

THE WANDLE, BEVERLEY BROOK, HOGSMILL CATCHMENT MANAGEMENT PLAN CONSULTATION REPORT

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NRA

*National Rivers Authority
Thames Region
November 1994*

WANDLE, BEVERLEY BROOK, HOGSMILL CATCHMENT MANAGEMENT PLAN
CONSULTATION REPORT
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ACKNOWLEDGEMENTS

All those organisations, groups and individuals who responded to the NRA TR during the period of informal consultation.

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 :

Wandle, Beverley Brook, Hogsmill CMP,
National Rivers Authority Thames Region,
Riverside Works,
Fordbridge Road,
Sunbury-on-Thames,
Middlesex TW16 6AP.
Tel : 01932 789833.

Price : £25 per copy (inc. postage & packing).

DRAFT CATCHMENT VISION.

The Draft Vision for this Catchment Management Plan is founded on the integration of three principal components. Their successful combination will enable conflicting demands on the River Wandle, Beverley Brook and Hogsmill River catchment to be balanced and pass it on to future generations in an improved condition.



Community involvement is the cornerstone of this approach to managing the local water environment not only by raising awareness of the issues but also by promoting active participation in environmental enhancements. Greater community awareness of the issues will bring with it more responsible citizenship as water users become more aware of their rights and duties in respect of the local water environment. Environmental sustainability embodies this concept of stewardship and involves seeking consensus on decisions regarding future development but only after full consideration of its effects on the water environment. To further ensure that the needs of the present community can be met without compromising the ability of future generations to achieve their own needs, adaptive management is built into the catchment planning process to cope with changes in political, economic and physical processes.

SECTION 1 MANAGING THE WATER ENVIRONMENT

1. MANAGING 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 highly 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 abstraction 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 the 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 health of the water environment within the River Wandle, Beverley Brook and Hogsmill River catchment. Situated to the south of London the catchment area covered by this plan is shown on the map opposite.

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 and pollution control, flood defences, fisheries, recreation, conservation and navigation.

There is now the strongest indication that the **Environmental Agency** will come into being during 1996 drawing together the responsibilities of the NRA, Her Majesty's Inspectorate of Pollution (HMIP) and certain waste disposal responsibilities. The NRA is currently finalising its response on the boundaries and possible management structures for the Agency centred on an integrated basis based on Regions and Areas following environmental boundaries ie. river catchments. This has been emphasised by The Secretary of State for the Environment, John Gummer, who said of the Agency on the 14th of October 1994, "It will, first of all need to take an integrated approach to providing effective environmental protection: integrated to take account of impacts on air, water and land and integrated geographically so that interconnected systems such as river catchments are considered as a whole." The NRA currently anticipate that the Catchment Management Planning process will play an important role within Environmental Agency.

The NRA have placed particular emphasis on planning for environmental sustainability and through an integrated approach to river catchment management. Inherent to the success of this approach is the need to work closely with local communities, industry, landowners, interest groups and other agencies whose activities and interests interact with the water environment.

1. MANAGING THE WATER ENVIRONMENT

Environmental sustainability in terms of river catchment management means that development needs are met without compromising the capacity of future generations to meet their needs. This is an approach that has been backed by the Rio Earth Summit, European Union and the UK Government. This is demonstrated by the following statement from Agenda 21 (Rio Earth Summit). "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 resources planning with land use planning and other development and conservation activities, demand management through pricing or regulation, conservation, reuse and recycling of water."

This theme has been adopted by the UK Government and is reflected in part by Planning Policy Guidance Note 12 'Development Plans and Regional Guidance' states that "the government has made clear its intention to work towards ensuring that development and growth are sustainable". The recently published UK Strategy for Sustainable Development sets out the Government's position in more detail:

- promote attractive and convenient urban areas, in which people will want to live and work;
- encourage the regeneration of urban areas and buildings;
- promote an understanding of sustainable development among all those who have an interest in the development process.

A strategy for river catchment management based on environmental sustainability needs to make clear that:

- sustainability is not purely about environmental matters alone;
- sustainability is not about 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 of future generations.

To achieve sustainability the consultation on this report needs to :

- recognise that non sustainability relates to present day change brought about by current activities which are impossible, difficult, slow or costly to reverse;
- acknowledge that changes can have a ripple effect stretching from the local area to 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;

1. MANAGING THE WATER ENVIRONMENT

- 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 unsustainable practices within the catchment.

The most important change in the future management of the river catchment will be the increased opportunity for community involvement. Local community groups or individuals will be able to take part in all aspects of this vision. Greater environmental awareness will also bring with it more responsible citizenship as people become aware of their choices and the consequences of those choices. However, NRA TR cannot act on their own in pursuit of the vision. It requires careful planning, shared responsibility amongst the local community and all agencies agreeing to work towards a common goal.

Specific NRA responsibilities, aims and objectives are detailed in Appendix I.

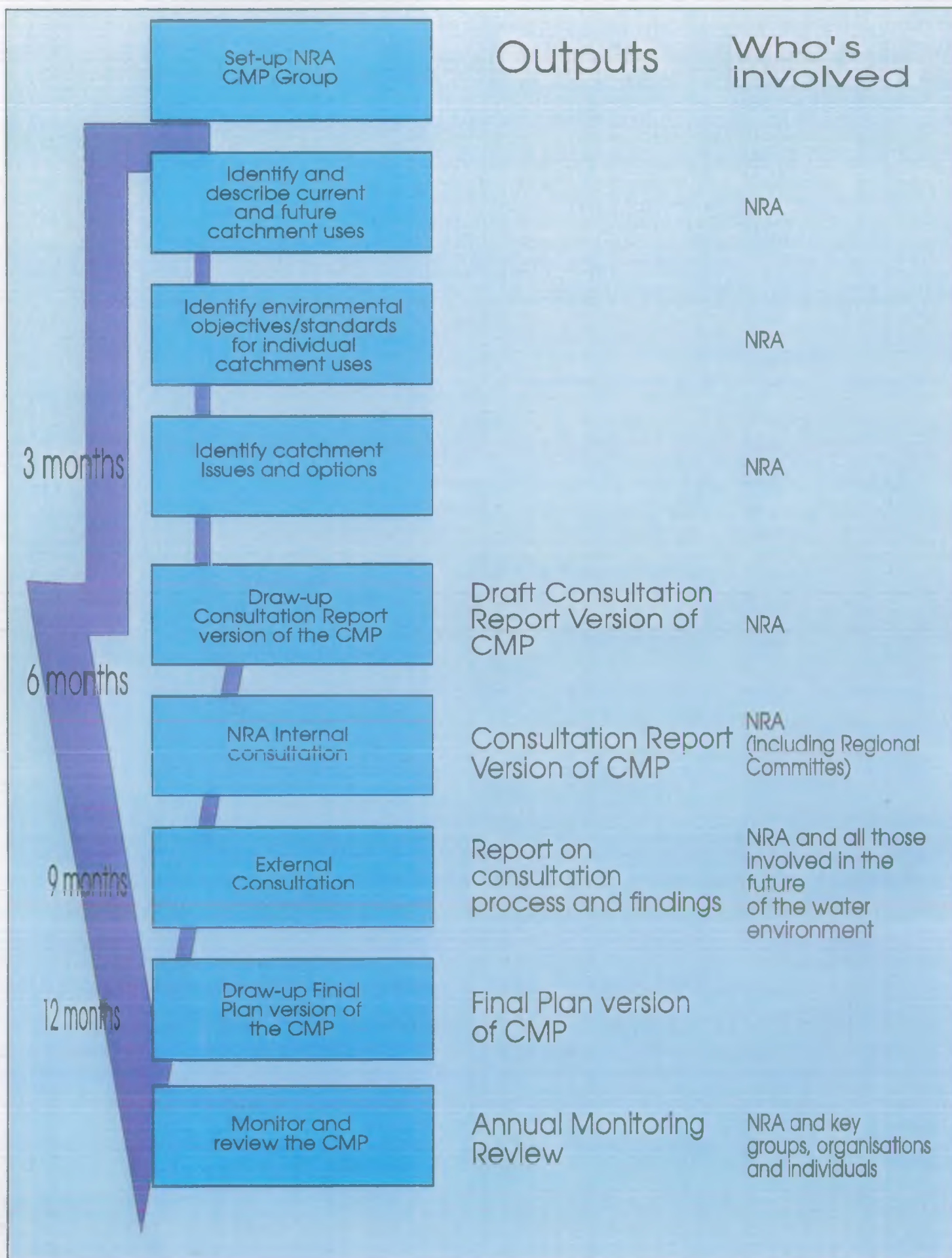
CATCHMENT MANAGEMENT PLANS

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 sometimes conflict with each other. The Catchment Management Planning process has been developed to manage these interactions and conflicts for the overall benefit of the water environment and its users. 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 future well being of the river catchment;
- agree a vision for the catchment which helps to guide all our activities over the next 10 - 20 years;
- establish an integrated strategy and action plan for managing and improving the catchment over the next 5 years; and
- identify specific actions, to which the NRA is committed, for inclusion in its business plans.

The preparation of a CMP involves a number of steps and outputs which are described in detail in the figure on the opposite page. This document, the **Consultation Report**, is the first output from the process and not the finished Plan.

Steps in the Catchment Management Process



1. MANAGING THE WATER ENVIRONMENT

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 identifies, following informal consultation, the key issues facing it.

The draft catchment vision, supporting policy objectives and potential actions presented here will only be finalised once we have had an opportunity to review and consider your response to this Consultation Report.

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

THE CONSULTATION PROCESS

Through this Consultation Report NRA TR want to obtain internal and external consensus on the future management of the River Wandle, Beverley Brook and Hogsmill river catchment. We are particularly interested to hear people's views on the following aspects of the consultation report:

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

Our 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 NRA TR will consider all comments, meet with relevant parties to resolve the issues that arise and produce an agreed **Final Plan** for the catchment. The Final Plan will review the formal consultation process, define a strategy for the management of the catchment over the next 5 years and detail a series of actions for NRA TR and others to implement. The resultant impact on the catchment will be monitored and reported on an annual basis.

If you wish to comment on the Consultation Report please do so by the **31st. of January 1995** by writing to the address given below. The Final Plan for the catchment is due for publication in April 1995. Please submit your comments to:

Mark Hodgins,
Catchment Manager (SE),
National Rivers Authority,
Riverside Works,
Fordbridge Road,
Sunbury-on-Thames,
Middlesex TW16 6AP.

SECTION 2 DESCRIPTION OF RESOURCES, USES AND ACTIVITIES.

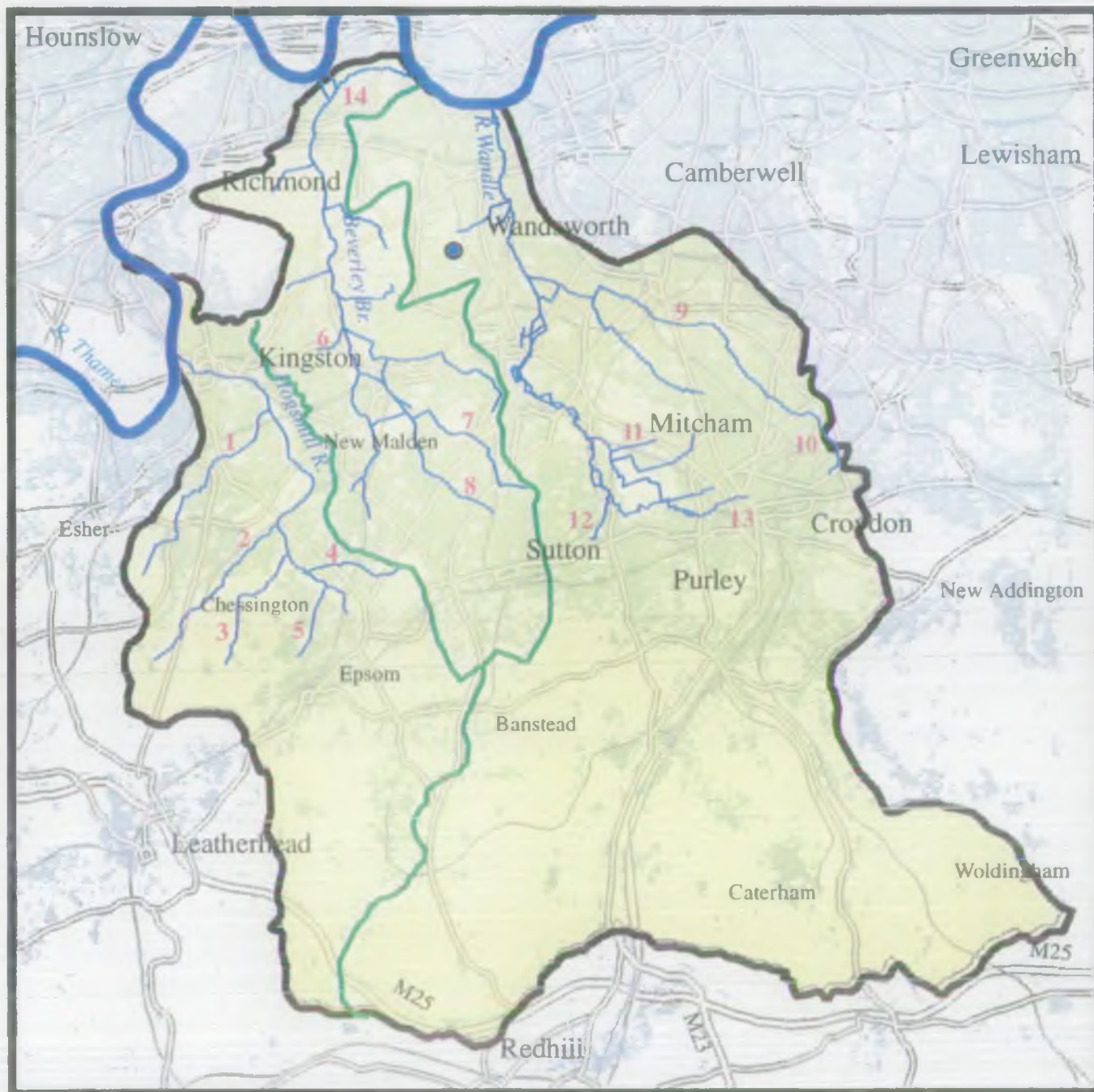
2.1 CATCHMENT OVERVIEW

The River Wandle, Beverley Brook and Hogsmill River catchments cover an area of 339 square kilometres between the River Thames and the dip slope of the North Downs to the south. Home to nearly a million people the catchment is predominantly urban in nature with housing development continuing to exert pressure on the water environment. The decline of heavy industry has paid environmental dividends but the disposal of treated sewage effluent from such a highly concentrated population has inevitably had an impact on surface water quality. During low flow conditions treated sewage effluent can account for in excess of 90% of the river flow in the Wandle and Beverley Brook. The impermeable nature of urban development combined with floodplain encroachment has also resulted in a fundamental alteration to the natural hydrological regime with river levels rising very quickly during storm events. The economic benefits of protecting such heavily urbanised areas from flooding were used to justify large scale flood defence works on the lower reaches particularly during the 1960's and 1970's.

Local groundwater resources are utilised to supplement bulk transfers from the non-tidal River Thames to meet water demand within the catchments; over 98% of the 240ML/day for licensed maximum groundwater abstraction within the catchment is used for potable supply. Groundwater abstraction has undoubtedly affected groundwater levels and base flow in the River Wandle and Hogsmill River, which are both spring fed. The natural quality of groundwater from the chalk aquifer remains good, but localised groundwater within the superficial gravel aquifers to the north of the catchment remain polluted from historic industrial activity. The domestic solid waste generated within the catchment is currently exported by barge, via Wandsworth Waste Transfer Station, down the River Thames to landfill sites mainly in Essex or by road to Bedfordshire. Transport and disposal of domestic solid waste currently poses a limited threat to ground and surface water. However, the future disposal of similar waste to backfill worked out gravel pits in the Beddington/Mitcham area is under consideration.

The combination of poor water quality caused by urban storm water run-off and treated sewage effluent, increased stream velocity and engineered concrete river channels has impacted heavily on the ecological status of many reaches of river. Enhancement opportunities do exist, especially where rivers run through existing public open space. These would also create added value to public enjoyment of the water environment, as well as improving ecological abundance and biodiversity.

Making the most of the recreational, amenity and educational potential of the water environment within such a heavily populated catchment is a prime objective. The conservation of existing ecologically important water dependent habitats, riverine landscapes, sites of archaeological importance and the rehabilitation / enhancement of degraded river reaches will increase the value that people living and working within the catchment place on the water environment. It is hoped that existing Areas of Outstanding Natural Beauty (AONB) and Areas of Great Landscape Value (AGLV) to the South of the catchment could be accessed by communities from the north via a network of green routes based primarily on river corridors.



KEY

	Catchment Management Plan Area		Watercourses		
	River Catchment Boundary	1. Surbiton Stream	10. Norbury Brook		
		2. Bonesgate Stream	11. Beddington Corner Branch		
		3. Horton Stream	12. Carshalton Branch		
	Wimbledon Park Lake	4. Ewell Court Stream	13. Croydon Branch		
		5. Green Lanes Stream	14. Flood Relief Culverts		
		6. Coombe Brook			
		7. East Pyl Brook			
		8. Pyl Brook			
		9. River Graveney			

Scale (approx)
0 5 km

2.1 CATCHMENT OVERVIEW

KEY CATCHMENT STATISTICS:

GENERAL

Population	985 000 (approximate)
Catchment area	339 sq km
Urban/suburban area	132 sq km (39%)
Length of river (source to River Thames)	19.0 kms (Wandle) 14.3 kms (Beverley Brook) 9.9 kms (Hogsmill)

WATER RESOURCES

Average annual rainfall	694 mm
Average flow (River Wandle)	143 ML/d
(Beverley Brook)	47 ML/d
(Hogsmill River)	84 ML/d
Total licensed groundwater abstraction	240 ML/d (estimate)

WATER QUALITY (GQA 1991 - 1993)

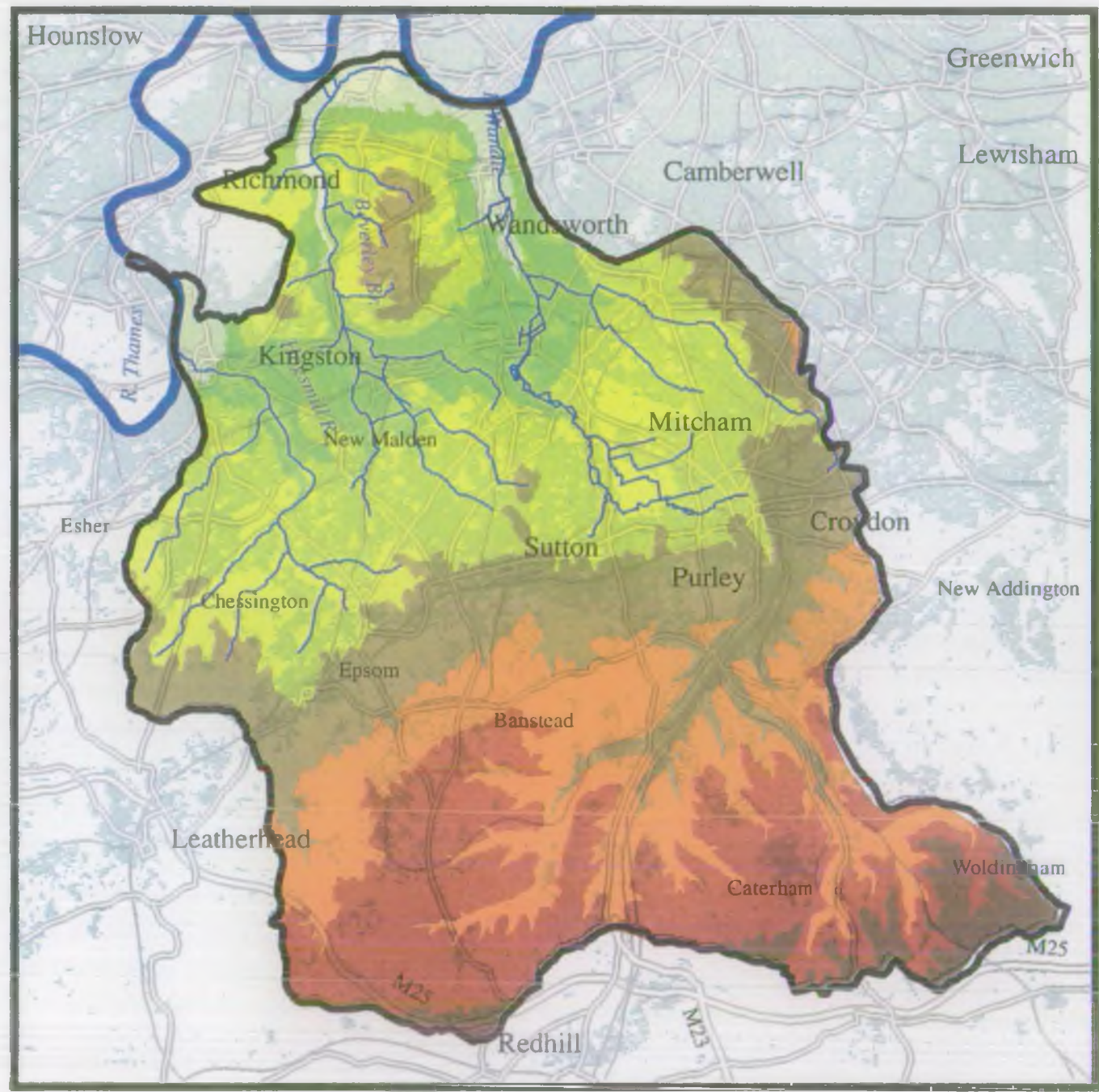
River length	Class A	0 km
	Class B	1.8 km (3%)
	Class C	14.1 km (32%)
	Class D	14.5 km (33%)
	Class E	11.7 km (26%)
	Class F	2.4 km (6%)

Length of EC designated cyprinid fishery (Wandle)	6.6 km
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






FLOOD DEFENCE

Length of statutory main river	(Wandle)	26.7 km
	(Beverley Brook)	23.1 km
	(Hogsmill)	9.5 km

Area at risk from flooding once every 50 years	5.0 sq km (observed & predicted)
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KEY

Ground Levels (m above Sea Level)							
	0 - 10		100 - 150				
	10 - 20		150 - 200				
	20 - 50		>200				
	50 - 100						

Scale (approx)

0 5 km

2.2 GEOLOGY & TOPOGRAPHY

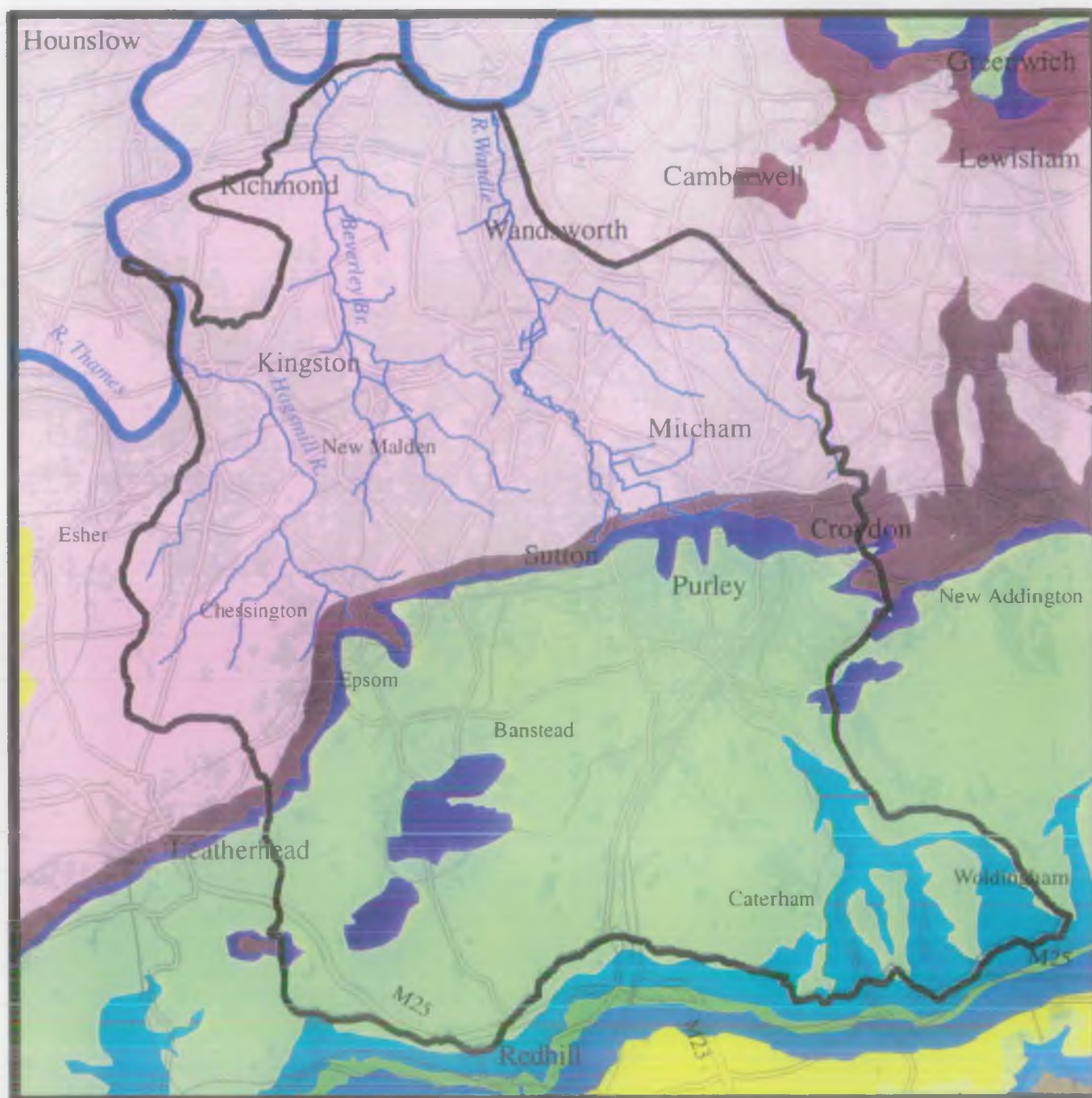
The southern part of the catchment overlies the Upper Chalk on the dip slope of the North Downs. The geological features in the northern part of the catchment are dominated by London Clay, laid down 55 million years ago when the area was covered by a shallow sea. Between the London Clay in the north and the Chalk in the south, narrow bands of Thanet Sand and Woolwich and Reading Beds have been exposed.

