local high risk sites and advise on pollution prevention.
- Develop and improve methods for alleviation/containment of oil/chemical spillages.

ISSUE 10: Vulnerability of groundwater to pollution.

- Promote NRA "Policy and Practice for Protection of Groundwater".
- Ensure new development/infrastructure incorporates suitable pollution mitigation measures.
- Give pollution prevention guidance on storage and handling to all users of oils/fuels/chemicals.

ISSUE 11: Potential reduction in groundwater quality in the Mickleham/Leatherhead area during low flows resulting from infiltration of poorer quality water from the River Mole.

- Investigate and determine the extent of the problem.

ISSUE 12: The need to identify the source of nitrate in the groundwater at Dorking.

- Undertake a study in conjunction with East Surrey Water Company.

ISSUE 13: The potential adverse effect on groundwater resources used for public supply resulting from extensive quarrying and landfilling in the Lower Greensand.

- Undertake investigation to determine the potential impact.

ISSUE 14: Potential impact of further development on available water resources.

- NRA:TR to inform/advise Local Authorities to ensure new development to be based on resource availability.
- East Surrey Water Company to continue the practise of leakage control.

ISSUE 15: Above the upper limits of the Mole Flood Alleviation Scheme actual Standards of Service remain to be consistently defined and compared against targets.

- Continue survey work to establish the appropriate Standard of Service.

ISSUE 16: The need to carry out Section 105 surveys for the Mole catchment.

- NRA:TR to identify priority and undertake survey work.

ISSUE 17: The potential impact of development proposals on flooding.

- NRA:TR to investigate and advise Local Authorities in respect of all proposals for new development.

ISSUE 18: The potential impact of additional development at Horley.

- NRA:TR to continue liaison with Reigate and Banstead Borough Council.
- Carry out assessment of the potential impact.

ISSUE 19: The need to evaluate the efficacy of the Burstow Improvement Scheme.

- NRA:TR to undertake an investigation.

ISSUE 20: The difficulty of promoting flood alleviation for properties currently receiving an unacceptable level of service.

- Continue monitoring the level of flood risk in relation to the opportunities to improve the level of service.

ISSUE 21: The ecological status of the rivers cannot be assessed by one method in isolation.

- Continue to conduct intensive surveys on an integrated basis to provide comprehensive chemical and biological data.

ISSUE 22: The need to protect important in-stream and river corridor habitats.

- Continue to monitor existing known important habitats.
- Undertake studies to evaluate and identify other areas of important habitat.

ISSUE 23: The need to secure appropriate conservation, enhancement and restoration of key riverine landscapes as identified in the landscape assessment.

- Implement the recommendations set out in the "River Mole Catchment Landscape Assessment".

ISSUE 24: The degradation of natural habitats.

- Undertake appropriate enhancement works.

ISSUE 25: The need to safeguard Reigate Heath SSSI.

- NRA:TR to prepare a Water Level Management Plan for the site.

ISSUE 26: The flood alleviation channel of the Lower Mole Improvement Scheme has seriously damaged the river channel and river corridor.

- Review existing management programme.
- Investigate opportunities for enhancement.

ISSUE 27: The need to undertake flood defence maintenance works in an environmentally sensitive manner.

- Promote maintenance guidelines.
- Promote NRA:TR staff training and awareness.

ISSUE 28: The increased demand for maintenance at Leatherhead.

- NRA:TR to co-ordinate flood defence, landscape, conservation and recreation management.

ISSUE 29: The management of Cobham Mill and adjacent land.

- NRA:TR to liaise with the Cobham Mill Preservation Trust and the Cobham Conservation Group to determine the management programme.

ISSUE 30: The environmental impact of water control structures.

- Fish passes should be built into existing structures when the opportunity arises.

ISSUE 31: The limited opportunity for public access to and along the rivers, particularly in the urban areas.

- Promote increased access particularly in the case of proposed development and redevelopment.

ISSUE 32: The limited opportunities for navigation and water based recreation on the River Mole.

- Investigate the opportunities for increased navigation and water based recreation.

ISSUE 33: Vandalism and unauthorised occupation of National Rivers Authority owned land.

- Prepare and implement an appropriate Management Plan for NRA:TR owned land.

ISSUE 34: The impact of rubbish and litter on the water environment.

- Promote co-ordinated anti-litter and tidy river campaigns.
- Promote local pride and the concept of public ownership of the water environment.
- NRA:TR to liaise with riparian owners.

ISSUE 35: The need to promote water environment issues at a local level within the catchment, especially via formal education.

- Promote NRA RIVERWORK teaching pack and National RiverWATCH scheme.
- Develop ecological "indicators" for the water environment with interested parties and adopt for use with local schools.
- Seek inclusion of appropriate policies in statutory development plans.