During glacial and interglacial periods, surface water draining northwards cut out valleys through the underlying rocks exposing the Middle Chalk as far as Kenley. The lower reaches comprise mainly fine alluvium over gravels laid down many thousands of years ago. However, the history of the lower reaches is complex and the River Wandle in particular deposited an extensive fan of alluvial gravels on the flatter ground in the Beddington/Mitcham area.

The geology therefore has a major influence on the sediments which make up the bed and banks of the River Wandle, Beverley Brook and Hogsmill River. The banks of many lengths of the remaining natural reaches contain black flinty gravels derived from the Upper Chalk.

The catchment plan boundary includes all land which drains surface water runoff into the River Wandle, Beverley Brook and Hogsmill River which discharge into the River Thames. All the rivers drain northwards from the dip slopes of the North Downs which rise to a level of 200m AOD (Above Ordnance Datum).

One of the main features of the dip slope is the series of dry river valleys which dissect the original chalk surface. These are clearly shown on the map on the previous page and were formed many thousands of years ago and do not form part of the contemporary river system. Although the catchment slopes gently northwards down to the River Thames floodplain, there are a number of notable plateau areas rising to just over 50m AOD, specifically Richmond Park, Kingston Hill and Wimbledon Common. These are covered with older 'High Level Terrace' gravels which are significant topographic features.



KEY

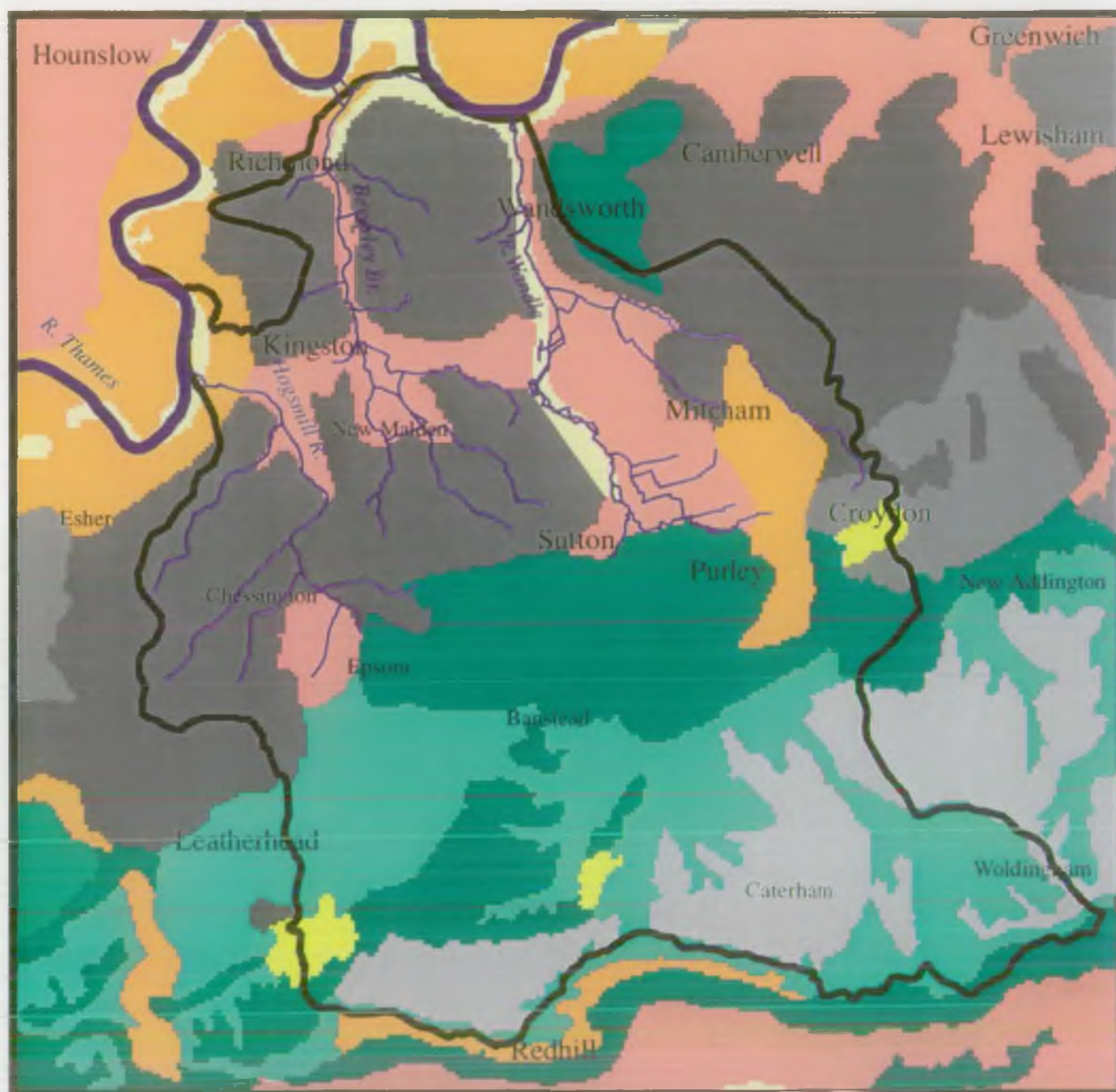
	London Clay		Middle Chalk		Sandgate Beds		
	Reading / Woolwich Beds		Lower Chalk		Hythe Beds		
	Thanet Sand		Upper Greensand		Atherfield Clay		
	Upper Chalk		Gault		Weald Clay	Scale (approx) 0 ————— 5 km	
	Lower Bagshot Beds		Folkestone Beds				










The soils of the catchment are developed to depths of one to two metres in a variety of geological substrates. For the purposes of catchment management, soils may be characterised by their texture, wetness regime and permeability. However, because of the extent of urban development within the northern part of the catchment the soil information may be less reliable than for the southern part where the Soil Survey and Land Research Centre have been commissioned by NRA TR to carry out field work for this CMP. Table 1 shows the distribution of various soils types in the catchment to supplement the soils map and table 2 describes their principle properties.

The pattern of soils partly reflects the north to south geological sequence of the area. In the south on the North Downs there are fine silty over clayey soils on the more level ground (Soil Type 5) which exhibit slight impedence to drainage. Shallow soils over chalk (Soil Type 1), typically associated with downland, cover the area around Epsom and the steep valley sides between Kingswood and Coulsdon and at Caterham. Headley Heath and an area south of Chipstead are unusual in having sandy soils (Soil Type 2) more typical of the Greensand to the south west of the catchment. Through Banstead and Purley, fine and coarse loamy well drained soils (Soil Types 3 & 4) occur in drift of varying thickness over the chalk and river terrace gravels at Croydon. These soils support a wide range of crops and horticultural enterprises where free from the impact of urbanisation.

The northern half of the catchment is dominated by heavy impermeable soils developed in clay with or without a veneer of fine loamy drift (Soil Type 7). The most noticeable exceptions to this rule are coarsely textured soils in river terrace gravels (Soil Type 9) bordering the lower reaches of the three main rivers. Although permeable, these soils are susceptible to high groundwater which in winter rises to within a metre of the surface. In the Richmond and Wimbledon areas there are very acid soils (Soil Type 6) that in an undisturbed state would support wet lowland heath vegetation. Sandy surface layers give way to a clayey subsoil that sustains a shallow perched water table for part of the year. The existing narrow flood plains of the River Wandle and River Thames contain clayey lime-rich alluvial soils (Soil Type 8) with a high water table.

	TABLE 1 Description	Depth to impermeable layer	Depth to rock(m)	Wetness class	Water storage capacity	Likelihood of land drains	Soil water flow mechanisms
1	Shallow, well drained loamy soils over chalk	None present	<0.3	I	Large	Low	Micropore and fissure flow to chalk
2	Well drained sandy and coarse loamy soils	>1	>1	I	Large	Low	Micropore flow dominant
3	Well drained fine and coarse loamy soils over chalk	None present	<1	I	Moderate	Low	Micropore and fissure flow to chalk
4	Well drained coarse loamy and some sandy soils, commonly over gravel	>1	>1	I	Large	Low	Micropore flow dominant
5	Loamy over clayey / flinty soils, some with slowly permeable subsoils causing slight seasonal waterlogging	0.4	>1	I - II	Small	Low (some moderate)	Micropore and fissure flow to chalk or drains
6	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 managed)	Variable; lateral saturated flow within groundwater table or drains
7	Slowly permeable, seasonally waterlogged fine loamy over clayey and clayey soils	0.3 - 0.5	>1	III - IV	Small	High	Fissure flow to drains
8	Stoneless clayey soils in river alluvium, some lime rich	<0.3	>1	III - IV	Small	High	Fissure flow to local groundwater or drains
9	Coarse loamy permeable soils, locally over gravel, with a seasonally high groundwater table	>1	>1	I - II (III - IV undrained)	Small / Moderate	High	Fissure flow to local groundwater, lateral saturated flow within groundwater table



	Soil Type 1		Soil Type 6				
	Soil Type 2		Soil Type 7				
	Soil Type 3		Soil Type 8				
	Soil Type 4		Soil Type 9				
	Soil Type 5						

Scale (approx)
0 5 km

2.3 SOILS

River flows in the Wandle, Beverley Brook and Hogsmill and the quality of both ground and surface waters are strongly influenced by soil type.

For the rivers, predicted ranges for the base flow index (BFI) and standard percentage run-off (SPR) associated with each soil type are given in Table 2. BFI is an indication of the 'flashiness' of a river; the extent to which flows respond to storm events. The lower the figure, the greater the storm response. Soils with slowly permeable subsoil and a small water storage capacity are closely associated with streams having a low BFI. Such soils are widespread in the northern part of the catchment and this fact, combined with the extent of urban hard surfaces, explains the frequency of extreme flows in the lower reaches of the rivers. In the southern part of the catchment, most of the soils are permeable and allow rainfall to recharge the underlying chalk aquifer. The SPR figures are an indication of the average proportion of rainwater falling on each soil type that should reach the river within the days following significant rainfall.

TABLE 2 Soil Unit	Stream parameters		Groundwater vulnerability	Nitrate leaching risk class	Soil erosion risk	Organic waste to land - concerns	Soakaways and effluent infiltration fields - concerns	Wetland habitat potential
	BFI	SPR%						
1	1.0	<5	H1	Extreme	Low	Nitrate leaching	Groundwater contamination	Low
2	0.9	15	H2	Extreme	Low	Nitrate leaching	Groundwater contamination	Low
3	1.0	5	I1	High	Low	Nitrate leaching	Groundwater contamination	Low
4	0.9	15	I1	Extreme	Low	Nitrate leaching	Groundwater contamination	Low
5	0.5	40	I1	Moderate	Low	Run-off/drain flow in winter	No problems for well designed systems	Moderate
6	Var	35	I1	Variable	Low	Run-off/drain flow in winter; winter wetness	Inundation in winter, summer percolation tests may mislead	High
7	0.2	50	L	Low	Low	Run-off/drain flow in winter; winter wetness	Inundation in winter, summer percolation tests may mislead	High
8	0.7	25	H1	Low	Low	Run-off/drain flow in winter; winter wetness	Inundation in winter, summer percolation tests may mislead	High
9	0.6	30	H1	High	Low	Run-off/drain flow on wettest months	Inundation in winter, summer percolation tests may mislead	High

Vertical drainage through the soil occurs via a number of pathways and the rates of water movement associated with each differ significantly. Movement down fissures and large pores (macropores) is much more rapid. The forms of flow likely to be present in the soils within these catchments are indicated in the table above. Water draining through soil can also transport dissolved substances out of the soil. Soils that are shallow, very permeable and/or that allow preferential rapid water flow all exhibit high rates of infiltration and percolation. Where they overlie an aquifer they result in high groundwater vulnerability. The groundwater vulnerability designations also reflect the soils' ability to adsorb substances such as some pesticides.

2.3 SOILS

Soils of low permeability, especially if they also lack significant water storage capacity leave surface waters vulnerable to contamination by substances applied to such land. Because of the small extent of bare ground within the catchments, soil erosion is not thought to be a significant problem.

The preceding table also gives guidance on water management concerns with regard to the disposal to land of organic wastes and the installation of forms of soakaway or effluent infiltration fields. NRA TR pollution control staff always advise farmers and industry of the need for detailed site specific investigation of land and soil conditions before considering such activities.

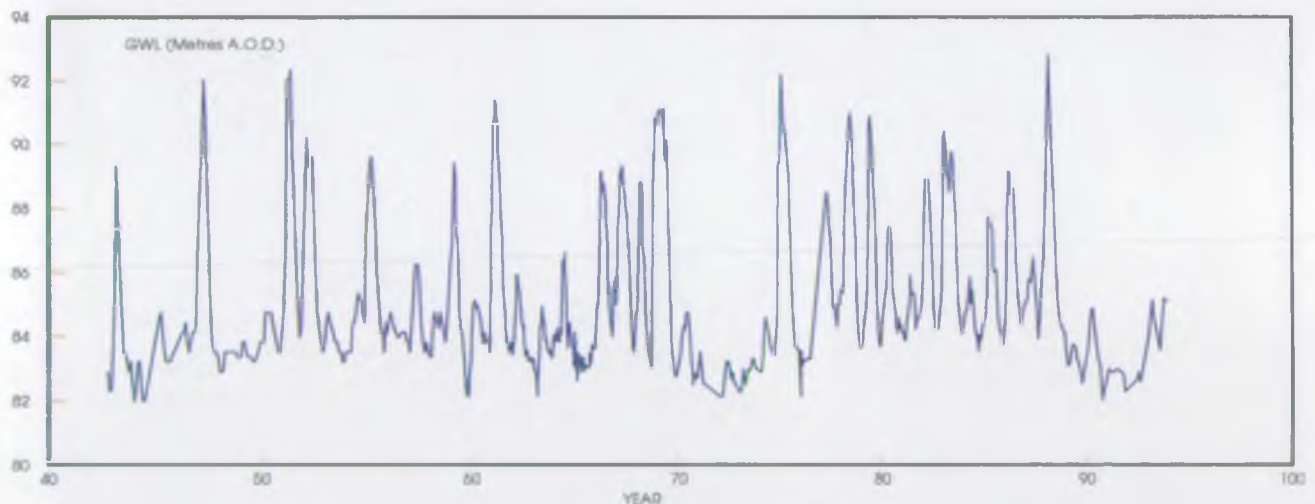
The potential for wetland habitat creation based on soil suitability varies across the catchments. There is little potential in the southern part on soil types 1 - 4 but much greater opportunity is offered by soil types 6 - 9 where land remains undeveloped.

2.4 HYDROGEOLOGY

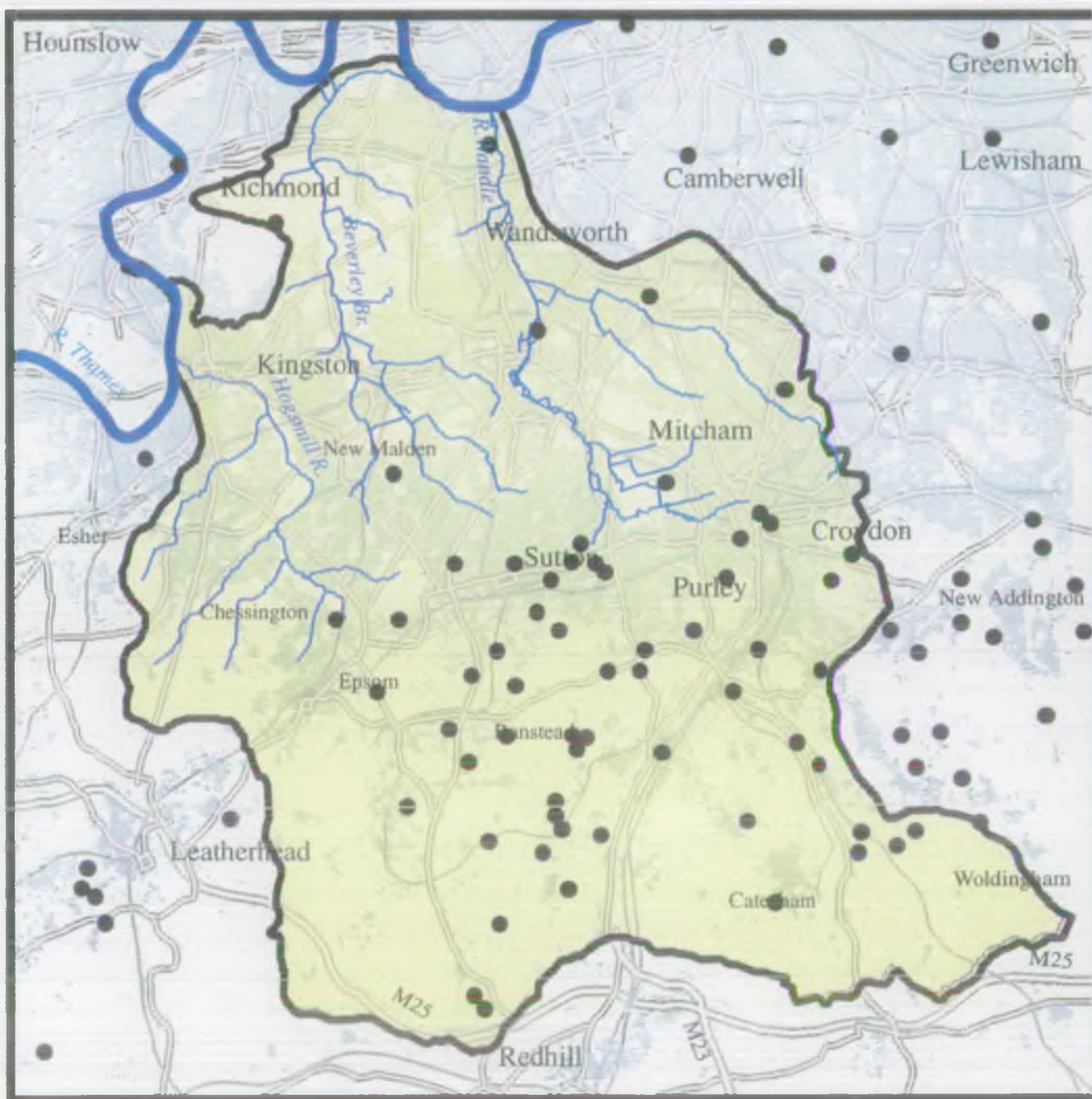
The headwaters of these three catchments commence on or near the dip slope spring line of the North Downs Chalk aquifer. The rivers run northwards onto the London Clay of the central London Basin syncline. The unconfined chalk of the North Down is not covered with any drift deposits from glacial times although a substantial proportion is urbanised. Consequently there is normal recharge from rainfall over most of the chalk area providing continuous input to the groundwater regime.

The majority of groundwater flows northwards to the dip slope spring line. Substantial springs occur at Ewell Ponds in the Hogsmill River catchment and at Carshalton Ponds, Beddington Park and Waddon Ponds in the River Wandle catchment. The Beverley Brook does not start as a chalk fed stream. A number of minor spring sources once existed along the dip slope spring line but the substantial exploitation of groundwater for public potable supply has resulted in these minor springs disappearing. The Carshalton Springs are artificially augmented when necessary by Sutton District Water Plc. Ewell Ponds are the subject of a future augmentation scheme should the need arise.

Despite the heavy exploitation of groundwater, the water table has not been significantly drawn down and recent wet winters following the 1989 - 1992 drought have seen exceptionally high groundwater levels. The figure below shows the hydrograph of Starrock Court Observation Well and shows no evidence of any long term trend.



Considerable quantities of groundwater flow northward to the deeply confined London Basin Chalk aquifer and North Downs derived groundwater is contributing to the steady recovery of levels under Central London. Intercepting some of this resource and using it to meet increasing demands for public water supply in the future could make an important contribution to controlling rising groundwater levels under London.



KEY

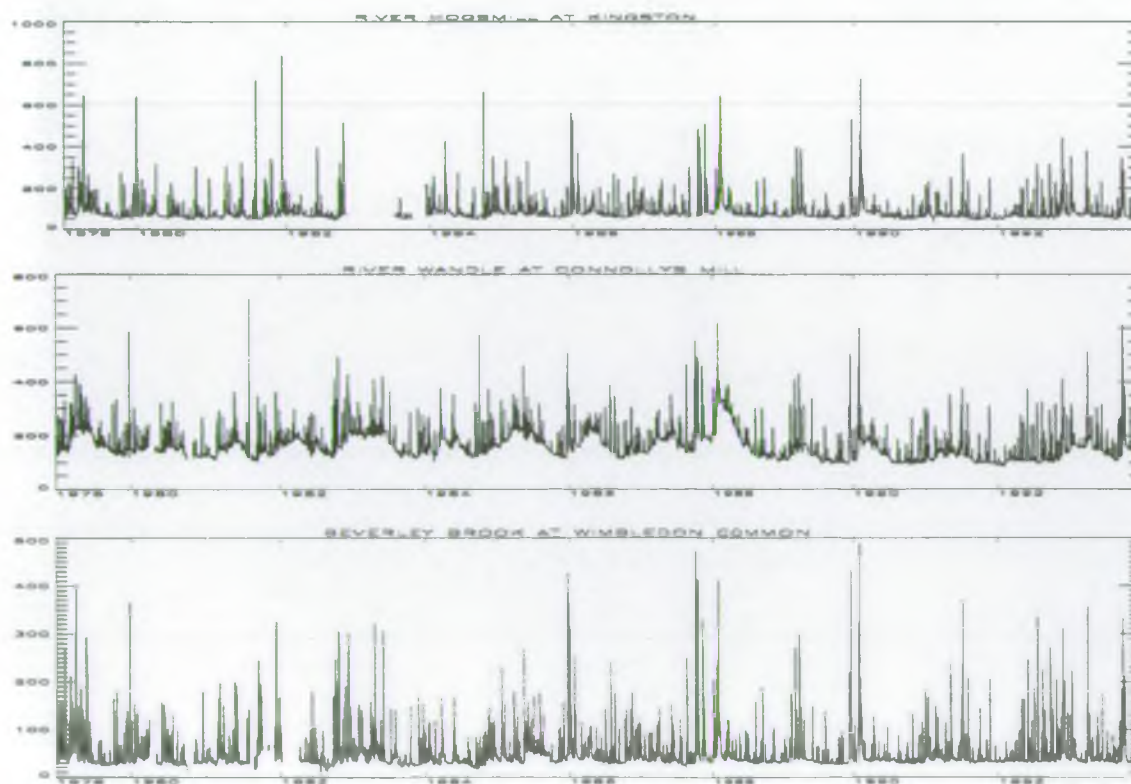
	Catchment Plan Area						
	Groundwater Monitoring Site						
							Scale (approx)
							0 5 km

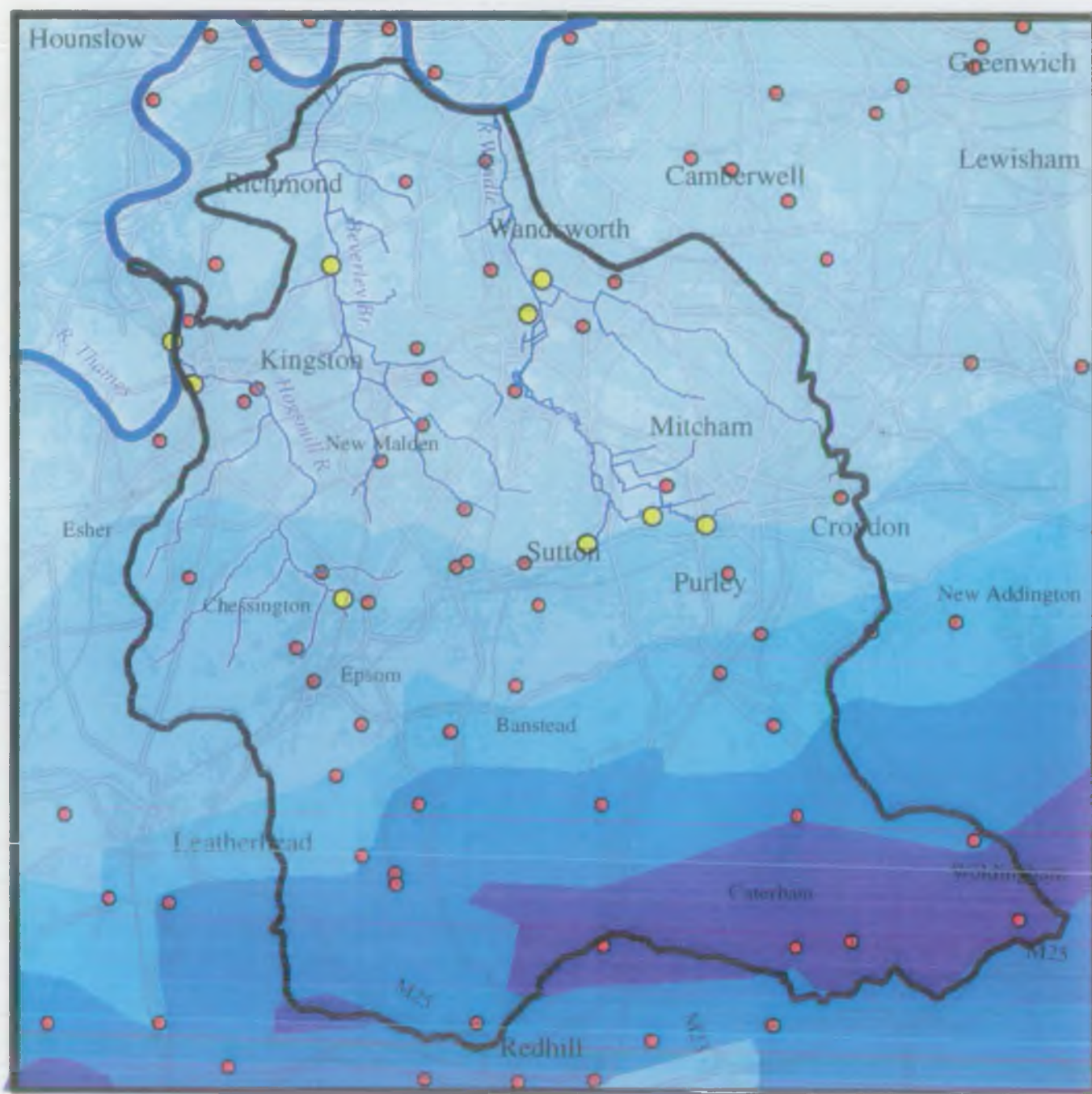
2.5 HYDROLOGY

The average annual rainfall across the three catchments is 694mm with a considerable amount of variation in different parts of the area. The average rainfall in the lower northern half of the area is 630mm compared with 760mm in the higher southern half.







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, after allowing for such losses, is 320mm per year in the south and most of this percolates through the soil and recharges the chalk aquifer. In the north the average annual effective rainfall is 160mm and most of this water flows straight into the surface water system due to the largely impermeable nature of the soils and urbanised areas.

Under normal conditions, both the Hogsmill River and the River Wandle are spring fed, whereas during times of drought these sources can diminish or cease to flow altogether. The Hogsmill rises from chalk springs at Ewell which contribute to an average of about 9MI/d. The Carshalton Branch of the River Wandle rises from springs at Carshalton whilst the Croydon Branch is fed by springs at Waddon, Croydon and Purley. These contribute an average of about 12MI/d. 90% of the downstream flow of these two rivers is derived from surface run-off and treated sewage effluent as is all the Beverley Brook. Hydrographs of the three rivers are shown below in MI/day. They effectively demonstrate the flashy nature which is typical of rivers which rely on surface water for most of their flow. They also demonstrate the constant base flow which represents the effect of sewage effluent.





KEY

Annual Average Rainfall (mm)		>800				
	<650		Flow Gauge			
	650 - 700		Rain Gauge			
	700 - 750					
	750 - 800					
						Scale (approx)
						0 5 km

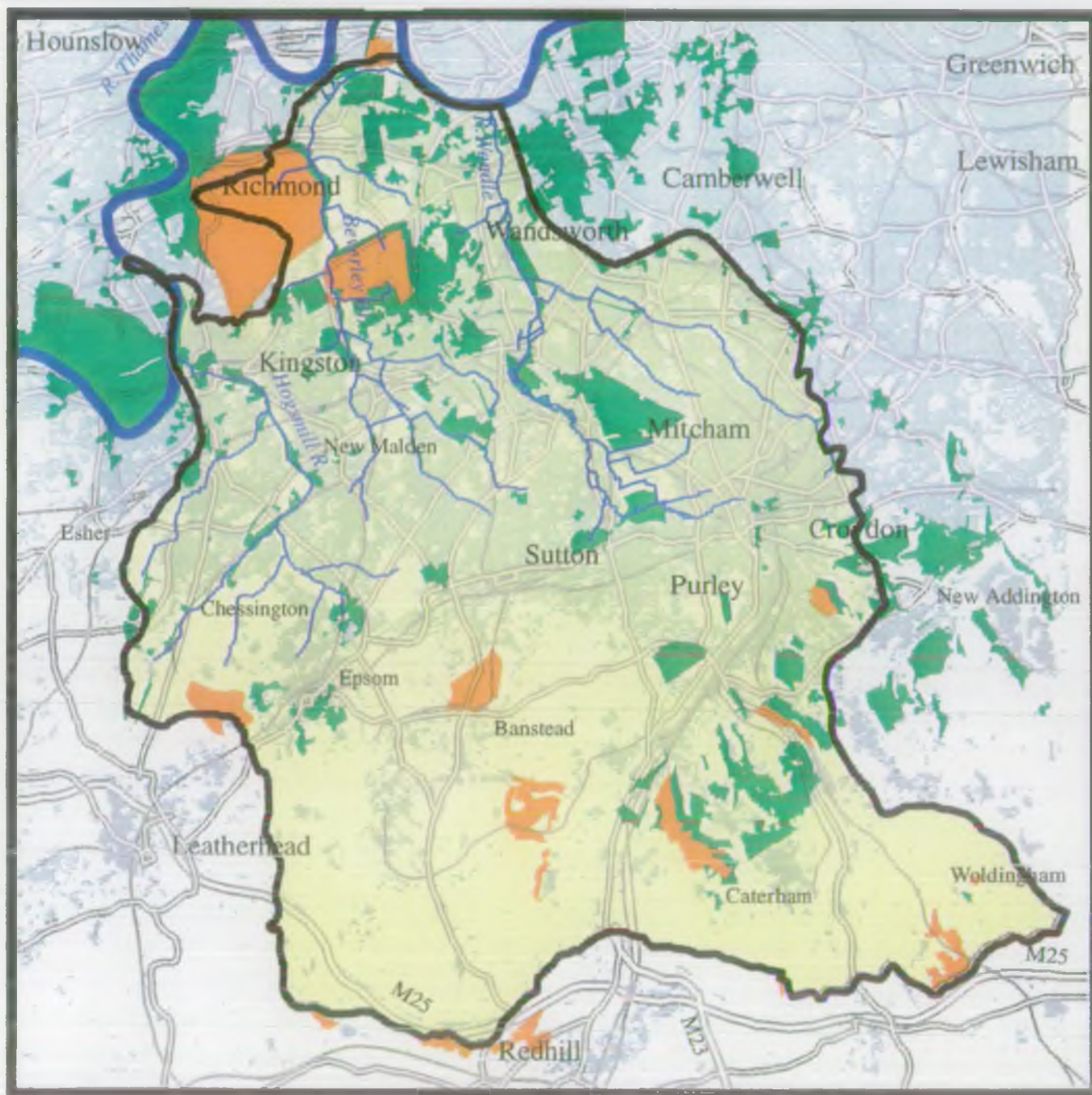
The ecology of streams and rivers reflects both the natural influences associated with the physical and chemical characteristics of the catchment from which they derive water and the artificial influences resulting from human activities. The NRA seeks to conserve and enhance the ecological value of streams 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".

In the absence of significant human influences the natural features of the rivers of the catchment would be gentle river gradients with fine grained sediments and relatively wide margins of wetland plant communities and large areas of occasionally inundated floodplain. The upper reaches of the River Wandle and Hogsmill River are fed by chalk groundwater. Typically chalk stream ecology is characterised by clear, well oxygenated water with a rich supply of plant nutrients and relatively stable temperature and flow regimes. These conditions promote highly productive plant communities rich in species, diverse macroinvertebrate communities and high biomass fisheries comprising both salmonid and cyprinid populations. Downstream the influence of the clay tributaries causes alterations to the ecology of the rivers due to the more flashy nature of the flow.

The ecology of the catchment has been altered by a range of human activities, brought about by the progressive urbanisation of the catchment over the last 150 years. These historical changes have caused physical changes including a loss of floodplain and increased rate of water run-off. This increased flashiness has led to flood prevention measures including alteration to channel dimensions, use of flow regulation structures and river bank protection to prevent erosion. The changes have resulted in artificial channels with a reduction in variety of instream and riparian habitats and consequently reduced ecological value and potential. Urbanisation has also had an influence on water quality, increasing use of the rivers for sewage disposal and increase in volume of polluted urban stormwater run-off. The reduced time of travel in these rivers has also reduced the rivers capacity to self-purify these polluting loads. The water quality changes have also degraded the ecological value and potential of the rivers.

Although the River Wandle catchment is predominantly urban the river provides a valuable green corridor within the built environment. The river also links various sites of conservation interest such as Beddington Sewage Treatment Works, Wilderness Island Local Nature Reserve (LNR) and Watermeads, increasing the value of these sites as well as the river by connecting otherwise isolated plant and animal communities. Much of the river has been identified by the appropriate Local Authorities, through the London Ecology Unit, as being a Site of Metropolitan Importance, partly due to the rich variety of aquatic plant life characteristic of chalk streams eg. stream water-crowfoot.

Both the Hogsmill River and the Beverley Brook are predominantly urban but flow through significant areas of open space of conservation interest such as LNRs or SSSIs. The Hogsmill River channel contains extensive reaches of diverse emergent and aquatic vegetation and some London rarities such as *Potamogeton berchtoldii*. A major limiting factor for habitat succession is often the engineered nature of the channel. NRA TR Hogsmill River Rehabilitation Project is currently investigating the feasibility of channel naturalisation.



KEY

	SSSI					
	Nature Conservation Area					
						Scale (approx)
						0 5 km

2.6 ECOLOGY

The in-channel biology of the Beverley Brook is poor due primarily to water quality problems. Both the River Wandle and Beverley Brook discharge into the tidal River Thames and the inter-tidal mudflats of these creeks are important habitats for birds and invertebrates.

All the Local Authorities within the three catchments have specific policies within their development plans to protect and enhance the conservation value of river corridors. NRA TR will continue to work closely not only with these authorities but also with other organisations, interest groups and the local communities in promoting conservation initiatives. Schemes such as the Countryside Commission's Countryside Stewardship Scheme for Waterside Land and the creation of 'green routes', promoted by the London Tree Forum and London Walking Forum, could have considerable ecological benefits for these river catchments.

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 recent MAFF proposals for the production of Water Level Management Plans. Priority is to be given to SSSIs. English Nature are currently compiling a list of sites, some of which are likely to fall within this catchment, and their associated water level requirements. Following public consultation agreed objectives will be set out in the plan together with the means by which those objectives will be met.

2.7 FISHERIES

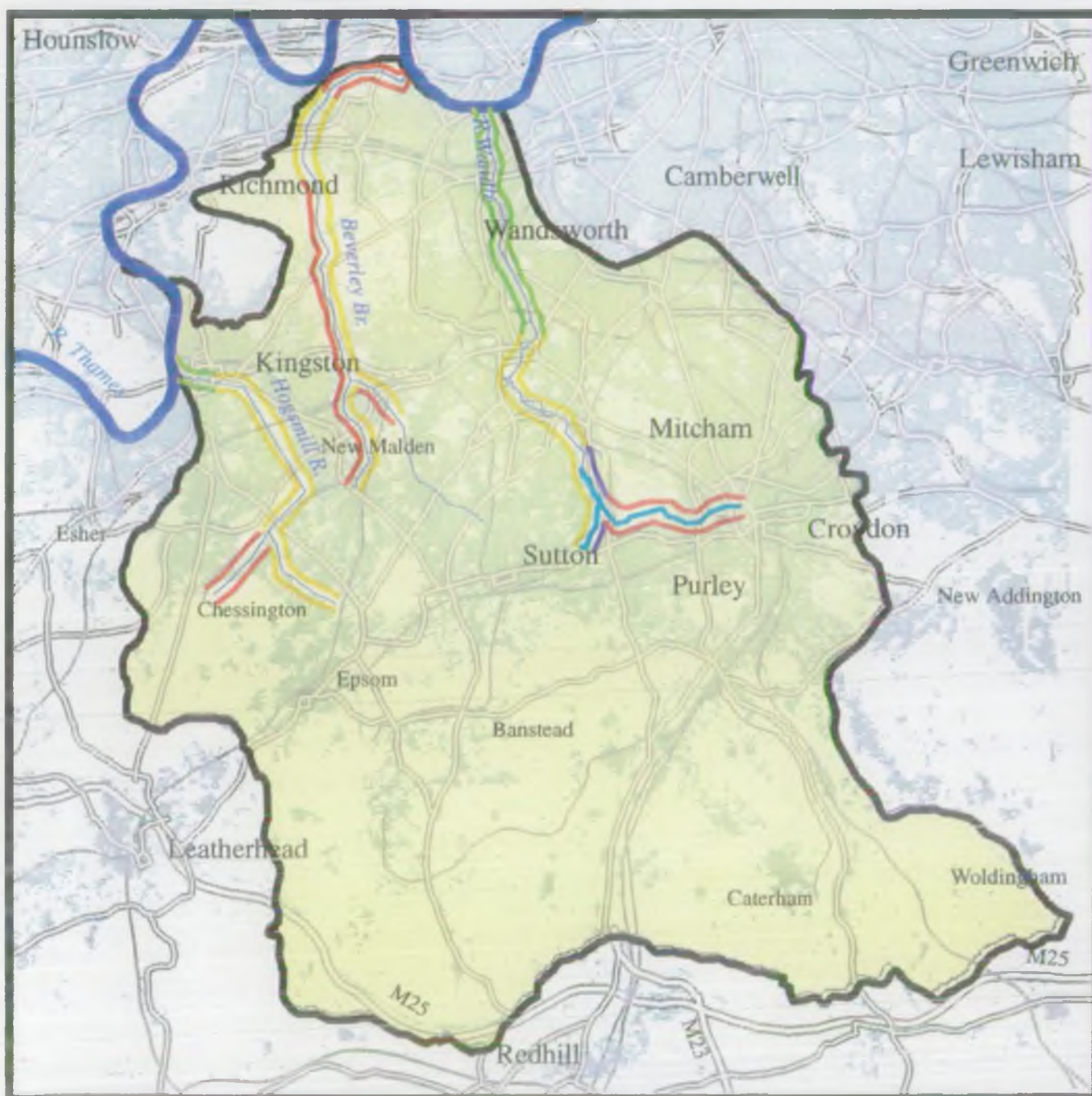
Recent fisheries surveys of all three catchments indicated generally poor fisheries status considered to be related to poor and variable water quality, high flows associated with urban stormwater runoff and poor habitat.

The four sites monitored as part of the 1989 River Wandle Fisheries Survey within the EC designated cyprinid reaches upstream of Mill Green (6.6kms in total) failed the target biomass. Fish populations in the Croydon Arm were minimal and only a reasonable mixed cyprinid and very modest brown trout fishery were present in the Carshalton Arm. Poor cyprinid populations were present in the river downstream to Colliers Wood with substantial populations observed further downstream to the River Thames confluence. The only evidence of recruitment was in the roach population at Earlsfield and it was concluded that the current fishery was being artificially maintained by regular past restocking efforts. Preliminary results from the 1994 fishery survey indicates some improvement in recruitment in the dace, roach and perch populations at Earlsfield with increased eel densities and penetration throughout the catchment. Angling on the River Wandle is informal and concentrated around Hackbridge and Colliers Wood / Earlsfield with an off stream pond at Watermeads run by Watermeads A.C. for members only. There are important stillwater angling fisheries at Wimbledon Park, Wandsworth Common and Tooting Common. Most are public or day permit fisheries.

The Beverley Brook was surveyed comprehensively for the first time in 1992 and results showed extremely poor fish populations throughout the catchment with only a modest eel population observed at Palewood Common. Angling is therefore minimal and informal but there are some minor public pond fisheries on Wimbledon Common, Barnes Green and Cannon Hill Common. TWUL ran major coarse and trout fisheries at Barn Elms reservoirs until 1993 but future fishing possibilities are unclear pending redevelopment of the site. Barnes and Mortlake A.C. run a small members only lake at Barnes Common and casual fishing occurs at Pen Pond in Richmond Park.

The 1993 Hogsmill River Fisheries Survey showed very poor fish populations in the upper reaches, due in part to significant pollution incidents in recent years, but eel densities in the lower river were very high. Angling is minimal and informal and there are no significant stillwater fisheries.

Fisheries Management Plans will be developed by NRA TR in consultation with interested parties in all three catchments based on the survey results to date. The plans will make site specific recommendations on habitat suitability and water quality conditions to improve and enhance the fisheries resource.



KEY

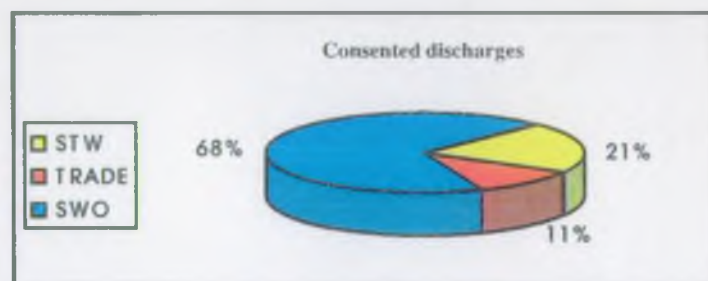
EC Fisheries Directive Reach Designations		Fishery Type (Left hand looking upstream)		Fishery Quality (Right hand looking upstream)			
	Cyprinid		Mixed Cyprinid / Salmonid		Good biomass / diversity / recruitment		
			Cyprinid only		Good biomass / low diversity / recruitment		
			Minor species		Moderate biomass / low diversity / no rec	Scale (approx) 	
			Sticklebacks only		Poor		

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 the 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 16 consented discharges into the River Wandle, Beverley Brook and Hogsmill River catchments. Each of the rivers receives the treated effluent from a Thames Water Utilities sewage treatment works (River Wandle from Beddington STW; Beverley Brook from Worcester Park STW and the Hogsmill River from Hogsmill STW). The discharge from these works is the major component of the flow in each river, particularly during the summer months, and therefore the quality of the effluents largely determines downstream water quality.

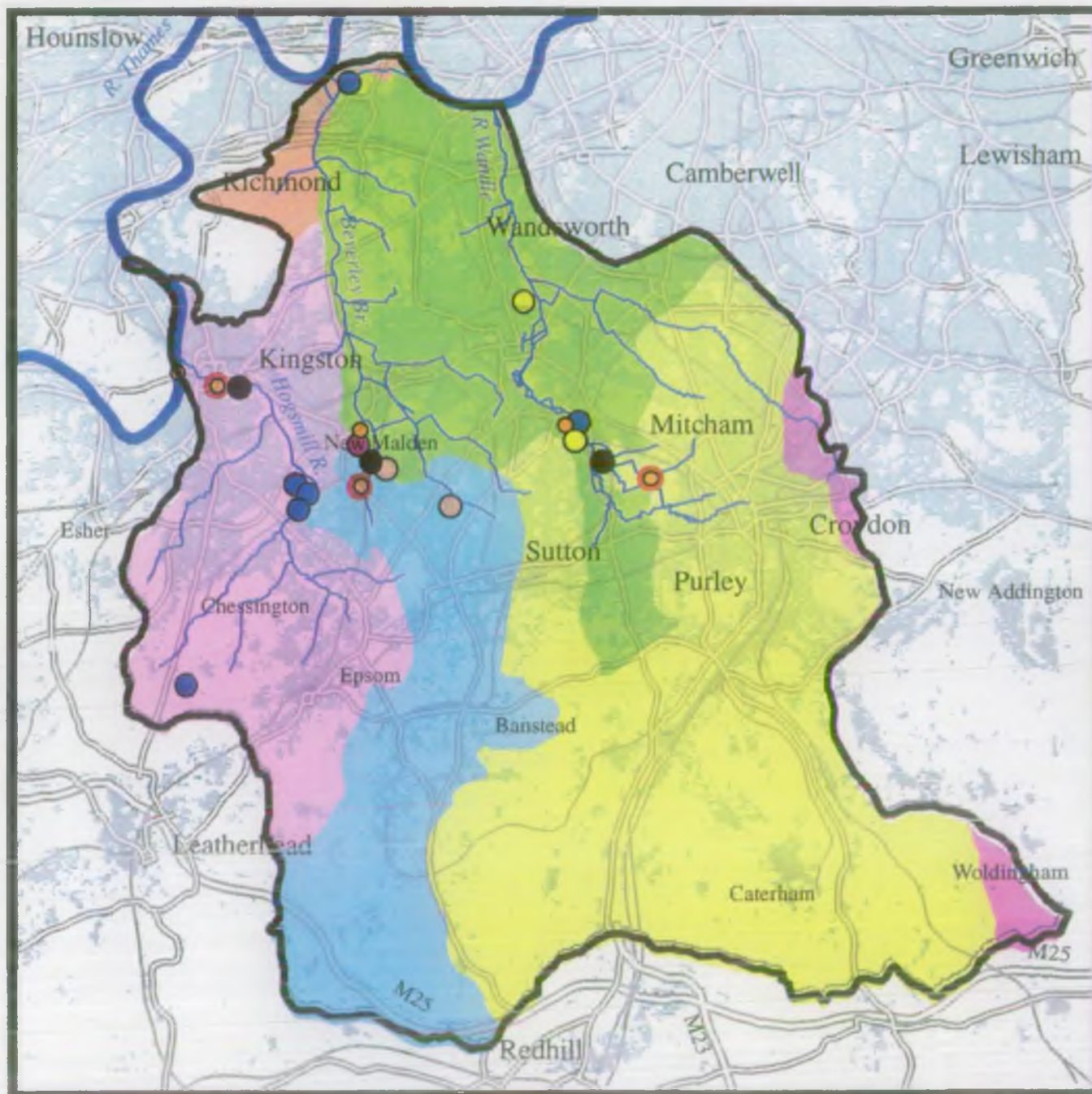
The NRA have identified the need to make changes to the existing consents and/or plant at each of these sewage treatment works in order to meet the needs of EC Directives and to improve the downstream water quality. The proposed changes have been included in the TWUL Asset Management Plan (AMP2) recently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

Discussions between the NRA and TWUL are in progress to agree priorities for this work on a region-wide basis. Details of the agreed expenditure and timescale for the work will be included in the Final Report for the CMP which is scheduled for April 1995.



The most significant trade effluent discharge is to the Pyl Brook on the Beverley Brook from Sutton District Water Plc. who have a statutory obligation to soften the water put into public supply by a ion exchange process from which a calcium chloride solution is discharged to waste. Since the closure of Sutton STW this discharge has been a major element in providing a flow down the upper part of the Pyl Brook, particularly during drought conditions. Due to the combination of factory closures and diversions of process effluents to foul sewer the few remaining direct industrial discharges consist of cooling water and gas holder sealing water. There are six privately owned sewage treatment plants discharging a small amount of effluent.

Her Majesty's Inspectorate of Pollution (HMIP) also play an important role in the control of releases to land, air and water from certain 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. There are currently three authorised processes and one anticipated authorisation within the catchment area, none of which discharge to controlled waters.