APPENDICES

APPENDIX I - NRA RESPONSIBILITIES, AIMS & OBJECTIVES

INTRODUCTION

The supply of water for domestic consumption and industrial use is not the responsibility of the NRA but of **water and sewerage undertakers**. The prices charged by these private companies are regulated by the **Office of Water Services**. The quality of water supplied for consumption is monitored by the **Drinking Water Inspectorate** and **District or Borough Councils**.

The disposal of sewage effluent is the responsibility of **water and sewerage undertakers**. Their discharges are subject to control by the NRA. Potentially significant industrial discharges to the water environment are controlled by **Her Majesty's Inspectorate of Pollution**.

The NRA has the primary responsibility for flood defence and land drainage matters but on "ordinary watercourses" the responsible land drainage and flood defence agency is the **District or Borough Councils** may also manage on behalf of **water and sewerage undertakers** surface water drains leading to rivers and watercourses.

The responsibilities of the above organisations are described further below. The activities of the NRA are then described in detail.

WATER AND SEWERAGE UNDERTAKERS

These private companies are responsible for providing water supplies and the management of sewage treatment works. Thames Water Utilities, Sutton District Water Company and Eastern District Company all provide services to the catchment area.

HER MAJESTY'S INSPECTORATE OF POLLUTION (HMIP)

HMIP is the regulatory authority for Integrated Pollution Control. This is a system introduced to control pollution from industrial processes which could cause significant pollution to air, land and water. Discharges from sewage treatment works and other discharges to water are regulated by the NRA.

DRINKING WATER INSPECTORATE (DWI)

The DWI is responsible for checking that companies supplying drinking water carry out proper monitoring and meet the regulations for the quality of water supplies set in part by the European Community Drinking Water Directive.

OFFICE OF WATER SERVICES (OFWAT)

A government agency responsible for making sure that the water and sewerage undertakers provide customers with a good quality and efficient service at a fair price.

APPENDIX I - NRA RESPONSIBILITIES, AIMS & OBJECTIVES

DISTRICT AND BOROUGH AUTHORITIES

These authorities monitor the quality of all water supplies, including private supplies, within their area. They can require improvements to be made to private water supplies.

Watercourses which have not been statutorily designated as "main river" on maps held by the NRA and Ministry of Agriculture, Fisheries and Food (MAFF) are known as "ordinary watercourses". The provision of flood defence and land drainage services on these watercourses is the responsibility of the relevant council (see p...).

NATIONAL RIVERS AUTHORITY (NRA)

AIMS

- *To achieve a continuing overall improvement in the quality of rivers, estuaries, and coastal waters, through the control of pollution.*
- *To manage water resources to achieve the right balance between the needs of the environment and those of the abstractors.*
- *To provide effective defence for people and property against flooding from rivers and the sea.*
- *To provide adequate arrangements for flood forecasting and warning.*
- *To maintain, improve and develop fisheries.*
- *To develop the amenity and recreational potential of inland and coastal waters and associated lands.*
- *To conserve and enhance wildlife, landscape, and archaeological features associated with inland and coastal waters of England and Wales.*
- *To improve and maintain inland waters and their facilities for use by the public where the NRA is the navigation authority.*
- *To ensure that discharges pay the costs of the consequences of their discharges, and, as far as possible, recover the costs of water environment improvements from those who benefit.*
- *To improve public understanding of the water environment and the NRA's work.*

APPENDIX 1 - NRA RESPONSIBILITIES, AIMS & OBJECTIVES

- *To improve efficiency in the exercise of the NRA's functions and to provide challenge and opportunity for employees and show concern for their welfare.*

STRATEGIC OBJECTIVES

Water Resources

It is the NRA's responsibility to assess, manage, plan and conserve water resources. The Water Resources Act 1991 describes the duty of the NRA to be to ensure measures are taken towards conservation, redistribution, augmentation and proper use of water resources. The Act requires the NRA to make arrangements with water and sewerage undertakers and statutory water companies for securing proper management and operation of water resources and associated works. To effect these requirements the NRA controls abstractions by a licensing system and has the power, if necessary, to issue drought orders and designate water protection zones and nitrate sensitive areas.

Under the Water Resources Act 1991 all abstractions require a licence except for those of less than 20 cubic metres a day for domestic or agricultural use from surface water and those of less than 20 cubic metres per day for domestic use. There are also other exceptions for small abstractions from boreholes and springs. Charges for abstraction licences are based upon quantity, source, season and loss.

To secure proper management of water resources the NRA operates a hydrometric network of rainfall and river flow gauging stations. These not only provide data for water resource assessment but also for flood prediction, impact of effluent discharges, fisheries management, conservation and recreational uses.