KEY

Consented Discharges			Water softening	Sewered Catchment Areas			Long Reach
●	TWU STW	○	EC Dangerous Substances Directive	■	Kew	■	Crossness
●	Private STW	○	Monitoring Site	■	Hogsmill		
●	Cooling water	●	Sewage Treatment Works	■	Worcester Park	Scale (approx) 	
●	Scaling Water			■	Beddington		

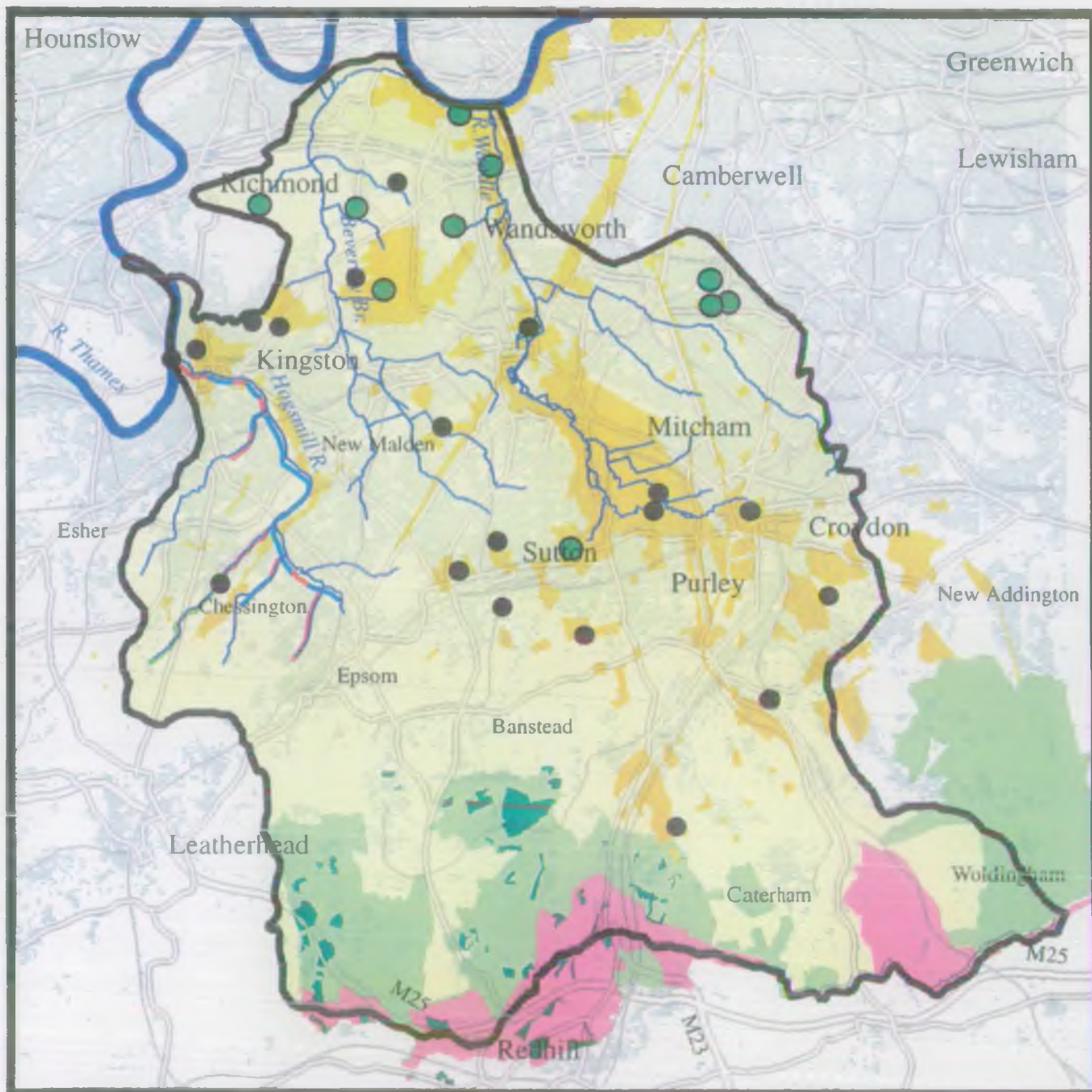
2.9 LANDSCAPE AND HERITAGE

Within the catchment area the North Downs chalk scarp forms part of the Surrey Hills/Kent Downs Area of Outstanding Natural Beauty (AONB) and Local Authorities have special policies for controlling development and encouraging appropriate land management techniques that both support an active rural economy and protect the distinctive landscape character. Both Tandridge and Reigate & Banstead Local Authorities have designated areas adjacent to the AONB as Areas of Great Landscape Value (AGLV). In development control terms this designation implies a particular emphasis on the need to preserve or enhance landscape quality when considering planning applications such that a greater level of need has to be shown in order for landscape objections to be set aside.









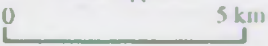

A number of local authorities have recognised the importance of maintaining and creating a network of landscaped river corridors within the catchment to visually enhance linear spaces leading through the built environment. The River Wandle valley has particularly benefited from such policies which enhance the amenity value of the Wandle Trail. NRA TR commissioned its own pilot study on a strategic and detailed landscape assessment of the Hogsmill River Catchment in 1993 as part of the proposed rehabilitation project. The 'Macro River Landscape' classification identified broad types of landscape within the visual envelope of the main river and its tributaries. The 'Micro River Landscape' classification identified types of small scale landscape of the river itself created by the river channel and its immediate banks. The Micro Landscape Value Classes are shown on the map opposite and the three main strategy options defined by this NRA TR methodology are conservation, restoration and enhancement.

The Approximate Relationship between the Micro Landscape Value Classes set out in the NRA Methodology and the Management Strategy Options.		
Value Class	Management Strategy	Definition of Management Strategy Options
1, 2	Conservation	Emphasis on conservation of existing character and appropriate management of particular features which contribute to this character.
2, 3	Restoration	Emphasis on restoring landscape character where this is being degraded.
3, 4	Enhancement	Emphasis on the enhancement of landscapes which have completely lost their former character and are downgraded, derelict or damaged. There may be opportunities to create new types of landscape as a result of enhancement.

All three catchments are notable for their sites of archaeological importance and potential which are afforded protection by the Local Authorities as directed by the DoE Planning Policy Guidance Note 16 (Archaeology and Planning). A large number of Scheduled Ancient Monuments (SAMS) and Parks and Gardens of Special Historic Interest are listed on the Greater London Sites and Monuments Record (GLSMR) within these catchments. Under Section 16(2) of the Water Resources Act 1991 it is the duty of the NRA "to have regard to maintaining the availability to the public for visiting or inspecting any building, site or object of archaeological, architectural or historic interest". Given the potential impact of various NRA activities on such interests an R&D project is currently working towards developing a consistent approach to archaeology throughout the NRA.



KEY

	Ancient Woodland		Scheduled Ancient Monuments	Hogsmill River landscape management options			
	Archaeological Interest				Conservation		
	Area of Great Landscape Value				Restoration		
	AONB				Enhancement	Scale (approx) 	
	Historic Parks and Gardens						

2.10 FLOOD DEFENCE

NRA TR are responsible for the provision of effective flood defence on main rivers and Local Authorities for non main rivers within the catchment. As these are classed principally as urban rivers throughout their length they are susceptible to flash flooding and acts of vandalism by members of the public. This combination means that most of the properties in the shaded area on the map opposite could be at risk from flooding. The map also shows modelled flooding and areas where surface water run-off restrictions could apply.

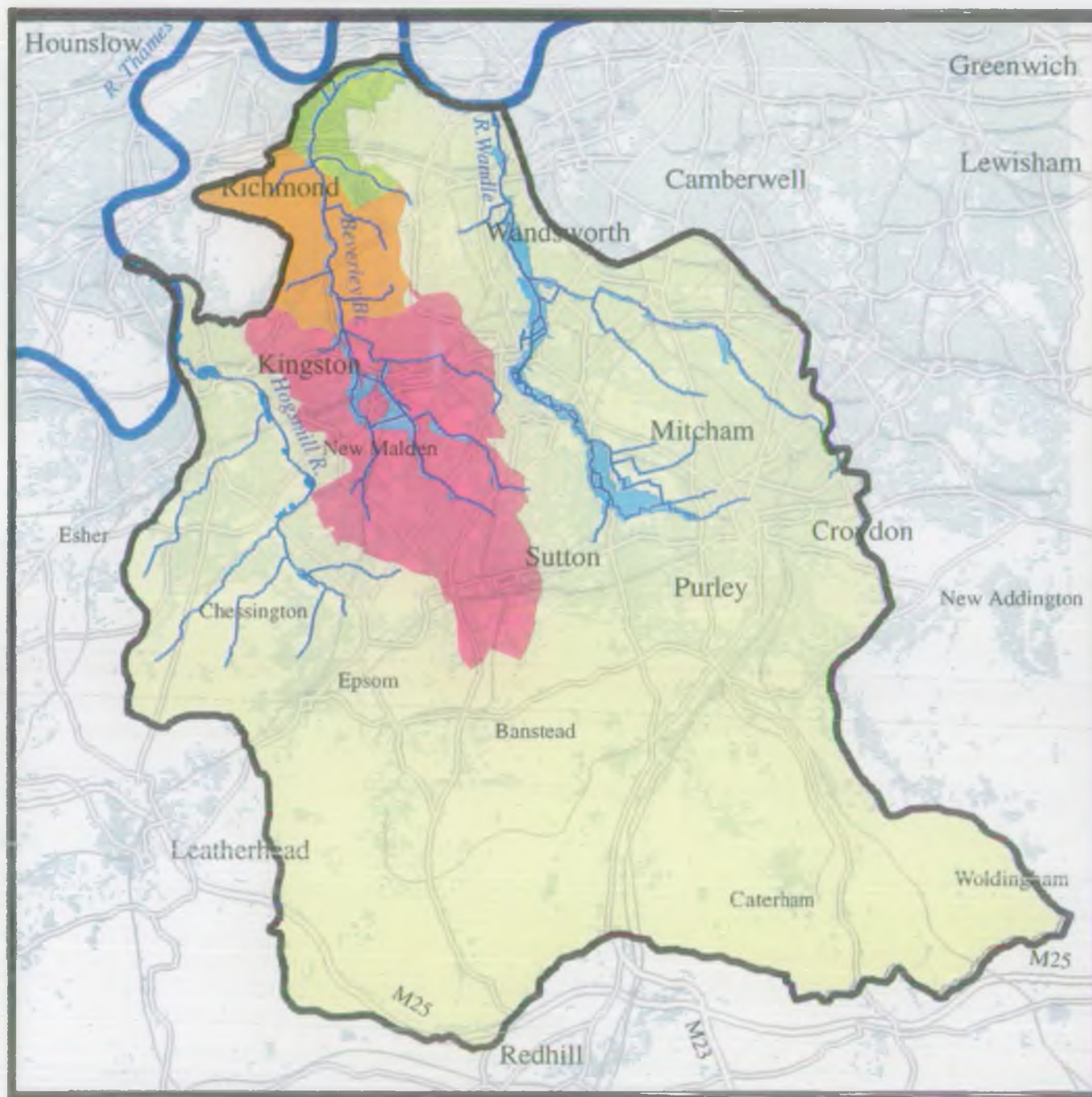
The Hogsmill River suffered from a recorded history of flooding which culminated in an improvement scheme by Surrey County Council (SCC) in the 1950's. As a result the catchment is now regarded as a low flood risk despite damage caused by the great flood of September 1968 and subsequent lesser events in the Villiers Road area of Kingston. Unexplained minor flooding also occurred on the Guildhall site. NRA TR recently took over riparian ownership of the Hogsmill main river from SCC which provides a unique opportunity to promote a river rehabilitation scheme without the usual legal concerns over land ownership. NRA TR are currently studying the efficacy and standard of flood protection afforded by the existing defences. The study will also prove whether proposed enhancement scheme options will be able to improve river habitats without causing deterioration of the existing capital flood alleviation scheme.

Although no flood warnings have been issued on the Hogsmill River since 1986, several amber warnings and one red warning have been issued on the River Wandle and Beverley Brook over the same period. Warnings are issued from the NRA TR office at Waltham Cross using telemetered data from rain gauges and river level gauges within the catchment combined with radar/rainfall forecast data from the Bracknell Meteorological Office.







NRA TR has permissive powers on all three main rivers to ensure that riparian owners carry out their responsibilities in respect of the river bank. However, between the 1930s and 1960s developers of riverside estates left the ownership of the river bank off the deeds. These developers in many instances have long since ceased to trade which leaves no riparian owner with which to negotiate repairs.

A large number of water control structures are present on all three watercourses. On the River Wandle there are six automatic tilting weirs which maintain the level of water upstream but can be opened fully to allow storm water to pass downstream. Rubbish collecting screens have also had to be constructed to prevent concrete channels and culverts becoming blocked. During high flows these must be cleared frequently or become flood hazards themselves. To assist in this matter NRA TR are drawing up detailed reach plans for flood protection purposes.

To ensure that surface water runoff from new developments does not increase the risk of flooding downstream NRA TR have rationalised the process of deciding whether storage is required by catchment modelling. A 'Zoning' map for the Beverley Brook is shown opposite where different reaches of the river network are coloured red, amber and green. NRA TR advise that no new development within a red zone should be allowed to drain into a watercourse without flow attenuation whereas unattenuated runoff from all new developments, up to a certain size limit, in a green zone should be allowed. The amber reaches are less clear cut and site specific investigation would be needed. Zoning maps for the River Wandle and Hogsmill River will be produced by the end of 1994 as part of the NRA TR developing policy on surface water management.



KEY

	Recorded Flooding		Green Zone		
	Modelled Flooding (1 in 100 year event)		Amber Zone		
			Red Zone		
				Scale (approx) 	

None of the three rivers covered by this catchment plan have public rights of navigation. However, large boats can penetrate a short tidal section of the lower River Wandle at high tide. A half tide weir has been constructed by the London Borough of Wandsworth at the mouth which reduces the tidal effect and was intended to enhance this area for water activities. This provision was originally part of the Battersea Boat Yard community project which was subsequently discontinued. Although no formal access agreement exists canoeing also takes place in this lower part of the river.

A similar situation exists on the Hogsmill River. The section between the River Thames and the weir at Kingston is regularly used by canoeists on an informal basis. No water based activities take place on the Beverley Brook.

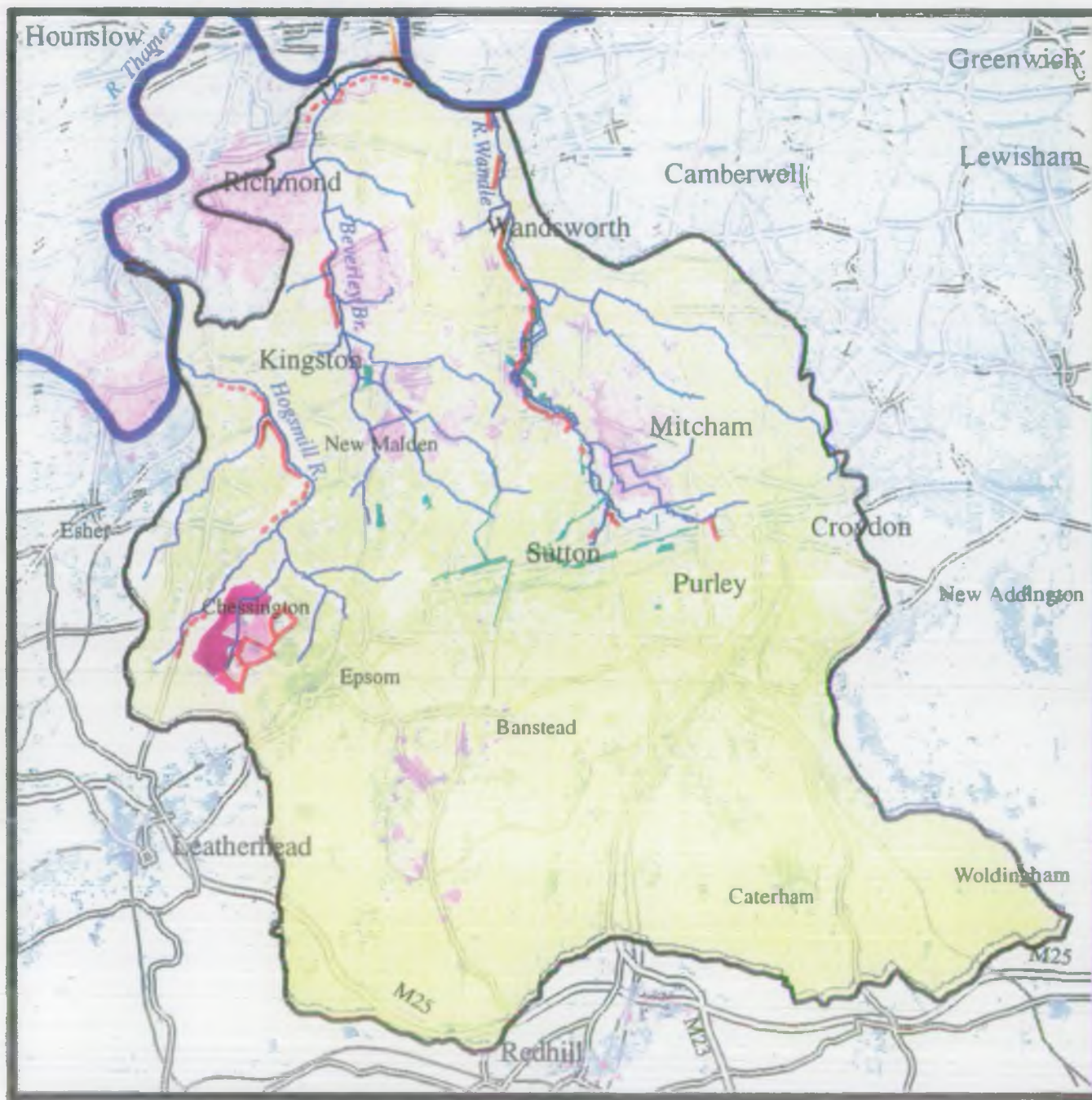
Access to the banks of both the River Wandle and the Hogsmill River is poor in the lower reaches but improves upstream. This is particularly true of the Hogsmill River where it runs through extensive areas of public open space to the south east of the centre of Kingston. Proposals are also in place, which are actively being pursued, to enhance and extend riverside walks along two of the watercourses ie. The Wandle Trail and the Hogsmill Walk. NRA TR is helping in the creation of the Hogsmill River walk by financially assisting the London Borough of Kingston with the provision of a future footbridge. Access to the Beverley Brook is well served as it runs through Richmond Park. The London Walking Forum aspire to create a Beverley Brook Path and to connect all three walks into the inner and outer London orbital walking routes.

The Beddington Mitcham Area of Opportunity located in the Wandle Valley, if developed for gravel extraction, represents an opportunity to create a large body of water for recreation in an area of London identified by the Sports Council as deficient in this respect. The single existing lake on the site is not currently used for recreational purposes. Future development of the site could also create opportunities for improving informal access ie. bridleways, cycleways and footpaths, with a possible link into the Wandle Trail.

NRA TR, through its Recreation Information Strategy, and relevant London Boroughs could promote the Wandle Trail through the joint publication of a suitable guidebook. London Borough of Merton are currently seeking funding from the Single Regeneration Budget for the Wandle Valley Corridor Regeneration Project and working with other London Boroughs in jointly bidding for monies in the Millenium Fund to create a Wandle Valley Regional Park. Both represent future opportunities for the enhancement and promotion of water based recreation and amenity within the catchment.

The proposed NRA TR Hogsmill Rivers Rehabilitation Project creates an opportunity to improve bank access and water space for canoeing because of the NRA's ownership of the river. However, any such use must be carefully managed to avoid conflict with more passive uses.

Within restricted areas of surface water run-off in all three catchments, both existing and proposed flood storage areas offer potential for multifunctional uses which should not be overlooked at the design stage. A good example of the potential educational and nature conservation value of flood storage areas within the Beverley Brook catchment is the 1.1 ha Anton Crescent Wetland in the London Borough of Sutton.



KEY

	Catchment Plan Area		Public Footpaths				
	Public Open Space		Proposed Public Footpaths				
	Horton Country Park						
	Green Chain						
						Scale (approx) 0 ————— 5 km	

2.12 AGRICULTURE

The following is based on an interpretation of MAFF Agricultural Census Data. The more significant trends are viewed as a fair reflection of agricultural activity within the catchment.

The land cover map opposite is a composite representation of winter and summer imagery using data gathered from the Landsat satellite between 1989 and 1992. The map clearly indicates the predominantly urban/suburban nature of the catchment (39% land cover). Most of the agricultural activity is confined to the south of the area in the Borough of Reigate & Banstead and the District of Tandridge. There are also clusters of horticultural holdings on the tilled land shown on the upper reaches of the Hogsmill River.











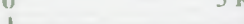




Of the land available for agricultural activity more than 50% is under pasture which is the same proportion as 1983. By contrast only 25% is currently in arable and horticultural cropping compared with 40% in 1983. A marked decrease in cereal cropping has only been partly offset by modest increases in the area under field beans / peas and oilseeds. 752 ha were set-a-side in 1983 and 517 ha were farm woodland. Farmers must not apply fertilisers or persistent pesticides to set-a-side land and are encouraged to manage the land in an environmentally sensitive manner.

There has been a significant fall in the number of dairy cows, pigs and poultry within the catchment. Beef herds and breeding ewes have increased to take their place. These trends are typical of the South of England over the same period. There are still over 190 holdings in the catchment only 10 of which are over 100 hectares.

One of the main features of the catchment is the extent of agriculturally undeveloped open land. Only 21% of land is tilled, grazed or forested. Over 30% of land cover within the catchment consists of scrub, heath, bracken and ruderal weed.



KEY

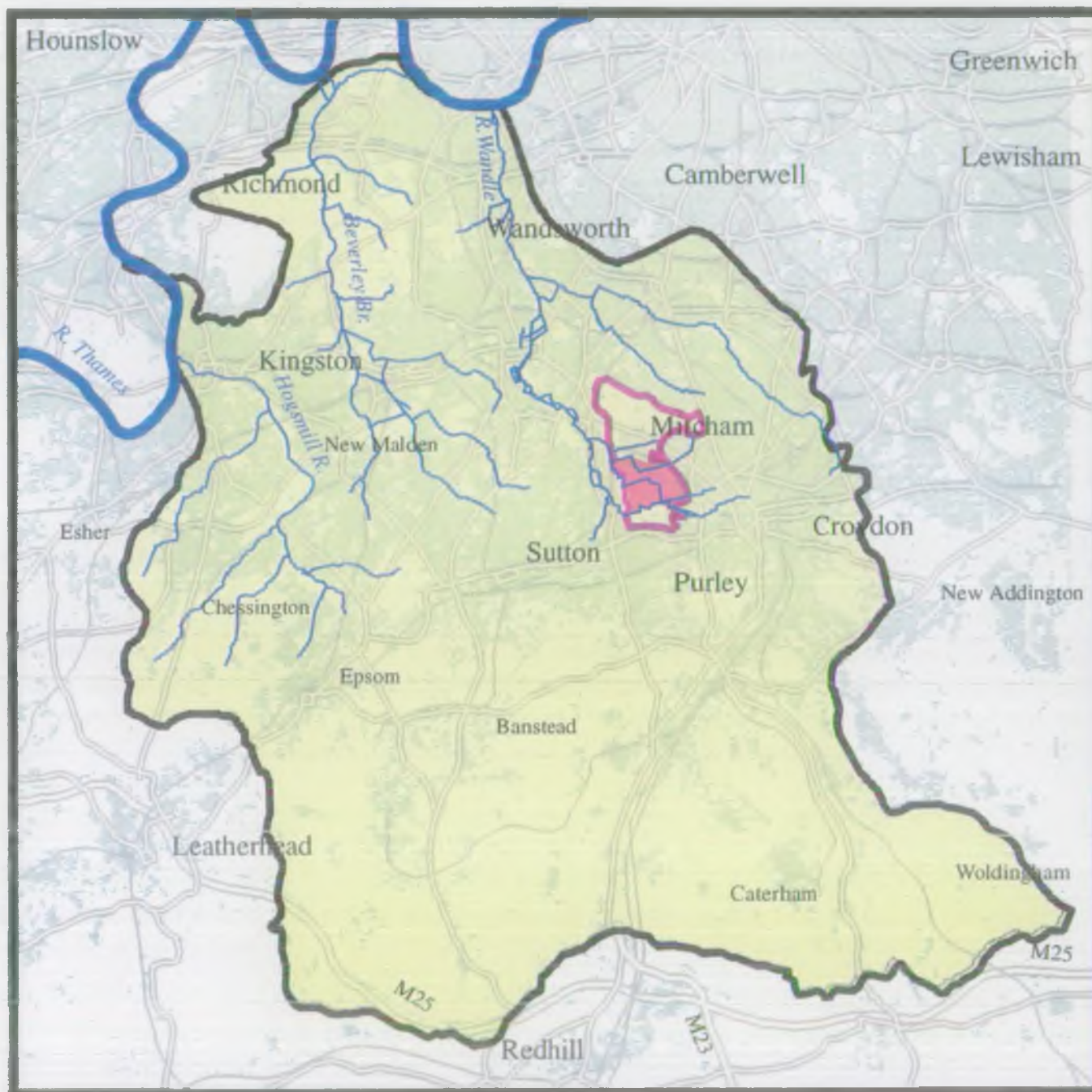
Land Cover Classification					
	Inland Waterway		Deciduous Woodland		
	Grass / Heath		Coniferous Woodland		
	Mown/Grazed Turf		Tilled Land		
	Meadow/Semi Natural		Ruderal Weed		
	Rough Grass/Marsh		Urban		<div>Scale (approx)</div> <div>0  5 Km</div>
	Bracken		Sub Urban		
	Dense Shrub/Heath		Inland Bare Ground		
	Scrub/Orchard				

2.13 MINERAL EXTRACTION AND SOLID WASTE DISPOSAL.

Domestic waste generated within the heavily urbanised catchment area is principally transported via barges on the River Thames to Stanford Le Hope Landfill Site in Essex and to the incinerators at Bermondsey. A number of Local Authorities transport refuse by road to landfill sites in Bedfordshire. Waste transfer stations within the catchment are regularly inspected by NRA TR pollution control staff and when managed and operated correctly pose no real risk to either surface or groundwater quality.

Mineral extraction to date has been confined to the removal of alluvial gravels within the Beddington Mitcham Area of Opportunity (BMAO) as identified in the 1976 Greater London Development Plan. The BMAO covers an area of 485 hectares of open land including Mitcham Common and Beddington Park in the River Wandle catchment. A large part of this area, including land owned by TWUL (Beddington STW), is underlain by sand and gravel deposits for which permission for extraction was originally granted by the GLC in 1985. Under the proposals TWUL upgraded Beddington STW negating the need to continue flooding large open fields with sewage sludge by the construction of new sludge storage tanks and a sludge digester. The phased programme provided for the reinstatement of worked gravel pits with 9 lakes over a 20 year period. Permission for an interim scheme was granted in the 1988 to provide 130,000 cubic metres of effective flood storage capacity and work was concluded in 1990.

NRA TR and the London Borough of Sutton have worked closely together in formulating specific policies within the Unitary Development Plan (UDP) relating to the strategic need for flood storage within the BMAO together with pollution prevention safeguards and an integrated approach towards balancing future opportunities for nature conservation and recreation. The latest TWUL application which involves the proposed backfilling of a number of gravel pits with domestic refuse, in an active waste disposal operation which entails raising the existing land profile, is currently under appeal.



KEY

	Catchment Plan Area						
	B.M.A.O.						
	Proposed mineral extraction						
						Scale (approx) 	

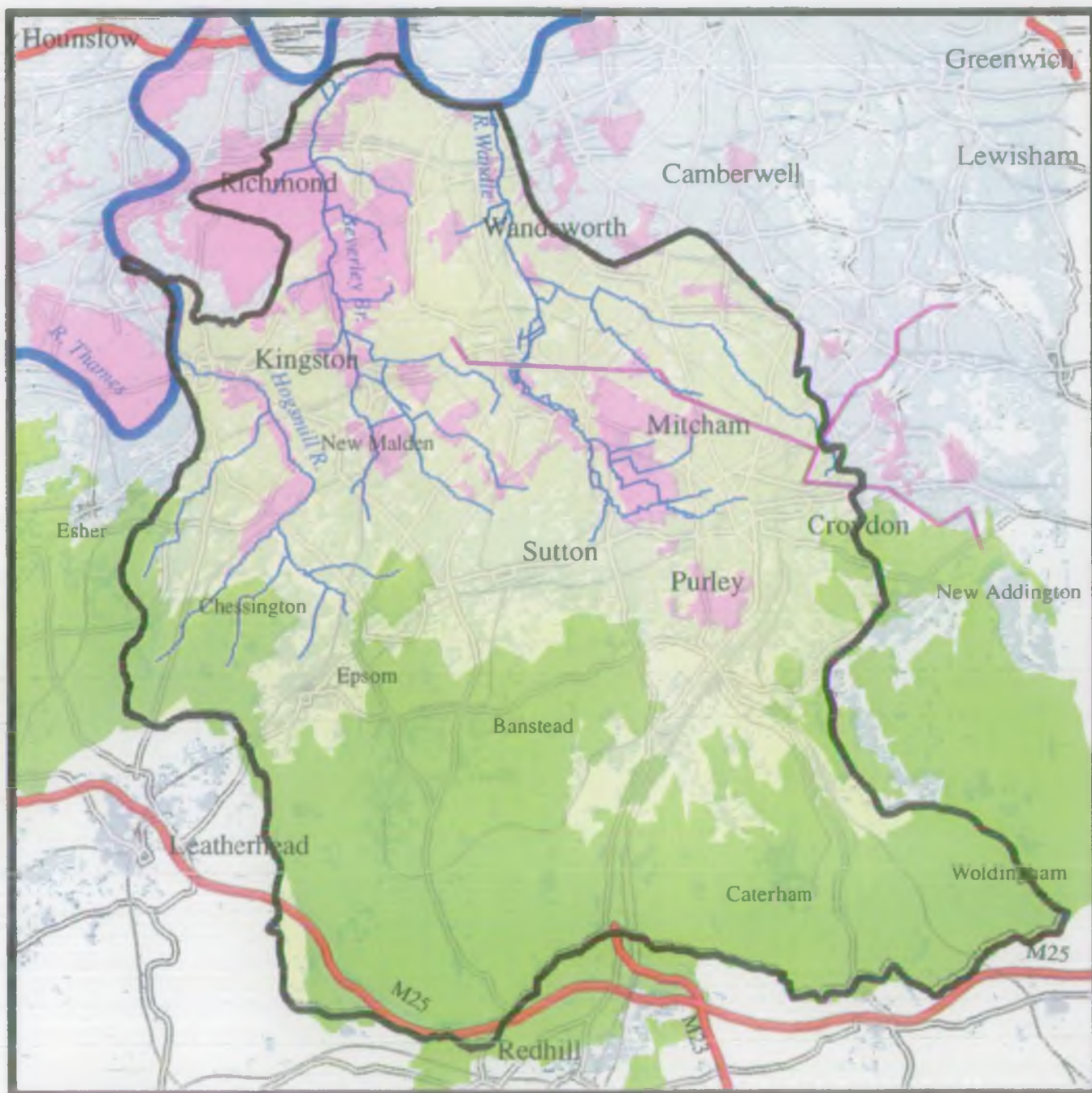
2.14 URBAN DEVELOPMENT

Until the mid nineteenth century the catchment was essentially rural in character but contained some important industries of more than local importance. The River Wandle and Hogsmill River were used to drive a number of mills to support local agriculture but many were converted to the manufacture of gunpowder between the Civil and Crimean Wars. The Wandle valley provided the route for the first public railway in Britain to transport goods between the River Thames at Wandsworth and Merstham near Redhill (1803 to 1839). The expansion of the railways and road network resulted in a rapid period of house building which was halted only by the imposition of Green Belt policies in post-war years and the designation of Metropolitan Open Land. The role that Green Belt plays in providing access to open countryside within the catchment is reiterated in LPAC Advice 1994. Research has shown that, whilst such a policy has been successful in restricting development, much land within the Green Belt is being held purely with the hope of gaining planning permission for development without regard for its current visual character. LPAC advise that Local Authorities should publish Green Belt Management Plans to preserve the quality and encourage public access and recreation.

Despite the pattern of population change within the catchment, net outward migration since the turn of the century, there is continued development pressure on existing open space. In the 1961 census the average size of a household was 4 compared with 2.5 today. This is due to a combination of young people leaving home at an earlier age and growing numbers of single elderly. Hence the underlying level of housing need is still high with an estimated 45,000 new homes required for the London Boroughs within the catchment before 2006.

Transport infrastructure improvements may also impact on the water environment unless appropriate mitigation measures are designed into such schemes. NRA TR and Reigate and Banstead District Council have ensured that the current widening of the M25 has built-in groundwater protection measures to prevent contaminated motorway run-off entering soakaways within source protection zones.

People's choice of lifestyles and housing requirements in the future may result in increased demand for public transport as towns become more popular than outlying villages in which to live and work. Current DoE policy on discouraging out-of-town shopping centres adds political momentum to regenerating town life. However, large towns within the catchment simply do not have the capacity to cope with increased road traffic congestion. London Borough of Croydon's response is to jointly promote a Bill with London Regional Transport for the development of a light rail system (Tramlink) linking central Croydon with Wimbledon, Beckenham and New Addington to foster economic growth and to decrease traffic congestion at peak times. The benefits of improving the quality of urban areas within the catchment include reduced development pressure on existing open space, less traffic pollution and fewer demands on natural resources. These are reflected in "Tomorrow's Towns" an Urban Environment Initiative (1993) sponsored by The Corporation of London, Association of Municipal Engineers, NRA and others. It is hoped that Local Authorities will take on board the aims of the report within the planning process which include making the most of waterside locations and features within new development proposals. One example is the current redevelopment of the old BP site at Carshalton within the London Borough of Sutton. The River Wandle is to be a central feature of the development rather than simply being culverted in order to maximise the space available for new houses.



KEY

	Motorway						
	Urban Area						
	Green Belt						
	Metropolitan Open Land						
	Proposed Croydon tramway						

Scale (approx)
0 5 km

2.15 LAND USE PLANNING

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. Appendix III shows examples of customised MLUP linked to some of the draft key issues identified in this consultation report. 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.

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SECTION 3 STATUS OF THE WATER ENVIRONMENT

3.1 INTRODUCTION

The purpose of the following section is to compare the current status of the Wandle, Beverley and Hogsmill River catchment, or the 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 raised are based on information held within NRA TR and the result of informal consultations with Local Authorities and other organisations. Preliminary options for resolving these issues are suggested in Section 4.

We are particularly interested to receive your views during the formal consultation process on the complete and fair assessment of these issues and the way forward for the Action Plan. Following your written responses it is anticipated that 'working groups' will be convened to discuss contentious issues and how best to resolve them. The results of these meeting will feed through to the **Final Plan** to be published in April 1995. This will have the core aim of clearly identifying an agreed schedule of work (the Action Plan), costed and timebounded, for effectively dealing with these issues and delivering measurable improvements in the status of the river catchment.

The DoE has recently published Guidance on the "Environmental Appraisal of Development Plans". The method recommended can be generalised for any organisation to use with appropriate criteria. NRA TR are currently developing suitable environmental sustainability criteria against which to assess programmes of work. It is intended that actions identified in the Final Plan for implementation by NRA TR will benefit from this process.

3.2 WATER QUALITY

A principal aim of the NRA Water Quality Strategy is to achieve a continuing 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. It is therefore essential to relate the cost of any proposed improvements to the benefits in deciding on whether or not individual schemes should go ahead and in assigning priorities.

ASSESSMENT OF SURFACE WATER QUALITY.

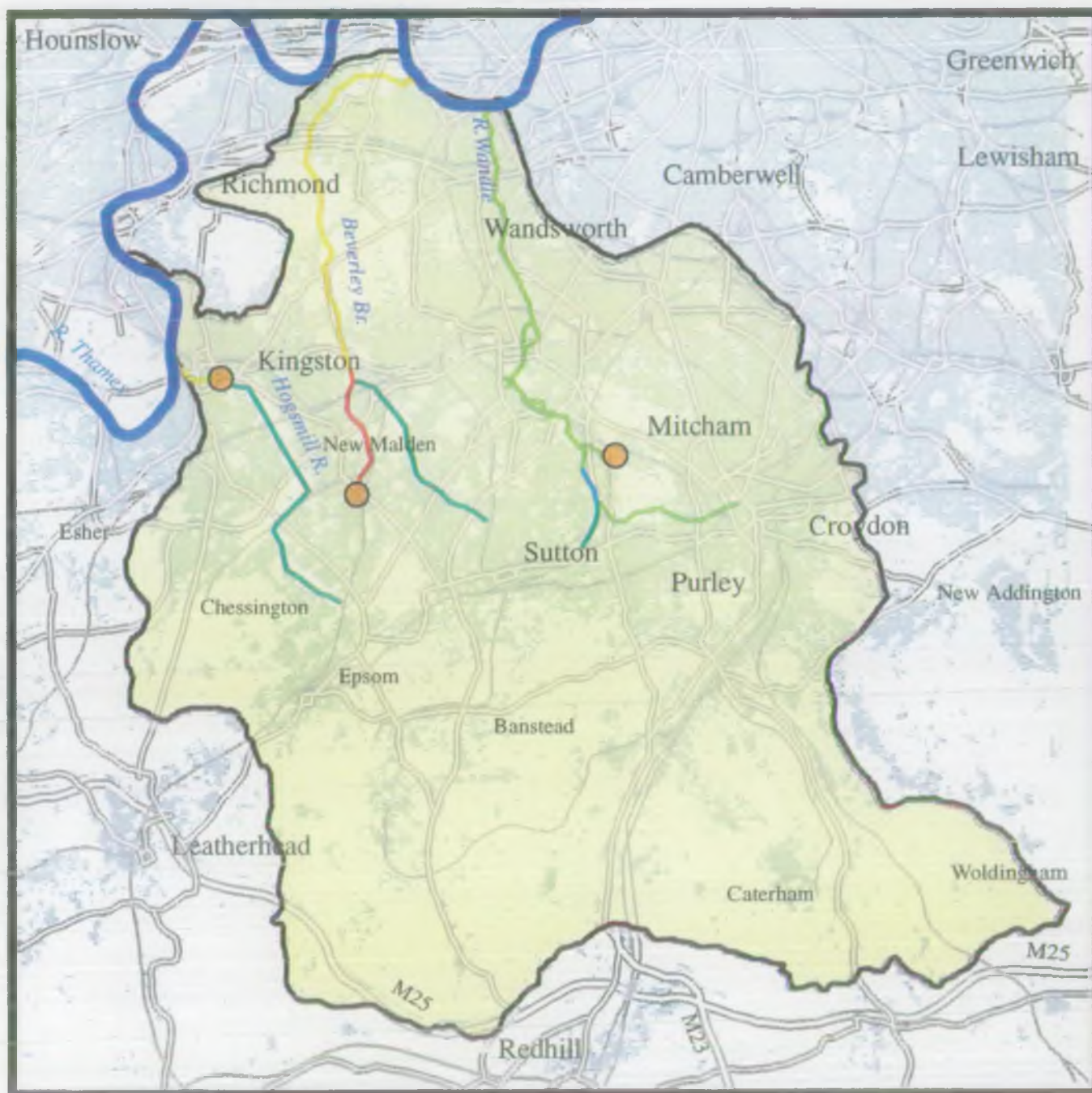
The NRA uses a range of chemical and biological techniques to assess water quality in our rivers. Until recently, the quality of individual lengths of rivers have been reported according to a classification scheme devised by the former National Water Council (NWC). In this scheme, rivers were assigned to one of six classes from 'good' to 'poor' based principally on a knowledge of the biochemical oxygen demand (BOD) and the concentrations of dissolved oxygen (DO) and ammonia. A number of problems have been identified with the application of the NWC Scheme and it has recently been replaced by a new scheme called the General Quality Assessment (GQA). This consists of a number of separate water quality assessments, each providing a separate 'window' through which water quality is viewed. Details of this chemical component are given in Appendix III. It is intended that further 'windows' will be added, covering biology, nutrients and aesthetic quality, but this will depend on the successful development of suitable methods and classification systems.

The current GQA chemical quality of the River Wandle, Beverley Brook and Hogsmill River is shown on the map opposite. This shows that the rivers vary in quality from grade B (good quality) to grade F (bad quality). The highest quality is found in the headwaters of the River Wandle and the poorest quality downstream of the sewage treatment works.

WATER QUALITY OBJECTIVES.

Since the late 1970s, river quality has been judged against statutory and non-statutory water quality objectives. These provide targets for both maintaining current quality and for planning for water quality improvements. The statutory water quality objectives are those specified in EC Directives. The non-statutory water quality objectives are the river quality objectives (RQOs), based on the NWC Classification.

Our rivers are divided into reaches. Water quality objectives are set for each reach to ensure that the water is of sufficient quality to meet agreed uses (eg. water should be of a standard suitable to support a cyprinid fishery). The achievement of this objective is determined by assessing compliance with sets of chemical standards formulated for each objective. River water samples are collected periodically for this purpose at designated sampling sites within each reach.



KEY

	Catchment boundary		Grade C				
	Sewage Treatment Works		Grade D				
General Quality Assessment			Grade E				
	Grade A		Grade F				
	Grade B						
Scale (approx)							0 5 km

3.2 WATER QUALITY

STATUTORY WATER QUALITY OBJECTIVES.

The Water Resources Act (1991) allows the government to set Statutory Water Quality Objectives (SWQOs). These will replace the RQOs. Five uses have been proposed for rivers (River Ecosystem; Special Ecosystem; Abstraction for Potable Supply, Industrial or Agricultural Abstraction and Water Sport Activity). To date regulations have only been produced for the River Ecosystem (RE) use. Five classes have been established within this use and a description within each class is given below.

Descriptions 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 of these are given in Appendix III. Implementation of these regulations is still awaited from government. In the interim period, the current RQOs have been translated into RQOs expressed as a river ecosystem class with a date by which this class can be achieved taking into account any planned investment or any other pollution control initiatives.

RQOs (RIVER ECOSYSTEM CLASS).

The RQOs expressed as a river ecosystem (RE) class for river reaches in the catchment are shown on the map opposite. Water quality either complied with or exceeded the RE class in eight out of the nine reaches in the catchment.






ISSUE 1 : All three rivers have a history of poor chemical and biological water quality downstream of the sewage treatment works.

THE EC DIRECTIVE ON THE QUALITY OF FRESHWATERS NEEDING PROTECTION OR IMPROVEMENT TO SUPPORT FISH LIFE (78/659/EEC).

Only three of the nine reaches in this catchment are designated under this directive. All three are on the upper reaches of the River Wandle and all are designated as cyprinid fisheries. Two out of the three reaches achieved or exceeded the standards required to support a cyprinid fishery during the four year period 1990 - 1993. The Croydon Branch of the River Wandle failed to achieve the required standard for two samples out of eighteen in 1990. These failures have not re-occurred since this time.



KEY

River Ecosystem Class			Catchment Plan Area				
	RE2						
	RE3						
	RE4						
	RE5						

Scale (approx)
0 5 km

3.2 WATER QUALITY

THE EC DIRECTIVE ON POLLUTION CAUSED BY CERTAIN DANGEROUS SUBSTANCES DISCHARGED INTO THE AQUATIC ENVIRONMENT OF THE COMMUNITY (76/464/EC).

This Directive is concerned with reducing pollution caused by substances known to be particularly hazardous to aquatic life. These are metals and some organic compounds and their concentrations in effluents and receiving waters downstream of discharges in which they are known to be present is monitored and strictly controlled. The concentration of pesticides, including hexachlorocyclohexane (HCH) e.g. Lindane, is measured in all the rivers downstream of the sewage treatment works.

ISSUE 2 : The concentrations of the pesticide Lindane exceed the environmental quality standard (EQS) for the receiving waters downstream of the sewage treatment works; a common occurrence in many urban watercourses.

There are a number of sources of HCH including non-point surface water run-off, aerial deposition together with point sources which include surface water sewer discharges as well as sewage treatment works. HCH is ubiquitous in the environment and the NRA is investigating methods of control. At the present time the only authorised discharge of HCH is at Worcester Park STW.

BIOLOGICAL STATUS

Currently there is no biological grading system in place for the rivers in the catchment area. However, a GQA 'window' to cover biology is to be introduced. In the interim, the biological status of the three river catchments will continue to be monitored on an annual basis at routine chemical monitoring sites. In recent years sampling has also been directed towards improving the spatial coverage of the main rivers and tributaries.

The biological quality of a site is shown by the number of different macroinvertebrate taxa present (small aquatic animals) and by their individual susceptibility to pollution. This is measured by using the Biological Monitoring Working Party (BMWP) score system. With this index, pollution sensitive taxa are allocated high scores and the more ubiquitous pollution tolerant types are given low scores. The total BMWP score is calculated by adding the scores allocated to each taxa present in a standard sample. Within NRA TR, BMWP scores above 100 generally indicate good diversity whilst scores below 20 occur at the most polluted sites. The Average Score Per Taxa (ASPT) is a useful summary measure of the balance between pollution tolerant and pollution sensitive taxa in a sample. ASPTs below 3.00 occur when only highly tolerant families are present (very poor water quality) whilst ASPTs above 5.00 indicate a more even spread of taxa as expected if water quality is not a limiting factor. Marked differences in BMWP scores which are corroborated by a change in ASPT are particularly strong evidence of water quality changes.

3.2 WATER QUALITY

The BMWP scores obtained from monitoring sites within the catchment are shown on the map opposite and more details are given in Appendix III. A large proportion of watercourse length in all three rivers achieves only poor or very poor biological quality. The primary cause of the restricted biological quality is the poor chemical water quality due to the discharges from the sewage treatment works. Surface water run-off from the urban areas and frequent pollution incidents also contribute to the poor biological scores. Some chemical pollution incidents may have long term effects on biological quality.

ISSUE 3 : Discharges of surface run-off from urban areas produce short term deteriorations in water quality which has a detrimental effect on biological quality.

The Worcester Park STW discharge also causes an occasional midge problem in the river within Kingston. The suspended solids discharged from the STW constitutes a rich and abundant food source for midge larvae which reach exceptionally high densities. Jet washing of the riverbed every two to three months is effective at artificially reducing the density in the short term.

ISSUE 4 : Nuisance midge swarms below Worcester Park STW. and to a lesser extent below Hogsmill STW.

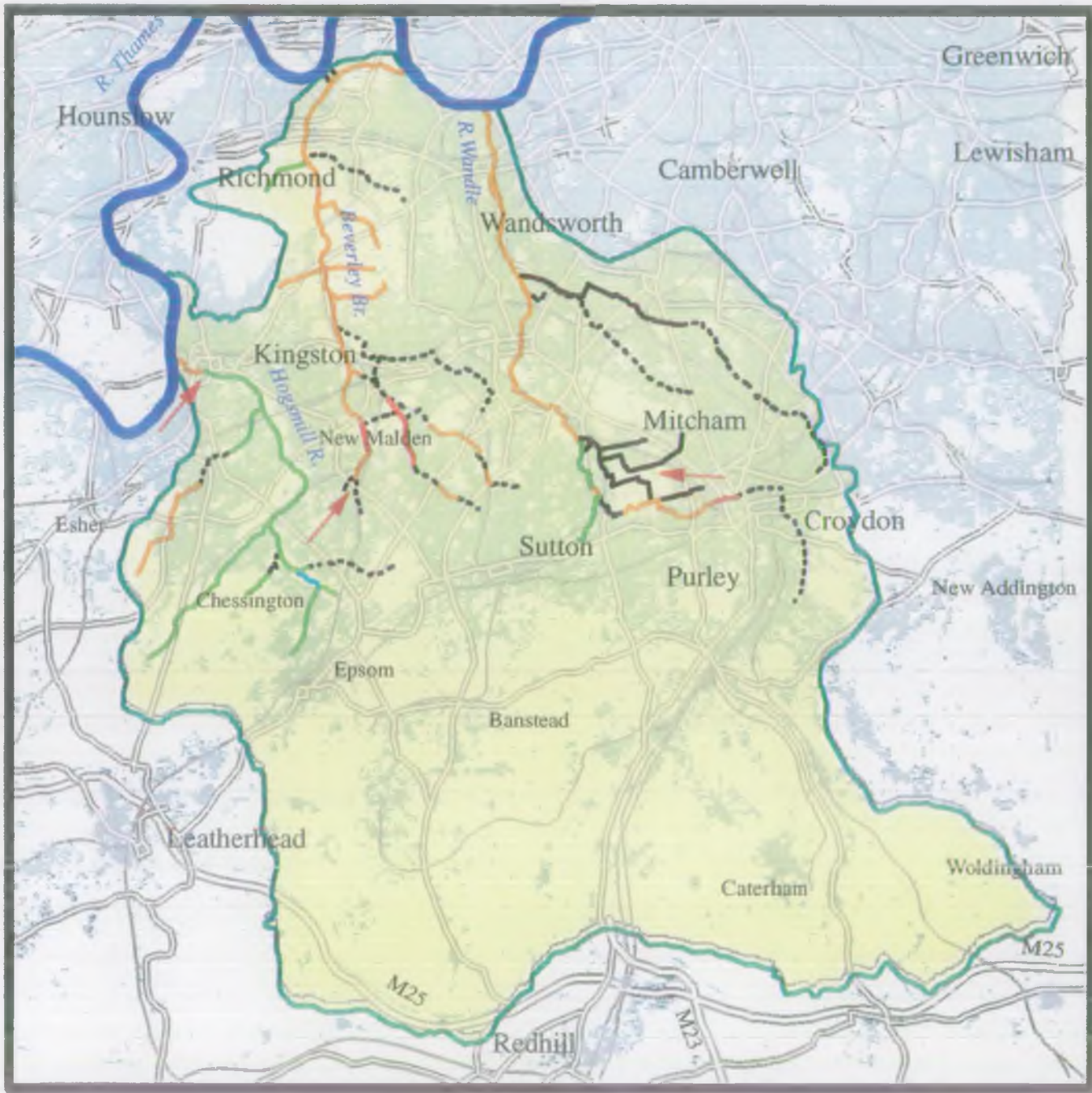
BACTERIOLOGICAL STATUS

There are no bacteriological standards yet available that can be used to assess health risks associated with river water contact.

All rivers that flow through urban areas or that receive discharges of treated sewage effluent contain large numbers of microorganisms, some of which may be potentially harmful. Bacteriological levels in the three rivers are particularly high below the discharge points from the sewage treatment works.

The NRA does not recommend the pursuit of any activity that results in bodily contact with river water but it is the responsibility of the Local Authority to advise on matters of public health.

ISSUE 5 : Conflict between the desire to increase access to the rivers within existing Public Open Space and public health considerations.