Our Strategic Objectives are:

- To plan for the sustainable development of water resources, developing criteria to assess reasonable needs of abstractors and of the environment.
- To collect, validate, store and provide hydrometric data and water environmental data in order to assess water resources.
- To apply a nationally consistent approach to abstraction licensing, including licence determination, charging, policing and enforcement.
- To implement a consistent approach to the resolution of inherited problems caused by authorised over-abstraction.
- To work with other functions and external bodies to protect the quality of our water resources.

APPENDIX I - NRA RESPONSIBILITIES, AIMS & OBJECTIVES

Water Quality

The aim of the NRA is to maintain and improve the quality of rivers, estuaries, coastal waters and groundwater through the control of water pollution. These aims are fulfilled via:

- water quality management;
- effluent quality regulation;
- pollution incident investigation; and,
- pollution prevention

Water quality management is based principally on monitoring of the environment to establish chemical, biological and microbiological quality. These data are used by the NRA to detect trends, plan improvements and execute its statutory duties regarding the setting of discharge parameters and compliance with EC directives.

The NRA controls inputs into the environment via the issue of consents. Discharges from industrial, agricultural, domestic and sewage related sources are regulated by specification of effluent quality limits and conditions which the discharger must achieve. Such discharges are routinely monitored and failure to satisfy consent conditions may lead to legal action being taken.

The NRA makes an immediate response to all reports of pollution. During a pollution incident investigation actions are taken to identify the source, stop the discharge, minimise adverse effects and ensure remedial work where appropriate is completed. Legal action is considered in cases of serious and/or repeated incidents.

Pollution prevention via development control and advice on best practice to industry, farmers, water supply and sewage companies is carried out in support of water quality management to prevent deterioration of the water environment.

Our Strategic Objectives are:

- . To maintain waters that are already of high quality.
- . To improve waters of poorer quality.
- . To ensure all waters are of an appropriate quality for their agreed uses.
- . To prosecute polluters and recover the costs of restoration from them.
- . To devise charging regimes that allocate the costs of maintaining and improving water quality fairly and provide incentive to reduce pollution.

APPENDIX I - ORGANISATIONAL RESPONSIBILITIES AND NRA AIMS & OBJECTIVES

Conservation

Conservation activities of the NRA aim to:

- conserve and enhance the wildlife, landscapes and archaeological features associated with inland and coastal waters; and,
- promote the conservation of aquatic flora and fauna.

The statutory duties under the 1991 Water Resources Act further state that the NRA shall further the conservation and enhancement of natural beauty in respect of proposals relating to NRA functions, protect sites of conservation interest and take into account the effects that any proposals would have. This is achieved through regulating the work of others through the land use planning consultation process and the issuing of consents under the Land Drainage Act 1991 and Water Resources Act 1991 for works adjacent to rivers. The NRA also carries out a programme of conservation works using its own workforce, in addition to assessing the conservation implications of other functional activities.

Our Strategic Objectives are:

- Assess and monitor the conservation status of inland and coastal waters and associated lands.
- Ensure that the NRA's regulatory, operational and advisory activities take full account of the need to sustain and further conservation.
- Promote conservation to enhance the quality of the aquatic and related environment for the benefit of wildlife and people.

Recreation

The NRA has statutory duties to:

- develop the amenity and recreational potential of waters and land owned by it; and,
- promote water recreation on all inland and coastal waters generally within its aims of environmental guardianship and improvement.

Recreation and amenity includes provision for opportunities and facilities for sports associated with water and the surrounding land, passive activities around water including public access and rights of way and the general aesthetic quality of the water environment.

These duties are identified in the 1991 Water Resources Act in addition to a Code of Practice which gives guidance on the kinds of provision required and the need to consider collaborative management with other bodies.

APPENDIX I - ORGANISATION RESPONSIBILITIES AND NRA AIMS & OBJECTIVES

In addition to these recreation and amenity considerations the NRA, where it is the authority, has responsibilities towards the maintenance and improvement of waterways for navigation.

Our Strategic Objectives are:

- Maintain, develop and improve recreational use of NRA sites.
- To take account of recreation in proposals relating to any NRA function.
- Promote the use of water and associated land for recreational purposes.

Fisheries

The general fisheries duties of the NRA are set out in the Water Resources Act 1991. Under this Act the NRA is responsible for the regulation of fisheries through the application of orders, byelaws and licensing systems.