KEY

Mean BMWP scores (1991 - 1994)			E - Very Poor (0-19)				
	A - Very Good (>150)		Culvert				
	B - Good (101 - 150)		No information				
	C - Fair (51 - 100)		Major STW discharge			<div>Scale (approx)</div> <div>0 ————— 5 km</div>	
	D - Poor (20 - 50)		Catchment Plan Area				

3.2 WATER QUALITY

BLUE - GREEN ALGAE

Blue - green algae are organisms with some properties characteristic of both bacteria and algae. They are capable of photosynthesis and the pigment required to do this gives the algae a blue-green colour. 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 people. The blue-green algae monitoring programme within NRA TR, as directed by policy from the NRA Toxic Algae Task Group, is continuing within the catchment on a reactive basis. At the request of the Royal Parks Commission a two year study was undertaken on blue - green algae in standing water within Richmond Park during 1991-1992. Four out of the thirty ponds sampled had significant algal blooms. This information was passed to the local Environmental Health Department who are the competent authority for assessing any subsequent risk to public health. The need for water quality standards relating to blue-green algae and their toxins has not been addressed to date.

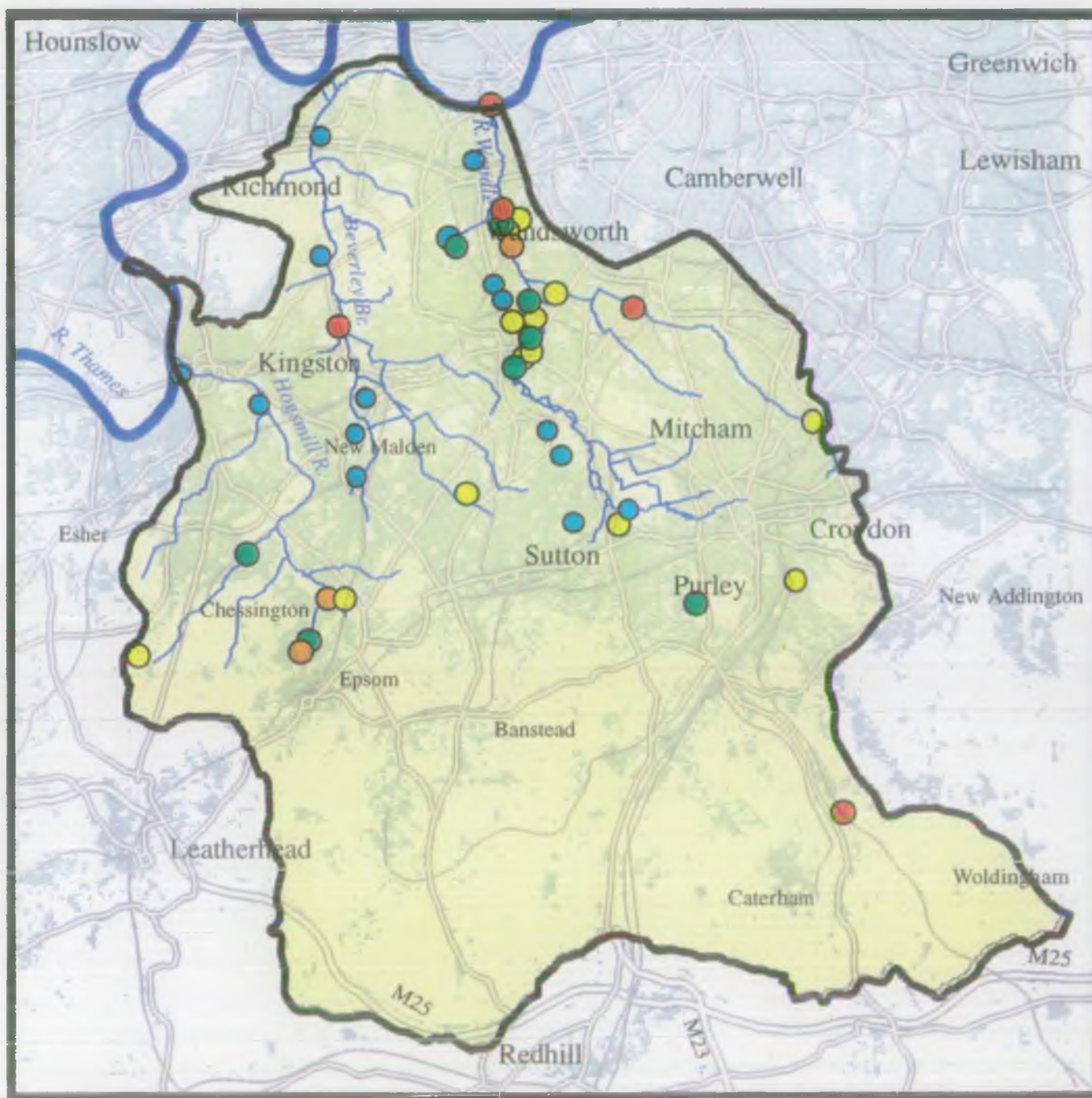
ISSUE 6 : Presence of blue-green algae in standing water within Richmond Park.

POLLUTION INCIDENTS






All three river systems are subject to frequent pollution incidents. Many of these are minor and have little effect on water quality and amenity value but some can result in very significant damage and long term ecological effects such as a cyanide pollution of a tributary of the Hogsmill River in 1991.

The map shows the geographical distribution of significant pollution incidents over the three year period 1990 - 1993. Of these 33 incidents, 15 were related to oil, 9 to chemicals and 5 to sewage. 12 of these incidents resulted in prosecution being taken by the NRA and total fines of £33,000 were imposed by the Courts.

ISSUE 7 : Frequent pollution incidents cause significant effects on water quality and ecology.



KEY

Type of pollution			Not known			
	Oil					
	Sewage					
	Chemical					
	General					

Scale (approx)
0 5 Km

3.2 WATER QUALITY

GROUNDWATERS

The southern half of the catchment is underlain by outcropping chalk which forms the major aquifer for London. To the north of Epsom and Croydon the chalk is concealed by an increasing thickness of younger deposits, consisting of the Woolwich/Reading Beds and London Clay. Terrace gravels form a thin veneer over parts of the London Clay and contain groundwater, sometimes in appreciable quantities.

The quality of the gravel groundwater is extremely variable. Local contamination from past industrial activity is fairly widespread e.g. near Carshalton and at Beddington. Future development of contaminated sites located on the Terrace Gravels will, where possible, include measures to rehabilitate both surface and groundwater. The gravel groundwater is locally abstracted for industrial usage.

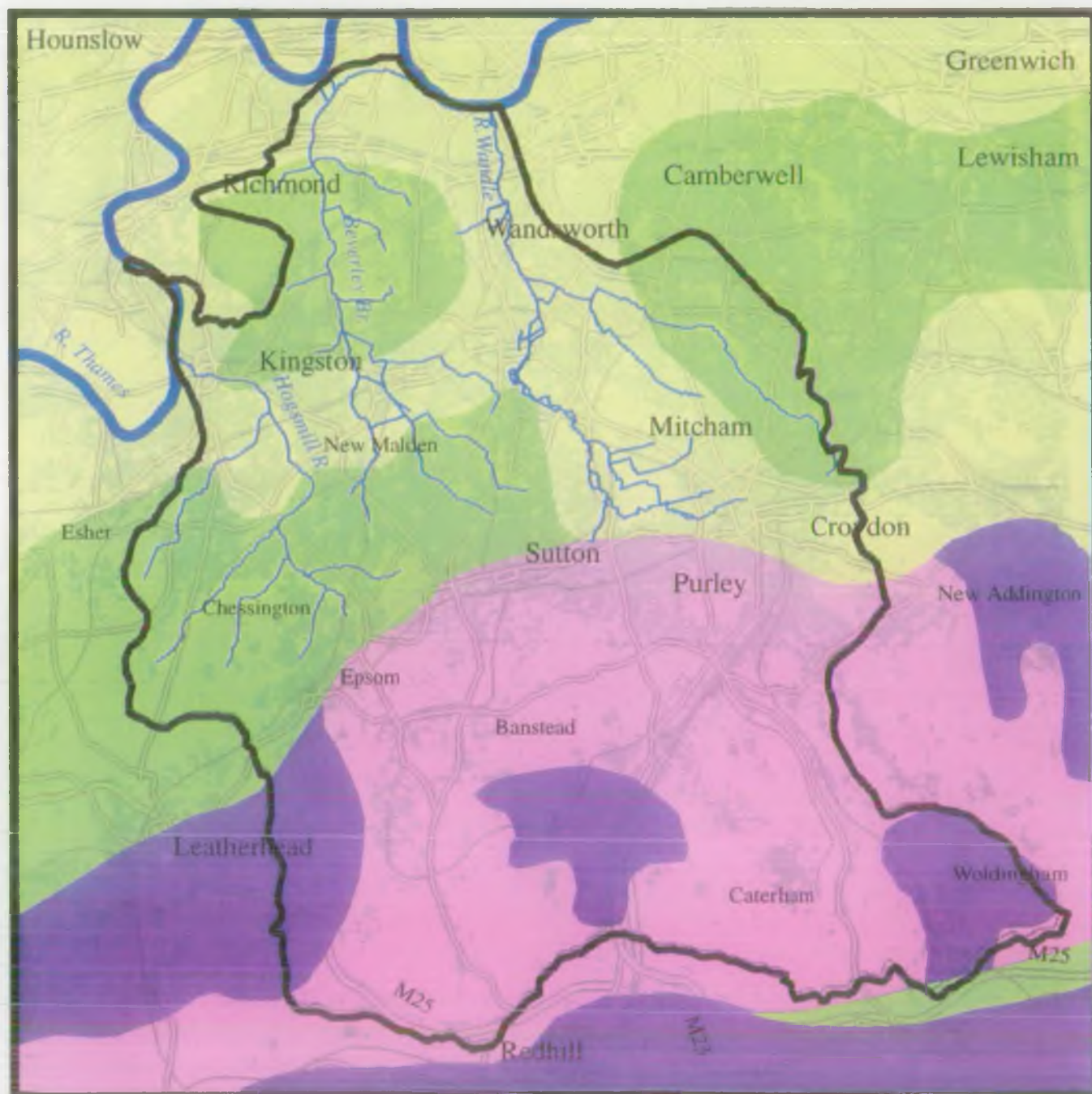
The North Downs chalk is a major recharge area for water abstracted within the London Basin. Being permeable it is vulnerable in places to groundwater pollution. There is a need to ensure that local abstractions, used principally for public supply purposes, are adequately protected. The quality of chalk groundwater, with the exception of part of the Croydon area where it is variable, is consistently good. Developments and activities which may prejudice this quality will be controlled or opposed such that this overall 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 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 six public supply sources within the catchment. These zones are based on the most reliable information currently available. However it is accepted that these zones will be redefined if more precise and accurate data become available.

The Authority has also published a 1:1,000,000 scale groundwater vulnerability map of England and Wales based on the presence of the overlying soil and underlying geology (see map opposite). Larger scale 1:100,000 maps are also scheduled for publication and sheet no. 39 titled West London has just been produced and covers part of this catchment area.

The NRA currently monitors the quality of groundwater from a number of sources within the catchment in order that any changes, however subtle, may be detected. 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 past activities undertaken several decades ago. It is important therefore to use this information to assess the effect of present day activities on groundwater quality.

ISSUE 8 : Vulnerability of the major groundwater catchment zones and the chalk outcrop area to pollution.



KEY

Groundwater Vulnerability Classification					
	Major Aquifer High Vulnerability				
	Major Aquifer Intermediate Vulnerability				
	Minor Aquifer				Scale (approx) 
	Non Aquifer				

3.3 WATER QUANTITY

In managing water resources the NRA seeks to achieve a sustainable balance between the needs of the environment and those of public and private water supply. The NRA must have particular regard for the statutory duty of the Water Companies to supply water, whilst at the same time seeking to further the conservation and enhancement of the natural environment. The Water Resources Act sets out a system of Abstraction Licences which allows the NRA to control the abstraction of water. The Act also sets out what matters the NRA must take into account when considering an application for a licence (eg. whether the requirements of the applicant are reasonable ; the impact on other water users; the impact on river flows/groundwater levels) and describes the procedures which must be followed when applying for a licence.

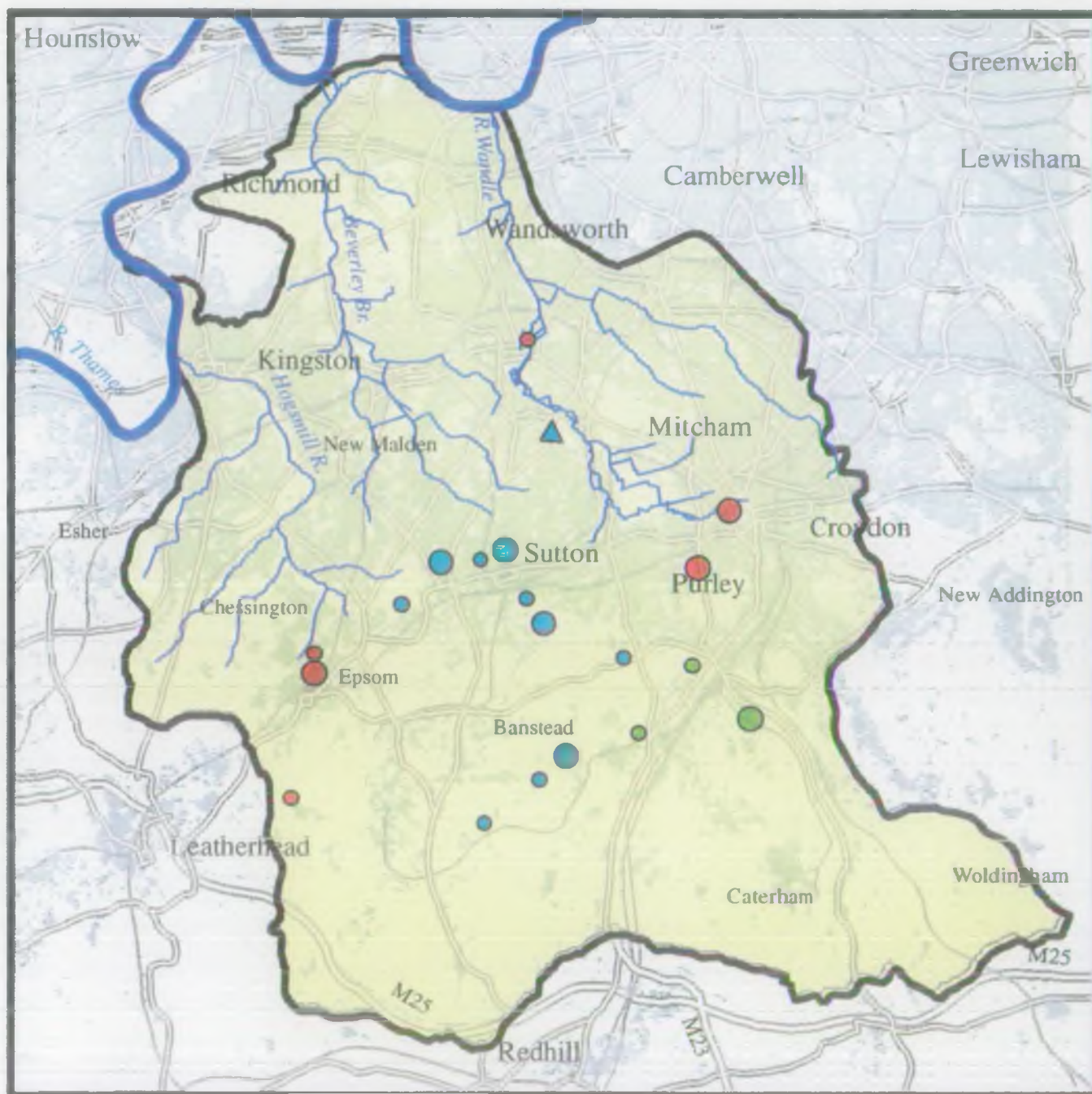
In response to its duties under the Water Resources Act the NRA TR has developed a set of formal policies for handling applications for licences and changes to existing licences. These policies do not in general allow the abstraction of water from rivers (or nearby groundwater) for a consumptive use in the summer months and encourage the development of winter storage for uses such as spray irrigation. It is also unlikely that the NRA would grant new licences authorising abstraction for continuous major abstractions such as potable supply. 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 **Ecological Acceptable Flows**, which will help our understanding of what a living river needs to survive.

The extended dry period from 1989 to 1992 has increased public awareness and concern about the impact of abstraction on river flows and spring sources within the catchment area. It is important however to distinguish between the impacts of abstraction and impacts of drought which are beyond our control. The NRA nationally is developing a methodology for assessing the severity of low flow conditions resulting from excessive but authorised abstraction.

Water resources within the catchment for public water supply are operated by three water companies; Sutton District Water Plc, Thames Water Utilities Ltd. and East Surrey Water Plc. In the main, supplies are derived from groundwater (see map opposite). These are augmented by bulk transfers of River Thames derived water via Thames Water Utilities Ltd. Local groundwater resources are largely fully committed. In a number of instances, abstractions for public water supply are linked to requirements to protect spring flows into local ponds such as Carshalton on the headwaters of the River Wandle. At times of naturally low groundwater levels, such as during the recent drought, these ponds can respond rapidly to groundwater pumping and in such cases, licences have been granted requiring augmentation support of the ponds under such circumstances.

ISSUE 9 : Periodic drying-up of the spring-fed ponds which form the source of the River Wandle.

Opportunities for further water resources development within the catchment will be limited, although with appropriate environmental protection measures small increases in average and daily abstraction may be feasible in some locations.



KEY

Catchment Plan Area	Abstraction use/Source/Volume	Water Supply Company		
	○ Public Supply, from Ground, >10(Ml) daily	Thames Water Plc		
	○ Public Supply, from Ground, <10(Ml) daily	Sutton District Water Plc		
	△ Flow Augmentation <10(Ml) daily	East Surrey Water Co		
			Scale (approx)	0 5 km

3.3 WATER QUANTITY

In liaison with Local Planning Authorities, NRA TR would normally seek to discourage development (unless new resources can be made available in good time) within the catchment where water resources are already scarce or where additional development is likely to result in less reliable supplies for the existing population and industry.

ISSUE 10 : Potential impact of development proposals on water resources which may lead to undesirable environmental consequences.

The identification of minimum groundwater level requirements for sustaining sites of conservation interest will be aided by recent MAFF proposals for the production of Water Level Management Plans. Priority is to be given to SSSIs. English Nature are currently compiling a list of sites, some of which are likely to fall within this catchment, and their associated water level requirements. Following public consultation agreed objectives will be set out in the plan together with the means by which those objectives will be met.

Future growth in demand for water may be influenced by a number of factors; for example, by increasing water use in the home, population growth, local development pressures and economic trends which may effect commercial water usage. "Future Water Resources in the Thames Region", published in June 1994, sets out a strategy for the future planning and sustainable management of water resources to meet the reasonable needs of public water supplies, industry and agriculture in the region. It shows that additional water resources within the area supplied by Sutton District Water Plc. will be required to sustain planned levels of local development and forecast demand beyond the turn of the century.

Controlling growth in demand for water is a critical feature of the strategy for the longer term. Control of losses through leakage from mains and encouraging more efficient use of water at work and at home can significantly affect growth in demand for water. In this way it may be possible to delay the need for major new strategic water resource schemes (such as the transfer of water from the River Severn to the River Thames at times of low flows or the proposed reservoir in South-west Oxfordshire) or perhaps avoid them altogether for the foreseeable future.

Whilst the scope for further control of leakage within the catchment is being explored, a number of water resource schemes are being investigated in order to meet anticipated growth in demand for water beyond the turn of the century. A key element of this will be the time limited licence at Chipstead Valley which may be made permanent subject to adequate environmental protection. Additional support is also being sought through the use of currently disused sources. Opportunities are also being investigated at the southern fringes of the confined aquifer of the London Basin where abstraction may be possible as a management opportunity to control rising groundwater under central London. Despite the serious difficulties that rising groundwater levels could cause there would be major benefit in the rehydration of many natural spring, stream and pond features.

3.3 WATER QUANTITY

FLOOD DEFENCE

Reducing the risk of flooding from the surface waters in the catchment forms an important part of NRA TR 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 floodplain 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 for a garden. The number of HE units are totalled within an individual river reach and placed within one of five land use bands (see Appendix III), each with a target range of flood defence service levels. These are shown on the map opposite. By comparing target standards of service against actual monitored flooding events it is possible to identify adequately, inadequately or excessively protected reaches. Currently there is an insufficiently long flood history against which to assess target standards of service.

ISSUE 11 : Lack of historic and modelled flooding data against which to assess flood defence Standards of Service.

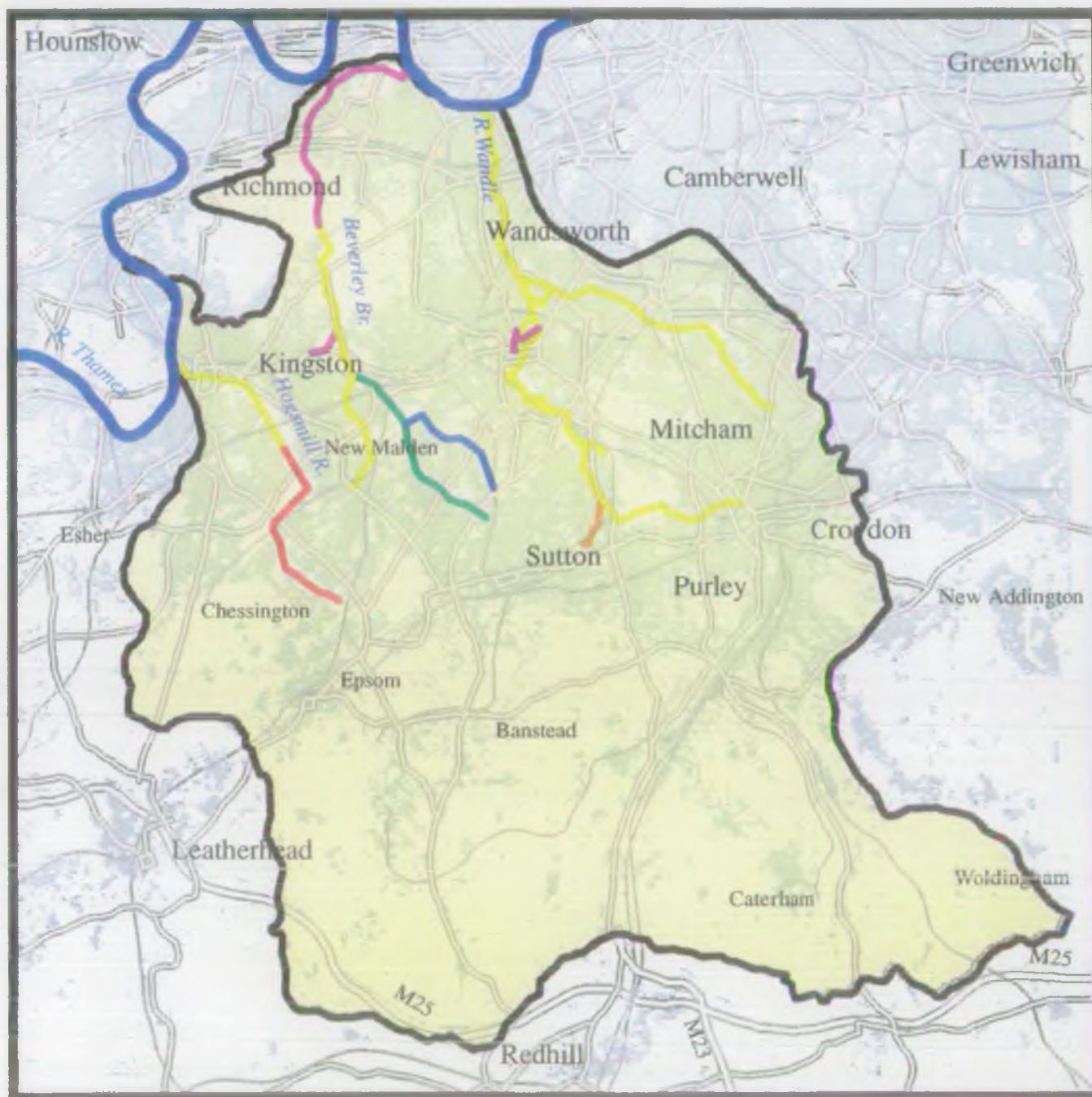
In order to define predictively the effect of proposals for flood alleviation works based on site specific problems as identified in Section 2.10, hydrological and hydraulic modelling must first be undertaken. Such models have either recently been completed, or are about to be completed, on all three rivers. Monies have been put aside for capital schemes which may be proposed if improvements in maintenance procedures alone are deemed insufficient to achieve reasonable standards of service. NRA and MAFF approval (for grant aiding) a capital flood defence scheme is dependent upon proving that the benefits of such work exceed the costs on a standardised basis. The enhancement scheme being proposed for the Hogsmill River is also subject to economic justification.

ISSUE 12 : The existing flood protection works on the Hogsmill River have seriously damaged the river channel ecosystem and river corridor.








Implementation of the enhancement scheme will also require the eradication of invasive Japanese Knotweed which has over-run the bankside plant community. Eradication using Glyphosphate is required well in advance of any scheme which proposes removal of bankside soil off site.