An essential feature of the Water Resources Act 1991 is the statutory duty placed on the NRA to "maintain, improve and develop fisheries". The term "fisheries" encompasses both sport fisheries and commercial fisheries, however the Act extends further to effectively cover all inland waters, other than fish farms, which are regulated by the Ministry of Agriculture, Fisheries and Food, which have the capacity to support fish. Sport fisheries include waters such as rivers, streams, canals, lakes, ponds and reservoirs.

To discharge its statutory duties the NRA undertakes a wide range of fish surveillance and monitoring activities. Fish populations are biological indicators of changes in river flow, quality and habitat. The regulation of fish introductions and fish capture are important activities.

The costs of the fisheries service are met, in part, by funds raised from rod licences.

Strategic Objectives:

- Protect and conserve salmon, trout, freshwater, eel and, where appropriate, coastal fisheries.
- Regulate fisheries through the enforcement of a consistent series of licences, orders, byelaws and consents.
- Monitor the fisheries status of rivers and inland estuaries and, where appropriate, coastal waters.
- Formulate policies to maintain, improve and develop fisheries and restore and rehabilitate damaged fisheries.
- Provide an efficient and effective fisheries service which is responsive to the needs of its customers and which is based on a sound charging system.

APPENDIX I - ORGANISATION RESPONSIBILITIES AND NRA AIMS & OBJECTIVES

Flood Defence

The NRA has powers to:

- protect people and property against flooding from rivers and the sea;
- provide a means for the drainage of land; and,
- provide adequate arrangements for flood forecasting and warning.

Certain watercourses are designated as "main river". On main rivers the NRA have permissive powers to: construct new defences; maintain defences; and, control the actions of others so that the risk to existing and future uses (e.g. development) can be minimised. The NRA are the primary group involved in flood defence matters but on ordinary rivers District or Borough Councils are the first point of contact.

The standard of flood protection can be measured in terms of the frequency at which (e.g. 1 in 50 years), on average, it will prove ineffective. The standards considered appropriate vary according to the land use to be protected and the economics of providing the service.

These activities are undertaken under the 1991 Water Resources Act and are directed by the Regional Flood Defence Committee. In addition to works on statutory main river, the NRA also has powers to control weirs and culverts on ordinary watercourses that would otherwise affect the flow.

Our Strategic Objectives are:

To develop and implement our flood defence strategy through a systematic approach for assessing capital and maintenance requirements and develop medium and long-term plans for those defences owned and maintained by the NRA.

To encourage development of information technology and extension of facilities which will further improve the procedures for warning of, and responding to, emergencies.

To support R&D which will assist in identifying future flood defence needs.

To review best practices for all operational methods, and the identification and justification of work, thus increasing efficiency and enhancing value for money.

To heighten general awareness of the need to control development in flood plains and contribute to the development of catchment management plans.

To identify opportunities for the enhancement of environmental, recreational and amenity facilities when undertaking flood defence works.

APPENDIX I - ORGANISATION RESPONSIBILITIES AND NRA AIMS & OBJECTIVES

Navigation

Our future strategy is to take a lead in working with other navigation authorities to bring about a more consistent approach to the administration of navigation in inland waters than currently exists in England and Wales, and to facilitate and regulate the use of those inland navigations for which the NRA is navigation authority or has powers, and to manage the inter-relationship of navigation with other core functions of the NRA.

Our Strategic Objectives are:

- Contribute to the development of an overall navigation strategy for England and Wales.
- Regulate NRA navigations through the enforcement of a consistent series of licences, orders, byelaws and statutes.
- Maintain and improve NRA navigation fairway, facilities and standards.
- Recover from users the costs of providing specific navigation facilities and a reasonable proportion of the costs of maintaining the navigation.

Land Use Planning

The NRA is a statutory consultee of the land use planning system and seeks to ensure that local authorities take into account the needs of the water environment when preparing development plans and determining planning applications.

A close working relationship is required with both County, District and Borough Councils on mineral workings, waste disposal issues, infrastructure works, works within river corridors or floodplain, and any activities likely to pollute surface or groundwaters or increase the demand for water resources.

Guidance notes for local planning authorities on the methods of protecting the water environment through development plans have been produced (September 1993), and these are being promoted in conjunction with the initiative to prepare Catchment Management Plans.

Summary

Further details on the work of the NRA can be found in a series of NRA strategy documents covering: water quality; water resources; flood defence; fisheries; conservation; navigation; recreation; and, research and development. These documents are available from the NRA Corporate Planning section at our head office in Bristol.

APPENDIX II - REPORT ON INFORMAL LIAISON

Between May and August 1995 NRA/TR wrote to organisations and individuals with an interest in the Mole catchment. As a result of this exercise a comprehensive consultation list has been drawn up (see Appendix VI). In addition to consulting by letter, informal meetings were held with Local Authorities within the catchment and a number of Government Departments, statutory bodies and other interest groups.

The purpose of this informal external consultation was to secure relevant information and an appreciation of the issues of concern relating to the water environment. This period of informal consultation was not a substitute for the planned period of formal consultation. The issues and concerns ranged widely and in general terms the results are shown below.

The results can only represent a general interpretation of the comments received. This is because many of the concerns expressed have implications for more than one category.

Between May and August 1995 NRA/TR wrote to 160 organisations and individuals.	
CATEGORY	% WRITTEN RESPONSE
CONSERVATION	20
WATER QUALITY	18
RECREATION AND AMENITY	17
LANDSCAPE	14
FLOOD DEFENCE	10
FISHERIES	11
WATER RESOURCES	8
MINERALS AND WASTE	2

The most common concerns centred on the need to conserve the local water environment for recreation, amenity and education. However, concerns were raised over health and safety risks associated with bacteriological loadings in the surface waters and increased public access. Many comments were received regarding water quality in general and the impact flora and fauna. The Lower Mole Flood Alleviation Scheme came in for criticism due to degradation of the natural habitat.

APPENDIX III - SUPPORTING INFORMATION

POLLUTION INCIDENT CATEGORIES

MAJOR

A major incident involving one or more of the following:

- a) potential or actual persistent effect on water quality or aquatic life;
- b) closure of potable water, industrial or agricultural abstraction necessary;
- c) extensive fish kill;
- d) excessive breaches of consent conditions;
- e) extensive remedial measures necessary;
- f) major effect on amenity value.

SIGNIFICANT

- a) notification to abstractors necessary;
- b) significant fish kill;
- c) measurable effect on invertebrate life;
- d) water unfit for stock;
- e) bed of watercourse contaminated;
- f) amenity value to the public, owners or users reduced by odour or appearance;
- g) breach of consent conditions

MINOR

Minor suspected or probable pollution which, on investigation, proves unlikely to be capable of substantiation or to have no notable effect.

APPENDIX III - SUPPORTING INFORMATION

RIVER ECOSYSTEM CLASSIFICATION: WATER CRITERIA

Class	Dissolved Oxygen % saturation 10 percentile	BOD (ATU) mg/l 90 percentile	Total Ammonia mg N/l 90 percentile	Un-ionised Ammonia mg N/l 95 percentile	pH lower limit as percentile; upper limit as percentile	Hardness mg/l Ca CO ₃	Dissolved Copper pg/l 95 percentile	Total Zinc pg/l 95 percentile
RE	80	2.5	0.25	0.021	6.0 - 9.0	10 > 10 and 50 > 50 and 100 > 100	5 22 40 112	30 200 300 500
RE	70	4.0	0.6	0.021	6.0 - 9.0	10 > 10 and 50 > 50 and 100 > 100	5 22 40 112	30 200 300 500
RE	60	6.0	1.3	0.021	6.0 - 9.0	10 > 10 and 50 > 50 and 100 > 100	5 22 40 112	300 700 1000 2000
RE	50	8.0	2.5	-	6.0 - 9.0	10 > 10 and 50 > 50 and 100 > 100	5 22 40 112	300 700 1000 2000
RE	20	15.0	9.0	-	-	-	-	-

GQA CHEMICAL GRADING FOR RIVERS AND CANALS

Water Quality	Grade	Dissolved Oxygen	Biochemical Oxygen Demand (ATU ¹)	Ammonia
		(% saturation) 10 percentile	(mg/l) 90 percentile	mgH/l) 90 percentile
Good	A	80	2.5	0.25
Fair	B	70	4	0.6
	C	60	6	1.3
Poor	D	50	8	2.5
	E	20	15	9.0
Bad	F ²	-	-	-

¹ as suppressed by adding allyl thio-urea

² ie quality which does not meet the requirements of grade E in respect of one or more determinands