In order to prevent high tides reaching the Beverley Brook, two large flap valves were installed in a tidal barrier at Ashlone Wharf prior to 1986 by the former Greater London Council (GLC). Two fixed side weirs were also built at Westfields and Priests Bridge to divert a proportion of high storm flows via concrete culverts directly into the River Thames to prevent flooding on the lower reaches of the Beverley Brook.

ISSUE 13 : Low base flows in the Beverley Brook downstream of the flood relief channels.



KEY

	Catchment Plan Area	Land Use Bands and target Standards of Service for flood plain areas			D (2 to 5 years)		
					E (1 to 2 years)		
			A (50 to 100 years)		X (unclassified)		
			B (20 to 50 years)			<div>Scale (approx)</div> <div><div>0</div><div>5 km</div></div>	
			C (10 to 50 years)				

3.3 WATER QUANTITY

The underlying cause of flooding in the Wandle, Beverley Brook and Hogsmill catchments is continuing urbanisation both in the floodplain itself and throughout the catchment. The impermeability of paved areas increases both the quantity and speed with which surface water drains to the rivers. Future urban development must therefore not increase the risk of flooding in the catchment and should facilitate where possible the reduction of existing flood risk. This can be achieved by temporary storage of runoff in ponds, soakaways and at source retention. In order to define the need for and amount of flow attenuation required from new development NRA TR has developed a process called 'zoning' using rainfall-runoff models (see section 2.10).

ISSUE 14 : NRA TR has no effective legislative control in setting run-off/storage criteria for proposed developments within red zones.

Provision of flood storage within the catchment also has additional benefits in terms of water quality and ecological status in the receiving watercourse. The design of flood storage areas to allow the maintenance of a minimum level of water within the site can also be of great conservation and education value. One such example is the 1.1 ha flood storage area known as the Anton Crescent Wetland on the upper reaches of the Beverley Brook. This area of former allotments was converted into a flood storage pond to alleviate flooding on the Pyl Brook. In a joint venture, the London Borough of Sutton, NRA TR and Sutton Conservation Group now actively manage the site for conservation purposes as well as flood storage. Westbourne local primary school have access to the site for educational purposes which is especially important in an area of deficiency in terms of distance from other wetland conservation sites.

ISSUE 15 : Deficiency of permanent waterbodies within flood storage areas.

ISSUE 16 : Opportunity to maximise environmental and recreational benefits associated with provision of flood storage at BMAO.

NRA TR and Local Authority flood defence maintenance regimes on main and non-main rivers within the catchment could potentially damage sites of both ecological and archaeological importance.

ISSUE 17 : Identification of appropriate management techniques for specific reaches of river banks and channels.

NRA TR also operates a flood warning service which uses a combination of rainfall data from a number of sources and river level data. Flood warning standards of service ensure that local police are informed of potential flooding of property four hours in advance in rural areas and two hours in advance in urban areas. The number of rain gauges and river level gauging stations within the River Wandle and Hogsmill River catchments are now deemed sufficient to generate reliable catchment wide data for flood warning standards of service to be met.

ISSUE 18 : Insufficient data on river levels on the upper reaches of the Beverley Brook and Norbury Brook.

3.4 ECOLOGICAL STATUS

The current status of the conservation value of the river channels and adjacent habitats within the catchment as shown on the map opposite is principally the result of urbanisation. There has been a marked degradation in quality due to the combination of loss of floodplain and river corridor habitats, increased surface water run-off and treated effluent disposal causing poorer water quality and increased flashiness of rivers. The ecological status is assessed by the NRA in the following ways; river corridor (in-stream and bankside 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. The London Ecology Unit also give detailed advice on the ecological status of rivers and river corridors. An integrated approach towards the assessment of ecological status and in the design and implementation of measures directed towards restoring or protecting ecological value is recognised as the most effective approach.

ISSUE 19 : The ecological status of the rivers within the catchment cannot be assessed by any one method in isolation.

The results of river corridor surveys undertaken by the London Wildlife Trust for the NRA on the River Wandle and the Beverley Brook in 1989 are shown on the map. The most ecologically fragile reaches and adjacent habitats on the River Wandle were identified as Morden Hall Park (950 metres) and Watermeads to Goat Bridge (1450 metres). The entire length of this river supported abundant and varied plant growth, including water crowfoot (*Ranunculus sp.*), which contributes to it's aesthetic and ecological value. The Beverley Brook was clearly poorer in terms of channel habitat diversity, due primarily to water quality limitations, but bankside habitats include lengths of high ecological value such as at Richmond Park. Apart from one small area on Wimbledon Common and a small damp grassland area by the Pyl Brook no typical wetland habitats were recorded. A strategic river corridor survey undertaken by the NRA TR in 1993 on the Hogsmill River identified the middle and upper reaches of the Bonesgate Stream as critical and the parts of the upper reaches of the Hogsmill River and Green Lanes Stream as important in terms of conserving the semi-natural mobile channel and associated high quality bankside flora. The Hogsmill River supported extensive reaches of diverse emergent and aquatic vegetation and several London rarities such as *Potamogeton berchtoldii* were recorded.

ISSUE 20 : Continuing need to protect existing in-stream and bankside habitats.

Sections of good biological quality, as indicated by aquatic macroinvertebrate surveys, do occur throughout the catchment. A strategic NRA TR macroinvertebrate survey of the Hogsmill River and it's tributaries identified over 130 species, including London rarities. Particularly rich assemblages of water beetles, molluscs and water bugs were found. However, the variety of caddisflies, mayflies and dragonflies, which are more sensitive to water quality, was lower. The upper reaches of the Hogsmill River had the most diverse macroinvertebrate communities which included several taxa characteristic of a chalk stream. The Bonesgate and Horton Streams were identified as supporting relict communities characteristic of headwater streams.

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3.4 ECOLOGICAL STATUS

No species level surveys have been completed in the Beverley Brook or Wandle sub-catchments but routine surveys have shown particular sections to support notable faunas. The River Wandle below Beddington STW and the Carshalton Branch of the river supports a strong component of caddisflies and other groups characteristic of chalk streams. Biological quality throughout the Beverley Brook catchment is poor although several small streams draining Richmond Park and Wimbledon Common retain faunas of ecological value.

ISSUE 21 : Specific protection measures are required to protect the biological status of headwaters.

NRA TR has undertaken a pilot study with the University of Southampton (GeoData Institute) in an attempt to define "natural" river channel target characteristics towards which any future enhancement investment would apply. A variety of data sets for the Hogsmill River catchment e.g. landscape, invertebrate, ecology, geomorphology, water quality and quantity, were integrated into digital format. High powered statistical analyses were undertaken within a geographical information system (GIS) to characterise the spatial pattern of river channel and bankside ecology and relate this to variations in associated factors. Preliminary results have indicated river reaches of greatest enhancement and conservation potential based on "naturalness" indices which support and develop the results obtained from the river corridor survey. Similar work on river catchments with more pronounced environmental gradients is required before the efficacy of such an approach can be fully assessed.

A consequence of the urbanisation of this catchment has been an increased flashiness of rivers, the historic response to which 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 carry high peak flows which wash out flora and fauna.

ISSUE 22 : Extent of artificial river channel and corridor throughout the catchment requiring restoration to more natural conditions.

One of the key factors in restoring and sustaining the ecological value of these rivers within a predominantly urbanised catchment is the successful promotion of riparian "buffer zones" for the conservation of bankside habitats. Such strips of land may offer benefits to recreation and amenity interests as well as nature conservation and pollution control.

ISSUE 23 : Lack of a clear definition of the effective width of riparian buffer zones.

The setting of targets for fisheries status based on the use of juvenile fish densities is currently being developed along with a national scheme for fisheries classification. The maintenance and improvement of river water quality may not, by itself, sustain a thriving coarse fishery within the catchment as past engineering practices have removed much of the original character on all three rivers. Many reaches are over-wide with uniform shallow glides. Regular deshoaling programmes have prevented riffle and pool sequences from developing and very few natural earth banks with marginal vegetation remain. Past tree management regimes have left some reaches heavily shaded which reduces the growth of in stream macrophytes.

3.4 ECOLOGICAL STATUS

Modern day engineering schemes and flood defence maintenance programmes incorporate a more sensitive approach to river channels. NRA TR has produced "Flood Defence Guidance for Conservation in Watercourse Maintenance Works" (August 1994) for use internally and as a benchmark for external contractors. Such an approach will assist in improving fish carrying capacities as will flood defence strategies which include provision for upstream storage to smooth out peak velocities which in smooth concrete channels may well be sufficient to wash fry and invertebrates out of the system.

Each of the three catchments also contain significant numbers of weirs and other water control structures which largely reflect their industrial past. 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. This is particularly the case with the half-tidal weir at the confluence of the River Wandle with the River Thames. Installed in 1990 the weir is now damaging fish habitats in the tidal creek as massive sedimentation has resulted in a 1.5 m depth of silt on both banks at low tide. This has resulted in the total loss of 300 m of riffle and pool habitat which is a vital resource not found in the main tidal Thames. The sedimentation is such that no permanent depth of water exists for small craft at low water for a distance of 200 m upstream of the weir thereby limiting the potential for recreational boating. The economic regeneration of the delta has not occurred and the NRA TR has not received any planning applications for new development proposals in the area.

ISSUE 24 : Environmental impact of all substantial water control structures.

ISSUE 25 : Environmental impact of the half-tide weir at the mouth of the River Wandle.

Recent fisheries and invertebrate surveys on the River Wandle, Beverley Brook and Hogsmill River have shown results which are at variance with the compliance data for the fisheries water quality objectives set. It is probable that the fish and invertebrate data reflect subtle and dynamic changes in water quality which are not identified as part of the fisheries water quality classification. The complex nature of the catchment can cause difficulties and apparent anomalies in the interpretation of data collected by river corridor, biological, fisheries and water quality surveys. An integrated approach (Issue 19) is believed vital if the existing fisheries resources are to be effectively maintained and improved by future enhancements.

3.5 RECREATION & AMENITY STATUS

In spite of the urban nature of the three catchments, much of the river channel lengths run through formal and informal areas of public open space (Section 2.11). LPAC advises London Boroughs that in reviewing UDPs all proposals affecting the River Thames and other waterways should maintain and improve public access to the waterfront and take account of safety requirements. UDPs which cover the river catchment area contain statements of intent to develop riverside walks e.g. the Wandle Trail and the Hogsmill Walk; and open up river channels which run through existing open space to public use such as the Beverley Brook in Richmond Park.

NRA TR recreation strategy fully supports improving access and encouraging the safe use of open waters for recreational purposes. We will continue to work in partnership with the Countryside Commission, Sports Council, Local Authorities and recreational groups in promoting appropriate initiatives and local strategies e.g. the London Walking Forum metropolitan routes and The Wandle Strategy. The Hogsmill River enhancement proposals may offer the opportunity for increased access for canoeists to the river. However, wherever such recreational uses are promoted they should not be to the detriment of the ecological value of the river channel, banks and corridor.

ISSUE 26 : Potential conflict between promotion of recreational uses and the nature conservation value of the river channels, banks and adjacent habitat.

Health and safety are matters of prime concern to all those who promote increased public access to the waterfront. Where NRA TR manages, owns, maintains or operates a river structure protective measures will be put in place, where there is a danger, and the structure will be signed accordingly. In proposing river enhancement projects, which may involve removal of existing riverbank railings, we would compare the new proposals with the existing situation and design-in safety features. These would be based on a site specific risk assessment whilst having continuous regard to the obvious fact that water is always dangerous.

The bacteriological profiles of the rivers within the catchment also raise important issues with regard to public health risks (Issue 5).

Concerns have also been raised with regard to problems of turbulence experienced by small boats and canoes turning on the main river Thames downstream of the confluences of these tributaries; especially downstream of the Hogsmill River.

ISSUE 27 : Safety risk to small craft on the River Thames from tributary inflows especially downstream of the Hogsmill River.

3.5 RECREATION & AMENITY STATUS

The depositing of rubbish and litter on riverbanks and directly into water is an important issue especially within these predominantly urban catchments. Where NRA TR is the landowners, such as on the Hogsmill River, litter is removed twice yearly on a routine basis. On other stretches of riverbank the responsibility lies with the riparian owner. Riparian owners also have a duty under the Thames Water Byelaws 1981, as enforced by NRA TR by virtue of the Water Resources Act 1991, not to impede the flow of water in, into or out of the river by wilfully or negligently causing or permitting rubbish and litter to fall into the river. NRA TR does have permissive powers to remove any such obstructions on a cost recovery basis but generally prefers to encourage riparian owners to undertake the necessary work.

Raising public awareness of the potential impact of such activities on flooding, water quality and safety is an issue that NRA TR in partnership with the Tidy Britain Group, Local Authorities and local community action groups is trying to address by well publicised litter picks and Tidy Riverbank campaigns. A anti-litter campaign sponsored by NRA TR and scheduled for the main River Thames for 1995 is unlikely to impact on the River Wandle, Beverley Brook and Hogsmill River catchments except on the lower tidal reaches.

ISSUE 28 : The impact of rubbish and litter on the well being of the water environment within the catchment.

Lakes and ponds within the catchment could also be included in such a campaign. This would provide a focus for the need to preserve and actively manage such sites in order to balance potentially conflicting uses. London Borough of Croydon's ongoing Ponds Campaign recognises the value in urban areas of such increasingly scarce resources.

ISSUE 29 : The need to protect and enhance the lakes and ponds within the catchment.

During informal consultation the potential educational benefit of protecting and enhancing the local water environment was highlighted. 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. The NRA TR is keen to become actively involved with all interested parties, such as the National Trust and the London Borough of Merton (who established the Snuff Mill Education Centre on the River Wandle) in promoting how improvements to the local rivers, lakes and ponds can be achieved.

ISSUE 30 : The need to promote issues relating to the water environment at a local level especially through formal education channels

SECTION 4 DRAFT MANAGEMENT OPTIONS

CATCHMENT ISSUES AND OPTIONS.

The following list of 30 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 D/S OF THE SEWAGE TREATMENT WORKS.

- Revise discharge consents and implement changes to plant to meet River Ecosystem Class 4 objective.
- Investigate cost/benefit of a long term water quality objective of River Ecosystem Class 3.

ISSUE 2 : LINDANE CONCENTRATIONS EXCEED STANDARDS.

- NRA TR, Thames Water Utilities, HMIP to produce a co-ordinated strategy of action to reduce loadings of Lindane on the aquatic environment as stipulated by North Sea Conference.

ISSUE 3 : IMPACT OF URBAN STORM WATER RUN-OFF ON RIVER WATER QUALITY.

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

ISSUE 4 : NUISANCE MIDGE SWARMS BELOW SEWAGE TREATMENT WORKS.

- Introduce more stringent suspended solids limits during revision of consents.
- Continue to jet wash silts.
- Change river channel morphology to discourage sedimentation.

ISSUE 5 : CONFLICT BETWEEN INCREASED PUBLIC ACCESS TO WATERFRONT AND PUBLIC HEALTH.

- NRA TR and Local Authorities to inform public of associated health risks.
- Improve bacteriological quality of rivers by seeking removal of illegal sewer connections to the surface water system and promotion of flood storage ponds.
- Investigate the cost/benefit of improving bacteriological quality of treated sewage effluent.

ISSUE 6 : PRESENCE OF BLUE-GREEN ALGAE IN RICHMOND PARK PONDS.

- NRA TR to continue to monitor on a reactive basis and inform Local Authority and Royal Parks Agency of bloom conditions.

ISSUE 7 : FREQUENT POLLUTION INCIDENTS.

- Carry out publicity campaign to promote awareness/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 8 : VULNERABILITY OF LOCAL GROUNDWATER TO POLLUTION.

- Promote NRA "Policy and Practice for Protection of Groundwater".
- Give pollution prevention guidance to all users of oils/fuels/chemicals on storage and handling
- Ensure new development/infrastructure incorporates suitable pollution mitigation measures.
- Improve and review groundwater monitoring programme.
- Develop an integrated surface water management strategy for the catchment.

ISSUE 9 : DRYING-UP OF SPRING FED PONDS AT THE SOURCE OF RIVER WANDLE

- Investigate extent of the problem and action report recommendations.

ISSUE 10 : POTENTIAL IMPACT OF DEVELOPMENT PROPOSALS ON LOCAL GROUNDWATER RESOURCES WHICH MAY LEAD TO UNDESIRABLE ENVIRONMENTAL CONSEQUENCES.

- Set minimum acceptable groundwater levels for water related conservation sites.
- Identify development pressure points and ensure development plans promote suitable policies for sustainable water resource usage.
- Promote efficient use of water throughout the catchment.

ISSUE 11 : LACK OF HISTORIC AND MODELLED FLOODING DATA AGAINST WHICH TO ASSESS FLOOD DEFENCE STANDARDS OF SERVICE.

- Construct full hydraulic mathematical model for the catchment.

ISSUE 12 : REDRESS THE BALANCE BETWEEN THE NEED FOR FLOOD PROTECTION ON THE HOGSMILL RIVER AND ENVIRONMENTAL REQUIREMENTS.

- Rebuild completely the existing river channel following cost/benefit analysis.
- Modify the existing river channel as one scheme following cost/benefit analysis.
- Modify the existing channel on a piecemeal basis as bankside redevelopment opportunities arise.

ISSUE 13 : LOW BASE FLOWS IN THE BEVERLEY BROOK DOWNSTREAM OF THE FLOOD RELIEF CHANNELS.

- Investigate the consequences of increasing the height of the weirs at Priest's Bridge.

ISSUE 14 : NRA TR HAS NO EFFECTIVE LEGISLATIVE CONTROL IN SETTING RUN-OFF/STORAGE CRITERIA FOR SURFACE WATER FROM NEW DEVELOPMENTS WITHIN "RED" ZONES.

- Complete the surface water zoning exercise for the River Wandle and Hogsmill River.
- Seek inclusion of appropriate policies in statutory development plans.
- Seek changes to existing legislation.

ISSUE 15 : DEFICIENCY OF PERMANENT WATERBODIES WITHIN FLOOD STORAGE AREAS.

- Permanent waterbodies should be considered at the design stage of new flood storage areas.
- Investigate potential of retrofitting and maintaining permanent waterbodies within existing flood storage provision in the catchment.

ISSUE 16 : NEED TO MAXIMISE ENVIRONMENTAL / RECREATIONAL POTENTIAL ASSOCIATED WITH STRATEGIC PROVISION OF FLOOD STORAGE WITHIN THE BMAO.

- Work with Thames Water, Local Authority and other interested parties to realise the potential of the BMAO following gravel extraction.

ISSUE 17 : NEED FOR APPROPRIATE MANAGEMENT TECHNIQUES FOR SPECIFIC REACHES OF RIVER BANK AND CHANNELS THROUGHOUT THE CATCHMENT.

- Compile "river reach maps" and guidance notes for internal and external use.

ISSUE 18 : INSUFFICIENT DATA ON RIVER LEVELS ON THE UPPER REACHES OF THE BEVERLEY BROOK AND THE NORBURY BROOK.

- Install appropriate river level gauges.

ISSUE 19 : ECOLOGICAL STATUS OF THE RIVERS CANNOT BE ASSESSED BY ANY ONE METHOD IN ISOLATION.

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

ISSUE 20 : NEED TO PROTECT EXISTING IMPORTANT IN-STREAM AND BANKSIDE HABITATS.

- Complete river landscape surveys on the River Wandle and Beverley Brook
- Promote suitable policies to Local Authorities for inclusion in statutory development plans.

ISSUE 21 : REQUIREMENT TO PROTECT BIOLOGICAL STATUS OF HEADWATERS.

- Instigate pollution prevention programme on headwaters.
- Complete species level surveys on headwaters of River Wandle and Beverley Brook.
- Seek adoption of appropriate policies in statutory development plans.

ISSUE 22 : EXTENT OF ARTIFICIAL RIVER CHANNEL AND CORRIDOR.

- As opportunity arises, promote more environmentally friendly defences using techniques outlined in the Rivers and Wildlife Handbook.

ISSUE 23 : LACK OF A CLEAR DEFINITION OF EFFECTIVE BUFFER ZONE WIDTH.

- Identify effective widths for specific river reaches and make information available externally.

ISSUE 24 : ENVIRONMENTAL IMPACT OF SUBSTANTIAL WATER CONTROL STRUCTURES.

- Coarse fish passes should be built into existing structures when renovated.
- Any proposed new structures should be subject to full environmental impact assessment.

ISSUE 25 : ENVIRONMENTAL IMPACT OF THE HALF-TIDE WEIR AT THE MOUTH OF THE RIVER WANDLE.

- Relevant organisations to work together to seek removal of the weir and enhancement of the tidal creek.

ISSUE 26 : POTENTIAL CONFLICT BETWEEN RECREATION AND CONSERVATION USES OF RIVERS AND LAKES.

- All interested parties to agree appropriate management strategies to resolve existing/future conflict between competing uses.

ISSUE 27 : SAFETY RISK TO SMALL CRAFT ON THE RIVER THAMES FROM TRIBUTARY INFLOWS ESPECIALLY DOWNSTREAM OF THE HOGSMILL RIVER.

- Investigate extent of the problem with all interested parties and implement report recommendations.

ISSUE 28 : IMPACT OF RUBBISH AND LITTER ON THE WATER ENVIRONMENT.

- Promote and co-ordinate anti-litter and tidy river bank campaigns such as the annual River Wandle clean-up day.
- Promote local pride and concept of public ownership of the water environment through the CMP process.

ISSUE 29 : NEED TO PROTECT AND ENHANCE STILL WATERS THROUGHOUT THE CATCHMENT.

- Develop an integrated strategy with all interested parties to balance the needs between competing uses and to protect and enhance the existing still water resource within the catchment.

**ISSUE 30 : 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.
- Revise and update NRA River Fact File for the Wandle/Beverley/Hogsmill.
- Develop ecological "indicators" for the water environment with interested parties and adapt for use within local schools.

SECTION 5 APPENDICES

APPENDIX I - ORGANISATION RESPONSIBILITIES AND NRA AIMS AND STRATEGIES

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 collection and treatment of sewage is the responsibility of **water and sewerage undertakers**. Their discharges of treated effluent are subject to control by the NRA. Certain industrial discharges 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 Council**. These 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.

WATER AND SEWERAGE UNDERTAKERS

These companies are responsible for providing water supplies and the management of sewage treatment works. **Thames Water Utilities**, **Sutton District Water** and **East Surrey Water** companies 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)

This government agency is 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 - ORGANISATION RESPONSIBILITIES AND NRA AIMS AND STRATEGIES

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.

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 I - ORGANISATION RESPONSIBILITIES AND NRA AIMS AND STRATEGIES

- *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.

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 - ORGANISATION RESPONSIBILITIES AND NRA AIMS AND STRATEGIES

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 require 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 AND STRATEGIES

In addition to these recreation and amenity considerations the NRA, where it is the navigation 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.

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. For flooding from sewers the responsible group is either the District or Borough Council or Thames Water Utilities.

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 AND STRATEGIES

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 April and July 1994 NRA TR wrote to 160 organisations and individuals with an interest in the Wandle/Beverley/Hogsmill catchment. A further 48 consultees were identified as a result and the full listing is shown in Appendix VI. In addition to consultation by letter, informal meetings were held with all the 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 related to the local water environment. This period of informal consultation was not a substitute for the planned period of formal consultation. The overall response rate from all organisations contacted was 54%. The issues of concern ranged widely and in general terms the results are shown below.

AREAS OF CONCERN RAISED DURING INFORMAL CONSULTATION.	
CATEGORY	% WRITTEN RESPONSE
RECREATION AND AMENITY	25
CONSERVATION	17
WATER QUALITY	17
LANDSCAPE	10
WATER RESOURCES	9
MINERALS AND WASTE	9
FLOOD DEFENCE	8
FISHERIES	5

The most common concerns centred on the need to maximise 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 poor water quality in general and the impact of historic flood prevention works on the river habitat. The half tide weir at the mouth of the River Wandle came in for criticism due to increased siltation upstream. Siltation in the lower reaches of the Beverley Brook was blamed on the flood relief channels upstream preventing sufficient water from cleaning the river channel. The periodic drying up of ponds in the Carshalton area and the proposed gravel extraction and waste disposal proposals in the Beddington Mitcham Area of Opportunity were also the subject of frequent comment.