APPENDIX III - SUPPORTING INFORMATION

STANDARDS OF SERVICE FOR FLOOD DEFENCE AND LAND DRAINAGE

Land Use Band	Description of Typical Land Use	Target Standards of Service
A	A reach containing the urban elements of residential and non-residential property distributed over a significant proportion of its length, or densely populated areas over some of its length. Any agricultural influence is likely to be over-ridden by urban interests. Amenity uses such as parks and sports fields may be prominent in view of the floodplain's proximity to areas of population density.	These heavily built-up areas should be protected to a standard such that the risk of flooding in any one year is no greater than 1 in 50. In some areas higher standards may be applied.
B	Reaches containing residential and/or non-residential property either distributed over the full length of the reach or concentrated in parts but characterised by lower densities than Band A.	Buildings should be protected to a standard such that the risk of flooding in any one year is between 1 in 20 and 1 in 50. However, agricultural or amenity land found in these areas should remain susceptible to regular flooding.
C	Limited numbers of isolated rural communities or urban fringe at risk from flooding, including both residential and commercial interests. Intensive agricultural use could also be included.	The chance of flooding in property in any one year would be between 1 in 10 and 1 in 50 years. Agricultural or amenity land, however, could be susceptible to more regular flooding.
D	Isolated, but limited number of residential and commercial properties at risk from flooding. Agricultural use will probably be the main customer interest with arable farming being a feature. In undeveloped pockets of largely urban use, amenity interests may be prominent.	Agriculture and amenity land in this band should be protected to a standard such that the chance of flooding or prolonged bankfull events in any one year, at a time when crops are normally susceptible to damage (i.e. March to October inclusive), is between 1 in 2 and 1 in 5.
E	There are likely to be very properties and major roads at risk from flooding in this reaches. Agricultural use will be the main customer interest with either extensive grassland or, where the flood plain extent is small, arable cropping being the most common land uses. Amenity interests are likely to be limited to public footpaths along or across the river.	Agricultural land in this category could be susceptible to yearly waterlogging and/or flooding, possibly occurring on several occasions throughout the year. Protection should be maintained to a standard which reduces the risk of either type of event to between one and three times per year at a time when crops are normally susceptible to damage.

APPENDIX IV -

ABBREVIATIONS

AC	-	Angling Club
AMP	-	Asset Management Plan
AOD	-	Above Ordnance Datum
AONB	-	Area of Outstanding Natural Beauty
AGLV	-	Area of Great Landscape Value
ASPT	-	Average Species Per Taxa
BFI	-	Base Flow Index
BMWP	-	Biological Monitoring Working Party
BOD	-	Biochemical Oxygen Demand
CMP	-	Catchment Management Plan
DoE	-	Department of the Environment
DO	-	Dissolved Oxygen
DWI	-	Drinking Water Inspectorate
EC	-	European Commission
EQI	-	Environmental Quality Index
EQS	-	Environmental Quality Standard
GIS	-	Geographical Information System
GQA	-	General Quality Assessment
HE	-	House Equivalent
HMIP	-	Her Majesty's Inspectorate of Pollution
LA	-	Local Authority
LNR	-	Local Nature Reserve
MAFF	-	Ministry of Agriculture, Fisheries and Food
MLUP	-	Model Land Use Policy
NRA	-	National Rivers Authority
NRA:TR	-	National Rivers Authority Thames Region
NWC	-	National Water Council
OFWAT	-	Office of Water Services
RE	-	River Ecosystem
SAM	-	Scheduled Ancient Monument
SCC	-	Surrey County Council
SOS	-	Standard of Service
SPR	-	Standard Percentage Run-off
SSSI	-	Site of Special Scientific Interest
STW	-	Sewage Treatment Works
WSCC	-	West Sussex County Council
WQO	-	Statutory Water Quality Objective
TWUL	-	Thames Water Utilities Limited
WLMP	-	Water Level Management Plan

APPENDIX V

GLOSSARY

Aquifer.	A water bearing reservoir rock, such as a particular formation or strata.
Biomass.	Total quantity or weight of organisms in a given area or volume.
BOD.	A standard test measuring the microbial uptake of oxygen; a measure of organic pollution.
Controlled Water.	Definition under the Water Resources Act - natural waters which are not isolated.
Cyprinid.	A group of fish of the carp family.
Ecosystem.	A biological community of interacting organisms and their physical environment.
Fauna.	Animals.
Flora.	Plants.
Macroinvertebrate.	Large invertebrate animals such as insects, worms and snails.
Macrophytes.	Large plants. In the water environment e.g. reeds.
Photosynthesis.	Production of carbohydrate from carbon dioxide and water by plants during daylight.
Potable.	Drinkable.
Riparian.	Situated on the bank of a river or relating to the legal rights of the landowner on a river bank.
Taxa.	Groups of similarly classified animals and plants.
Weir.	A low dam across a river.

A.D.A.S.

Abinger Hall Estate Co
Abinger Parish Council
Allen Road Association
Ancient Monument Society
Ashted Residents Association
Association of Surrey Chambers
Association of Neighbourhood Councils
Association of British Chambers of Commerce
Association of District Councils
Balcombe Parish Council
Beare Green Community Association
Betchwood & Buckland Society
Betchwood Parish Council
Bewbush Branch Labour Party
Bletchingley Parish Council
Bolney Parish Council
Bookham Community Association
Bookham Residents Association
Bookham Sports Association
Box Hill Management Committee
Box Hill Neighbourhood Council
Brighter Ashstead Group
British Gas Transco
British Gas PLC (Southern)
British Herpetological Society
British Trust for Ornithology
British Trust for Conservation Volunteers
British Telecom PLC
British Pipeline Agency
British Horse Society
British Gas South Eastern
British Aggregate Construction Materials Industries
~~British Canoe Union~~
British Airports Authority Angling Club
British Airports Authority PLC
Brockham Green Village Society
Brockham Parish Council
Brockham Angling Society
Buckland Parish Council
Burnham Road Residents' Association
Burstow Parish Council
Byways & Bridleways Trust
CALPAC
Camping & Caravan Club
Felpham Parish Council

Carshalton and District Angling Society
Castle Gardens Residents' Association
Central Association of London & Provincial Angling Clubs
Chalkpit Terrace Residents' Association
Charlwood Parish Council
Charlwood Society
Chart Resident's Association
Civic Trust
Civil Aviation Authority
Cleeve Road Residents's Association
Cobham Conservation Group
Cobham Court Angling Society
Cobham Mill Preservation Trust
Cobham Residents Association
Cobham Court Anglers
Colgate Parish Council
Commission for the New Towns
Common Ground
Commons, Footpaths & Open Spaces Society
Confederation of British Industry
Conservation Area Advisory Committee
Council for British Archaeology
Council for the Protection Of Rural England
Council for Sport and Recreation
Country Landowners Association
Countryside Management Project
Countryside Commission
County Fire Headquarters
Crawley Angling Society
Crawley Borough Council
Crawley Conservation Volunteers
Crawley Museum Society
Crawley Model Boat Club
Crawley Social Democratic Party
Crawley Sports Council
Crawley Mariners Yacht Club
Crawley Liberal Democrats
Crawley Greenpeace
Crawley Conservative Association
Crawley Constituency Labour Party
Crawley Constituency Liberal Democrats
Crawley Fly Fishers
Crawley Windsurfing Club & School
Crown Estate Commissioners
Cycling Touring Club
Deepdene Avenue Residents' Association
Department of Energy
Department of National Heritage
Dorking & District Preservation Society

Dorking & District Chamber of Commerce
Dorking Sports Council
Dorking Fishing Club
Dorking Angling Society
Downlands Countryside Management Project
East Surrey Health Authority
East Horsley Parish Council
East Surrey Water Company
Eastern Surrey Health Commission
Effingham Residents & Ratepayers Association
Effingham Parish Council
Elmbridge Borough Council
Energy Technology Support Unit
English Golf Union
English Nature
English Heritage
English Tourist Board
English Partnerships
Epsom & Ewell Borough Council
Epsom Health Care Trust
Epsom Angling Club
F.W.A.G.
Farm Close Residents Association
Faulkners Angling Society
Federation of Sussex Amenity Societies
Felbridge Parish Council
Feltham P.S.
Fetcham Residents Association
Forestry Commission
Forestry Authority Hampshire & West Downs Conservancy
Friends of Box Hill Association
Friends of Severell Copse
Friends of the Earth
Furnace Green Branch Crawley, Conservatives
Furnace Green Branch, Labour Party
Garden History Society
Gatwick Airport Ltd
Gatwick Airport Consultative Committee
Glenwood Association
Godstone Parish Council
Goodwyns Community Association
Gossops Green Labour Party
Government Office for the South East
Green Forum
Greenpeace
Groundwork Foundation
Grove Projects
Guildford Borough Council
H.M.I.P.

Hampshire County Council
Headley Parish Council
Highways Agency
Holloway Estate Residents Association
Holmbury and St Mary Village Association
Holmwood Residents Association
Holmwood Parish Council
Hookwood Residents Association
Horley P.S.
Horley Residents' Association
Horley Chamber of Commerce
Horley Town Council
Horne Parish Council
Horsham District Council
Horsham Area Social Democratic Party
Horsham & Crawley Health Trust
Horsham Natural History Society
Horsley Countryside Preservation Society
House Builders Federation
Housing Corporation London and the Home Counties
Ifield Labour Party
Ifield Village Conservation Area Advisory Committee
Kingston Rodbenders Angling Group
Kingston upon Thames Society
Kingston University
Kingston Working Men's Angling Society
Kingston Centre for Environmental Awareness
Kingston Museum & Heritage Service
Langley Green Branch, Labour Party
Leatherhead & District Angling Society
Leatherhead Council of Sport
Leatherhead & District Chamber of Trade and Commerce
Leatherhead Society
Leatherhead & District Countryside Protection Society
Leatherhead, Fetcham & Bookham Labour Party
Leatherhead Community Association
Leigh Parish Council
Leigh Residents Association
Liberal Democrats
Linden Court Residents Association
Linking Environment & Farming
London Wildlife Trust
London Borough of Richmond Upon Thames
London Ecology Unit
London Green Belt Council
London Planning Advisory Committee
Lower Mole Countryside Management Project
Martineau Drive Residents' Association
Mercury Communication Ltd