APPENDIX III - SUPPORTING INFORMATION

RIVER ECOSYSTEM CLASSIFICATION: WATER CRITERIA

Class	Dissolved Oxygen %saturation 90 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 5 percentile upper limit 95 percentile	Dissolved Copper pg/l 95 percentile	Total Zinc pg/l 95 percentile
RE1	80	2.5	0.25	0.021	6 - 9	5 22 40 112	30 200 300 500
RE2	70	4.0	0.6	0.021	6 - 9	5 22 40 112	30 200 300 500
RE3	60	6.0	1.3	0.021	6 - 9	5 22 40 112	300 700 1000 2000
RE4	50	8.0	2.5	-	6 - 9	5 22 40 112	300 700 1000 2000
RE5	20	15.0	9.0	-	-	-	-

GQA CHEMICAL GRADING FOR RIVERS AND CANALS :

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

* as suppressed by adding allylthiourea

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

APPENDIX III - SUPPORTING INFORMATION

TABLE OF BIOLOGICAL MONITORING RESULTS

WATERCOURSE/SITE	1981-85	1986-90	1991-94
HOGSMILL RIVER SUB-CATCHMENT:			
BONESGATE STREAM			
Below Chalky Lane (TQ 178 624)	-	44 (4.0)	58 (3.9)
At Footbridge to Horton Country Park (TQ 187 632)	-	-	67 (4.0)
Above Hogsmill (TQ 200 646)	-	-	52 (3.8)
EWELL COURT STREAM			
Above Ewell Court Lake (TQ 213 639)	-	-	6 (2.3)
Above Hogsmill (TQ 210 638)	-	-	68 (3.9)
GREEN LANES STREAM			
Above Blenheim Road (TQ 212 625)	-	-	51 (3.8)
Above Hogsmill (TQ 214 633)	-	-	63 (4.2)
HOGSMILL RIVER			
At Ewell (TQ 219 631)	-	-	59 (3.7)
Above Green Lanes Stream (TQ 215 633)	-	59 (3.7)	72 (3.8)
Below Green Lanes Stream (TQ 214 635)	-	-	120 (4.4)
Below Ewell Court Stream (TQ 208 638)	-	-	101 (4.2)
Above Bonesgate Stream (TQ 203 648)	-	84 (4.0)	99 (4.2)
Cromwell Road (TQ 211 658)	-	-	96 (4.3)
Below Tolworth Box Culvert (TQ 205 671)	-	-	75 (4.1)
At Surbiton Hill Park (TQ 201 679)	34 (3.4)	-	86 (4.1)
Above Hogsmill STW (TQ 199 683)	48 (3.6)	59 (3.7)	80 (4.3)
Below Hogsmill STW, Villiers Road (TQ 187 687)	29 (3.1)	24 (3.0)	58 (3.8)
At Villiers Road (concrete channel) (TQ 187 686)	-	33 (3.3)	38 (3.5)
Above Thames (Clattern Bridge) (TQ 179 691)	-	-	34 (3.4)
HORTON STREAM			
Chessington Close (TQ 201 635)	-	-	73 (4.0)
Above Hogsmill (TQ 205 641)	-	-	87 (4.3)
SURBITON STREAM			
Above Surbiton (TQ 178 651)	-	-	32 (3.6)
Above Hogsmill (TQ 200 678)	-	-	65 (4.0)

APPENDIX III - SUPPORTING INFORMATION

BEVERLEY BROOK SUB-CATCHMENT:			
BEVERLEY BROOK			
Cuddington Rec, Worcester Park (TQ 227 648)	-	-	27 (3.0)
Pembury Avenue (Above STW) ((TQ 224 664)	15 (3.0)	23 (2.9)	29 (3.2)
At Motspur Park (TQ 224 675)	8 (2.1)	20 (2.9)	18 (2.6)
Above A3, Coombe Hill Golf Course (TQ 220 693)	-	-	27 (3.0)
Wimbledon Common (TQ 215 715)	-	-	40 (3.3)
Richmond Park (TQ 213 738)	15 (2.5)	21 (2.8)	33 (3.3)
Palewell Common Drive (TQ 211 748)	29 (3.2)	-	-
Barnes Green (TQ 220 762)	19 (2.8)	28 (3.2)	35 (3.3)
BEVERLEY DITCH			
Above Beverley Brook (TQ 216 713)	-	-	16 (4.0)
CANNIZARO PARK STREAM			
Above Beverley Brook (TQ 218 706)	-	-	36 (4.0)
EAST PYL BROOK			
At Morden Park (TQ 246 672)	-	-	29 (2.9)
At Grand Drive (TQ 236 675)	30 (3.3)	-	-
KESWICK AVENUE DITCH			
Above Beverley Brook (TQ 215 713)	-	-	44 (4.0)
PEN PONDS OVERFLOW STREAM			
Above Beverley Brook (TQ 212 739)	-	-	79 (4.4)
PYL BROOK			
Kimpton Park Recreation Ground (TQ 247 655)	-	12 (2.4)	-
Hamilton Avenue (TQ 244 656)	-	-	23 (2.9)
Garth Road (TQ 238 663)	15 (2.5)	17 (2.5)	-
Coniston Close (TQ 236 674)	-	-	15 (2.5)
At West Barnes Lane (TQ 227 685)	21 (2.6)	22 (2.9)	30 (3.0)
QUEENSMERE STREAM			
Above Beverley Brook (TQ 215 728)	-	-	16 (3.2)
RIVER WANDLE SUB-CATCHMENT:			
BEDDINGTON PARK TRIBUTARY STREAM			
Above Wandle (TQ 288 651)	-	-	77 (4.1)
LIBERTY'S TAIL RACE			
100m Below R. Wandle (TQ 268 698)	-	-	29 (3.2)
RIVER WANDLE - BEDDINGTON BRANCH			
Aldwick Road, Beddington (TQ 307 651)	25 (2.9)	18 (2.7)	12 (2.4)
Church Road, Beddington (TQ 292 652)	27 (3.0)	-	44 (3.5)
Below The Grange (TQ 286 651)	46 (3.5)	42 (3.5)	-
RIVER WANDLE - CARSHALTON ARM			
Below Three Arch Bridge (TQ 282 652)	72 (4.5)	77 (4.3)	89 (4.3)

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

SUGGESTED LAND USE POLICES

The following issues which have been identified within the Catchment Management plan are considered to be generally land use issues, or could be covered by the promotion of a land use policy.

GENERAL POLLUTION.

- ISSUE 1 -** *All three rivers have a history of poor chemical and biological water quality d/s of Beddington, Worcester Park and Hogsmill STWs.*
- ISSUE 2 -** *Lindane concentrations exceed the EQS for receiving waters from point and diffuse sources within the catchment.*
- ISSUE 3 -** *Discharges of surface water run-off from urban areas produce deterioration in water quality which has a detrimental effect on biological quality.*
- ISSUE 7 -** *Frequent pollution incidents cause significant effect on water quality and ecology.*

Because the model land use policies were promoted whilst the Local Authorities were formulating their plans the issue of general pollution is well covered .

The general uptake of policy is currently 65% for Local Authorities within the catchment.

SUPPORTING LEGISLATION

The NRA will continue to work with planning authorities within this catchment to ensure that a high profile is given to suitable policies to protect this interest.

The need to promote the protection of the water environment from the detrimental effects of pollution are clearly identified in ;

STATUTORY LEGISLATION

- PPG 12 -** **Development Plans and Regional Planning Guidance, Feb 1992.**
- Para 6.8** Increased public awareness is coupled with strong evidence of the value that people place on the environment e.g. clean water.

APPENDIX III - SUPPORTING INFORMATION

Para 6.18 Planning policies should reflect the need to protect water quality

PPG23 - Planning and Pollution Control, July 1994

Para 1.21 From 1994, the Government intends to phase a general system of statutory water quality objectives, initially in respect of rivers (some objectives are already in force in respect of EC Directives). The NRA must ensure, as far as practicable that the objectives are achieved.

Annex 3 Water Quality, para 1. The NRA is under duty to ensure that as far as practicable any statutory quality objectives, which have been set by the Secretary of State, are achieved at all times.

NATIONAL NON STATUTORY

This Common Inheritance - Britain's Environmental Strategy (Government White Paper 1990)

Para 2.11 The objectives are.... to achieve further improvements in the quality of our water... to establish the levels of emissions that our waters can safely tolerate, and set up mechanisms... to maintain, and strengthen where necessary, control over pollution from industry, including farming, and other dangerous chemicals and other substances.

SURFACE WATER QUALITY .

MODEL POLICY

S1 The Council will resist changes in land use which, in its opinion after consultation with the NRA, will lead to a deterioration in the quality of underground and surface waters.

JUSTIFICATION

2.2 New development can have significant effects on the quality of surface, underground and coastal water. The Council will therefore seek to prevent developments which it, in consultation with the NRA, considers likely to place the quality of watercourses or groundwater at risk.

APPENDIX III - SUPPORTING INFORMATION

GROUNDWATER PROTECTION

ISSUE 8 - *Vulnerability of the major groundwater catchments zones and the chalk outcrop area to pollution.*

Groundwater resources are an essential source of water for public supply, industry and agriculture. They also sustain the base flows of the River Wandle and Beverley Brook. As a general principle, the NRA supports the conservation of groundwater quality, the aim being to prevent its pollution, rather than the subsequent cleaning up of contamination. However, some activities, such as the disposal of effluent in soakaways, landfilling of unsealed sites over permeable bedrock, the disturbance of contaminated sites, or the inappropriate storage of chemicals can result in the pollution of groundwater. The cleaning up of contaminated groundwater is difficult and expensive. It is better, therefore, to prevent or reduce the risk of groundwater contamination, rather than deal with its consequences.

The issue of groundwater protection is generally well covered within the development plans for the catchment, however since the promotion of the policies, the use and awareness of the NRA "Policy and Practise for the Protection of Groundwater" has increased. In addition to which, the zoning maps which are required to support these policies are now further refined.

The existing uptake of groundwater protection is 78%, this percentage has taken into account planning authorities within the catchment that are not vulnerable to the potential pollution of groundwater and therefore do not contain a policy.

STATUTORY LEGISLATION

Sustainable Development - The UK Strategy, Jan 1994

Para 8.31 Groundwater is particularly vulnerable to diffuse contamination, by nitrates and pesticides from farming, landfill sites and other activities, which is harder to reduce than pollution from point sources. Once contaminated, it may take years before the groundwater recovers.

PPG 12 Development Plans and Regional Planning Guidance, Feb 1992

Para 6.19 Particular attention should be paid in plans to the protection of groundwater resources which are susceptible to a wide range of threats arising from land-use policies. Once groundwater has been contaminated, it is difficult if not impossible to rehabilitate it.

REGIONAL - NON STATUTORY

LPAC's Advice on Strategic Planning Guidance for London, 1994

Para 6.15 There are areas where the deep chalk is vulnerable and groundwater in the extensive deposits of river gravels is also very vulnerable to pollution and has been seriously damaged by past activities. These matters need to be taken into account when development or redevelopment proposals are being considered.

APPENDIX III - SUPPORTING INFORMATION

MODEL POLICY

L3 Developments will not be permitted which, in the opinion of the Council, after consultation with the NRA, pose an unacceptable risk to the quality of groundwater.

JUSTIFICATION

2.9 Groundwater resources are an invaluable source of water for public supply, industry and agriculture, as well as sustaining the base flows of the River Wandle and Beverley Brook. Some activities, such as the disposal of effluent in soakaways, landfilling of unsealed sites over permeable bedrock, or inappropriate storage of chemicals can result in the pollution of groundwater. Since the clean up of contaminated groundwater is difficult and very expensive, the Council will seek to prevent or reduce the risk of groundwater pollution by refusing planning consent for developments which it considers pose an unacceptable risk to groundwater. Guidance¹ on considerations affecting the acceptability of development from a groundwater protection viewpoint has been prepared by the NRA. This includes map-based data showing the constraints on development.

APPENDIX III - SUPPORTING INFORMATION

ISSUE 14 - *The National Rivers Authority has no effective legislative control in setting run-off/storage criteria for proposed development within red surface water run-off zones.*

Unless carefully sited and designed, new development or redevelopment, can increase run-off by the addition of impermeable surfaces such as roofs and paved areas. This can result in the increased risk of flooding in areas downstream from the development in question. Because the development and the flooding it causes are usually at some distance from one another, the connection is often only established once the scheme has been completed. It is essential, therefore, that hydrological/hydraulic surveys are undertaken, and that works designed to control surface water run-off are implemented before development takes place. Developers will be responsible for the costs of such works. The NRA (TR) is currently developing a series of surface water zoning maps to assist planning authorities in providing detailed advice for the management of surface water.

SUPPORTING LEGISLATION

REGIONAL - STATUTORY

RPG 3 Strategic Guidance for London

Para 68 Unless carefully sited and designed, new development can exasperate problems of flooding in areas downstream through an increase in run-off from additional roof and paved surfaces. Where appropriate, boroughs should, in consultation with Thames Water Authority (now the NRA Thames Region) take into account in their UDPs, the surface drainage consequences of new development, including the need to protect the floodplain and urban washlands.

REGIONAL - NON STATUTORY

LPAC's Advice on Strategic Planning Guidance for London, 1994

Policy TW6 The Government and Boroughs in determining major planning applications should, where appropriate, take into account measures for surface runoff, the downstream river environment and existing legislation on water pollution.

Conservation Issues in Strategic Plans (prepared by the Countyside Commission, English Heritage and English Nature) 1993

Chap 4, Good Practice in Regional Planning Regional policy on waste management, particularly landfill, should avoid the pollution of surface and groundwater systems. Land use planning is critical for the conservation of the water environment. River catchments provide a valuable geographical focus for this at the regional level. There is scope for close liaison between NRA regions and the regional conferences on this matter.

SURFACE WATER RUN-OFF.

MODEL POLICY

The Council will resist development which would result in adverse impact on the water environment due to additional surface water run-off. Development which could increase the risk of flooding must include appropriate attenuation or mitigation measures. Developers will be expected to cover the costs of assessing surface water drainage impacts and of any appropriate mitigation works, including their long-term monitoring and management.

JUSTIFICATION

New developments may result in a substantial increase in surface water run-off as permeable surfaces are replaced by impermeable surfaces such as roofs and paving. This may result in an increased risk of flooding downstream and a reduction in infiltration to groundwater. Other consequential effects include increased pollution, silt deposition, damage to watercourse habitats and river channel instability, as well as reduction in both river base flows and aquifer recharge. These effects can often be at some considerable distance from the new development. The Council, in consultation with the NRA, will assess the surface water run-off implications of new development proposals. New developments will only be permitted where the Council is satisfied that suitable measures, designed to mitigate the adverse impact of surface water run-off, are included as an integral part of the development. Where appropriate, the development should include provision for the long term monitoring and management of these measures.

APPENDIX III - SUPPORTING INFORMATION

ISSUE 26 - Potential conflict between promotion of recreation uses and nature conservation value of river channels, banks and adjacent habitat.

The NRA, in its role as 'Guardian of the Water Environment', aims to encourage policies which:

- further the conservation and enhancement of the natural environment;
- promote facilities for recreation, including public access;
- further the conservation and enhancement of the built environment, sites and objects of archaeological, architectural or historic interest.

However there is a need to balance the needs of conservation against increased public access.

By emphasising the importance of river corridors, the NRA aims to promote these three aspects of the river environment. Such a corridor is a continuous area of land which is physically and visually linked to the watercourse itself. Studies have shown that there is a high correlation between river corridors in England and existing environmental designations, notably SSSIs and Areas of Outstanding Natural Beauty. In urban areas, the importance of river corridors is even more pronounced since they represent one of few remaining features which link areas of open space. Such links are significant for amenity and recreation, but also for wildlife, allowing otherwise isolated areas to reach a 'critical mass' in terms of animal and plant populations and habitat types. These factors suggest that river corridors warrant reference in land use plans as important elements which link areas of open space together.

The designation of river corridors in land use plans would highlight areas of particular importance to the NRA. There are two reasons why this is the case. The first is to ensure that the existing environmental and amenity value of the river corridor is not impaired by any proposals. Wherever possible, new developments that are permitted in river corridors should complement and enhance the river environment. The second is to suggest possible enhancement measures aimed at securing the restoration of the natural watercourse and its associated habitats. Developments, particularly redevelopment, may offer the opportunity for such improvements which could be incorporated into any proposals during the early stages of the formulation.

SUPPORTING LEGISLATION

Water Resources Act 1991 This sets out the general environmental and recreational duties of the NRA as follows:

It shall be the duty of the (National Rivers) Authority in formulating or considering any proposals relating to any functions of the Authority :

16(1)b to have regard to the desirability of protecting and conserving buildings, sites and objects of archaeological, architectural or historic interest; and

16(1)c to take into account any effect which the proposal would have on the beauty or amenity of any rural or urban area or any such flora, fauna, features, buildings, sites or objects;

16(2)a to have regard to the desirability of preserving the public any freedom of access to areas of woodland, mountains, moor, heath, down, cliff or other places of natural beauty.

Sustainable Development - the UK Strategy.

Para 8.1 The biodiversity of an important aspect of the UK flora and fauna is dependant on maintaining the character and quality of the inland freshwaters of the UK.

MODEL POLICY

The Council, in consultation with the NRA, will seek to promote river corridors as important areas of open land by:

- **conserving existing areas of value and wherever possible seeking to restore the natural elements within the corridors and margins;**
- **promoting appropriate public access;**
- **identifying appropriate locations for water related recreation;**
- **protecting and improving access for operational and maintenance purposes, including the provision of maintenance strips where practical;**
- **resisting development which would have an adverse impact on nature conservation, fisheries, landscape, public access or water-related recreation.**

JUSTIFICATION

The Council recognises that river corridors are of great importance for water resources, water quality, nature conservation, fisheries, recreation and that they often make a significant contribution to the character of the landscape. In many instances river corridors are an important source of open space in their own right, but frequently also form links or 'green chains' between areas of open space, often across borough boundaries. These links can be crucial for the survival or enhancement of wildlife. The Council is committed to the protection, and wherever possible, enhancement of rivers, groundwater, ponds, wetlands, and appropriate public access and water-related recreation. Consequently, the Council will generally support initiatives and proposals which will result in the conservation or enhancement of the natural elements of the river, result in landscape improvements, or which promote public access and water-based or waterside recreation in river corridors. Planning obligations are an important means of securing such improvements. Conversely, planning consent will not normally be granted for developments which are likely to have a detrimental impact on natural elements, public access, the quality of the landscape or recreational facilities found within river corridors and coastal margins. The Council will also protect or enhance access for operational or maintenance purposes.

Some of the Issues raised (16,20,21,24) are best suited to be covered when the individual site briefs are being considered by the planning authorities.

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.

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
BMAO	-	Beddington/Mitcham Area of Opportunity
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
GLC	-	Greater London Council
GLSMR	-	Greater London Sites and Monuments Record
GQA	-	General Quality Assessment
HE	-	House Equivalent
HMIP	-	Her Majesty's Inspectorate of Pollution
LA	-	Local Authority
LNR	-	Local Nature Reserve
LPAC	-	London Planning Advisory Committee
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
PWQO	-	Provisional Water Quality Objectives
RE	-	River Ecosystem
RQO	-	River Quality Objective
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
SWQO	-	Statutory Water Quality Objective
TWUL	-	Thames Water Utilities Limited
UDP	-	Unitary Development Plan

APPENDIX V**GLOSSARY**

Aquifer.	Underground water.
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.
Buffer Zone.	A strip of land adjacent to the river free from urban development.
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.
Ruderal weed.	Plants that grow on waste ground.
Taxa.	Groups of similarly classified animals and plants.
Weir.	A low dam across a river.

APPENDIX VI - CONSULTATION LIST.

A.D.A.S.
Ancient Monument Society
Association of British Chambers of Commerce
B & Q P.L.C.
Banstead Angling Society
Banstead Commons Conservators
Barnes Community Association
Battersea Canoe Club
Beacon Centre
Beddington Society
Beddington, Carshalton and Wallington Archaeological Society
British Canoe Union
Beddington Farm Bird Group
Bourne Society
British Gas
British Herpetological Society
British Horse Society
British Telecommunications PLC
British Trust for Ornithology
British Trust for Conservation Volunteers
Carshalton Society
Central Association of London & Provincial Angling Club
Central Council of Physical Recreation
Chamber of Commerce & Industry (Kingston)
Chamber of Commerce & industry (Merton)
Chamber of Commerce and Industry (Croydon)
Chamber of Commerce & Industry (Richmond)
Chelsham & Farleigh Parish Council
Civic Trust
City of London Corporation
Common Ground
Conservation Area Advisory Committee (East)
CPRE Local Group
Council for British Archaeology
Confederation of British Industry
Council for the Protection of Rural England
Country Landowners Association
Countryside Commission
Countryside Commission (London)
Countryside Commission (Surrey)
Croydon Natural History and Scientific Society
Cycling Touring Club
David Congdon MP

APPENDIX VI - CONSULTATION LIST (cont.)

Deen City Farm
Department of Environment
Department of National Heritage
Derek Coleman
Downlands Countryside Management Project
Dr. Charles Goodson-Wickes MP
East Surrey Water Plc.
Elmbridge Borough Council
Energy Technology Support Unit
English Nature (Essex/Herts)
English Nature (Sussex & Surrey Team)
English Tourist Board
English Partnerships
English Nature (London)
English Heritage
Epsom & Ewell Borough Council
Epsom Angling Club
F.W.A.G.
Flaskett Ltd
Forest Authority (Thames & Chilterns Conservancy)
Forest Authority (Hampshire & W.Downs Conservancy)
Forest Enterprise
Friends of Barnes Common
Friends of Sheen Common
Friends of the Earth
Friends of Old Deer Park
Friends of Richmond Park
Godstone Parish Council
Greenpeace
Groundwork Foundation
H.M.I.P.
House Builders Federation
House Builders Federation
King George Park Management Advisory Committee
Kingston Rodbenders Angling Club
Kingston Upon Thames Archaeological Society
Kingston University
Kingston Centre for Environmental Awareness
Kingston Museum & Heritage Service
Kingston Upon Thames Society
Lady Olga Maitland MP
Landseer Bailey
Leatherhead & District Angling Society
Limpsfield Parish Council
Linking Environment & Farming

APPENDIX VI - CONSULTATION LIST (cont.)

London Planning Advisory Committee
London Borough of Lambeth
London Ecology Unit
London Borough of Richmond Upon Thames
London Borough of Sutton
London Borough of Wandsworth
London Borough of Croydon
London Borough of Merton
London Walking Forum
London Waste Regulation Authority
London Wildlife Trust
London Wildlife Trust (Sutton Group)
London Wildlife Trust (Merton Group)
London Tourist Board
London Electricity Board PLC
London Natural History Society
London Wildlife Trust (Richmond Group)
Lower Mole Countryside Management Project
Maori Sports Club
Marine Estates
Merton Space Management
Merton Historical Society
Ministry of Agriculture, Fisheries & Food
Mitcham Common Conservators
Mitcham Common Preservation Society
Mole Valley District Council
Mountain Bike Federation
Mr Craig MacCraiger
Mr Martin Wallace
Mr Toby Jessel MP
Mr Nigel Forman MP
Mr Peter Ainsworth MP
Mr Richard Balfe MEP (London South Inner)
Mr Tom Cox MP
Mr Jeremy Hanley MP
Mr Malcom Wicks MP
Mr Richard Ottaway MP
Mr Richard Tracey JP
Mr Keith Hill MP
Mr James Moorhouse MEP (London S. & Surrey E.)
Mr Michael Elliot MEP (London West)
Ms Anita Pollack MEP (London S.W.)
National Association of Fisheries & Angling Consultatives
National Playing Fields Association

APPENDIX VI - CONSULTATION LIST (cont.)

National Playing Fields Association (Croydon P.F.A.)
National Playing Fields Association (Surrey P.F.A.)
National Trust
National Federation of Anglers
National Trust
National Farmers Union
Nonsuch Antiquarian Society
Pensford Field Environmental Trust
Platform
Putney Society
R.S.P.B.
Racal Radar Defence Systems
Ramblers Association
Ramblers Association (Surrey Area)
Ramblers Association
Rawlinson and Hunter
Reigate and Banstead Borough Council
Richmond upon Thames Boat Project
Richmond Park Wildlife Group
Richmond Tidy Group
Richmond Society
Richmond upon Thames Environmental Centre
Ripples
River Thames Society
Rotary Club
Round Table
Royal Botanic Gardens
Royal Parks Agency
Royal Borough of Kingston upon Thames
Rt. Hon. Dame Angela Rumbold DBE MP
Rt. Hon. Norman Lamont MP
Rt. Hon. Sir Archibald Hamilton MP
Rt. Hon. David Mellor QC MP
Rt. Hon. Kenneth Baker CH MP
Salmon & Trout Association
Sand and Gravel Association
Savacentre Ltd
Seeboard
SERPLAN
Silsoe College
Sir Paul Beresford MP
Sir George Gardiner MP
Snuff Mill Environmental Centre
Soroptomists' International G.B.I.

APPENDIX VI - CONSULTATION LIST (cont.)

South East Thames Fisheries Consultative Council
South London Housing Association
Sports Council (London Region)
Surbiton and District Bird Watching Society
Surrey Archaeological Society
Surrey Local History Council
Surrey Wildlife Trust (Kingston Group)
Surrey Wildlife Trust (Sutton Group)
Surrey Wildlife Trust (Woking)
Surrey Record Office
Surrey Wildlife Trust
Surrey Archaeological Society
Surrey Archaeological Society
Surrey County Council
Surrey Bird Club
Sutton Conservation Group
Sutton Ecology Centre
Sutton District Water PLC
Tandridge District Council
Thames Angling Preservation Society
Thames Water Utilities
UK Irrigation Association
Wallington & District Angling Society
Wallington North & District Residents Association
Wandle Group
Wandle Heritage
Wandle Industrial Museum
Wandsworth Action Volunteers for the Environment
Wandsworth Historical Society
Wandsworth Society
Watermeads Angling Club
Wildfowl and Wetlands Trust
Wimbledon Society
Wimbledon Park Residents Association
Wimbledon and Putney Commons Conservators