Mickleham Parish Council
Mid Surrey Regional Health Authority
Mid Sussex Water Co
Mid Sussex District Council
Mid-Downs Health Authority
Ministry of Agriculture, Fisheries & Food
Ministry of Defence
Mole Valley Branch of Surrey Society
Mole Valley District Council
Mole Valley Cyclists Action Group
Mole Valley Conservative Association
Mole Valley Geological Society
Mole Valley Friends of the Earth
Mole Valley Conservation Volunteers ,
Monkhouse & Partners
Mr A. S. Hepworth
Mr. L Matthews
Ms Joan Meecham
N.A.C. Rural Trust
National Playing Fields Association
National Grid Company PLC
National Trust
National Power PLC
National Federation of Anglers
National Farmers Union
National Association of Fisheries & Angling Consultatives
Nature Watch
Network South Central
Newdigate Society
Newdigate Parish Council
North Leatherhead Community Association
North Surrey Water Ltd
North West Brockham Residents Association
Nutfield & Merstam Pond Restoration Group
Nymans Gardens, National Trust
Ockham Parish Council
Ockley Society
Open Spaces Society
~~Painshill-Park Trust Ltd~~
Park and Park View Protection Association
Plant Life
Pond Place Residents Association
Pound Hill Branch Labour Party
Pound Hill Conservatives
Pound Hill South Conservatives
Property Services Agency
R.P.S.Clouston
R.S.P.B.
Railtrack

RailTrack Property
Ramblers Association
Raynes Park C & U.C. Angling Club
Regeneration, Housing and Environment Directorate
Reigate Society
Reigate College
Reigate & Banstead Archaeological Co-ordinating Committee
Reigate & Banstead Sports Council
Reigate and Banstead Borough Council
Reigate Area Conservation Volunteers
Reigate and District Angling Society
Reigate & Redhill Y.M.C.A. Angling Club
Reigate, Redhill and District Chamber of Commerce
River Mole Action Group
River Thames Society
River Mole Preservation Association
Round Table
Royal Borough of Kingston upon Thames
Royal Botanic Gardens
Royal Town Planning Institute
Runnymede Borough Council
Rural Development Commission
Rural Housing Trust
Rusper Parish Council
Rusper Residents Association
Rusper Residents Group
Salfords and Sidlow Parish Council
Salmon & Trout Association
Sand and Gravel Association
Seaboard
SEGAS
SERPLAN
Slaugham Angling Club
Slaugham Parish Council
Slaugham Society
Small Business Federation Surrey & West
Soroptimists' International G.B.I.
South East Council for Sports & Recreation
South East England Tourist Board
South East Waste Regulation Advisory Committee
South East Water Company
South East Thames Fisheries Consultative Council
South West Regional Health Authority
South Terrace Residents' Association
Southern Water Services PLC
Southgate Branch Labour Party
Spelthorne Borough Council
St Pauls Road Residents' Association
Sunmead Angling Society

Surrey Archaeological Society
Surrey Bird Club
Surrey County Council
Surrey County Association of Parish & Town Councils
Surrey County Playing Fields Association
Surrey Fire & Rescue Service
Surrey First
Surrey Golf Union
Surrey Flora Committee
Surrey Local History Council
Surrey Police
Surrey Record Office
Surrey Society
Surrey Training & Enterprise Council
Surrey Voluntary Services Council
Surrey Wildlife Trust
Sussex Archaeological Society
Sussex Botanical Recording Society
Sussex Chamber of Commerce & Industry
Sussex Downs Conservation Board
Sussex Federation of Amenity Societies
Sussex Police Management Services
Sussex Wildlife Trust
Tandridge District Council
Thames Angling Preservation Society
Thames Water Utilities
Three Bridges/Northgate Branch, Labour Party
Tower Hill Residents' Association
Training & Enterprise Council
Turners Hill Parish Council
Tyrrells Wood Estate Association
Upper Deepdene Park Road Residents Association
Walton-on-Thames Angling Society
Warlingham & District Anglers' Society
Waverley Borough Council
West Sussex County Council
West Sussex Assn. for the Disabled
West Green Branch Labour Party
Westcott Village Association
Westhumble Residents Association
Westwood Village Association
Wildfowl and Wetlands Trust
Wildlife Aid
Woking Borough Council
Wooten Parish Council
World Wide Fund For Nature
Worth Conservation Area Advisory Committee
Worth Horsham Parish Council
Worth Parish Council