

NRA THAMES 261

National Rivers Authority  
Thames Region  
Catchment Planning - West

**River Thame**

NO

Catchment Review  
March 1996

Document for internal circulation only



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## 1.0 INTRODUCTION

The National Rivers Authority (NRA) was established by the Water Act 1989. The NRA has defined its role in the following "mission statement":

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

In order to effectively manage the water environment and sustain it for the future, the NRA has adopted the principle of Catchment Management Planning. This entails the preparation of Catchment Management Plans (CMP) for each natural river catchment within England and Wales. Through data evaluation, issues analysis, external liaison and consultation, the CMP provides a vehicle to focus attention on the water environment. The process involves all interested parties in planning for the future well being of the catchment and establishes an integrated plan of action for managing the catchment over a period of five years, after which it is reviewed.

However, as a precursor to the commissioning of the Catchment Management Plans, brief and succinct Catchment Reviews such as this are being drafted which will:

- provide a concise summary of the current status of the water environment;
- make full use of the knowledge of internal staff and their assessments of the value of the catchment to people and wildlife;
- provide a focus for integrating on-going NRA functional activities;
- promote region-wide awareness of issues and opportunities and priorities for action;
- facilitate the prioritisation and production of Catchment Management Plans.

The following review will provide a summary of catchment statistics, issues, current and future proposed NRA activity in order to achieve a broad awareness of potential opportunities and constraints. The document will also form the basis of the full Catchment Management Plan which will provide the focus for those concerned with the future well-being of the water environment of the area.

## ENVIRONMENT AGENCY

In April 1996 the Environment Act will bring together the NRA, Her Majesty's Inspectorate of Pollution and the Waste Regulation Authorities into one single Environment Agency. This new Agency will have wide-ranging powers and responsibilities in terms of environmental management.



# River Thames Catchment Review:

## Map 1 Overview

### Local Authorities

- Aylesbury Vale
- Dacorum
- Chiltern
- Wycombe
- South Oxfordshire
- Cherwell

- County Boundary
- Main River
- Grand Union Canal
- Water Bodies
- Motorway
- Primary Road
- Railway

CMP Boundary

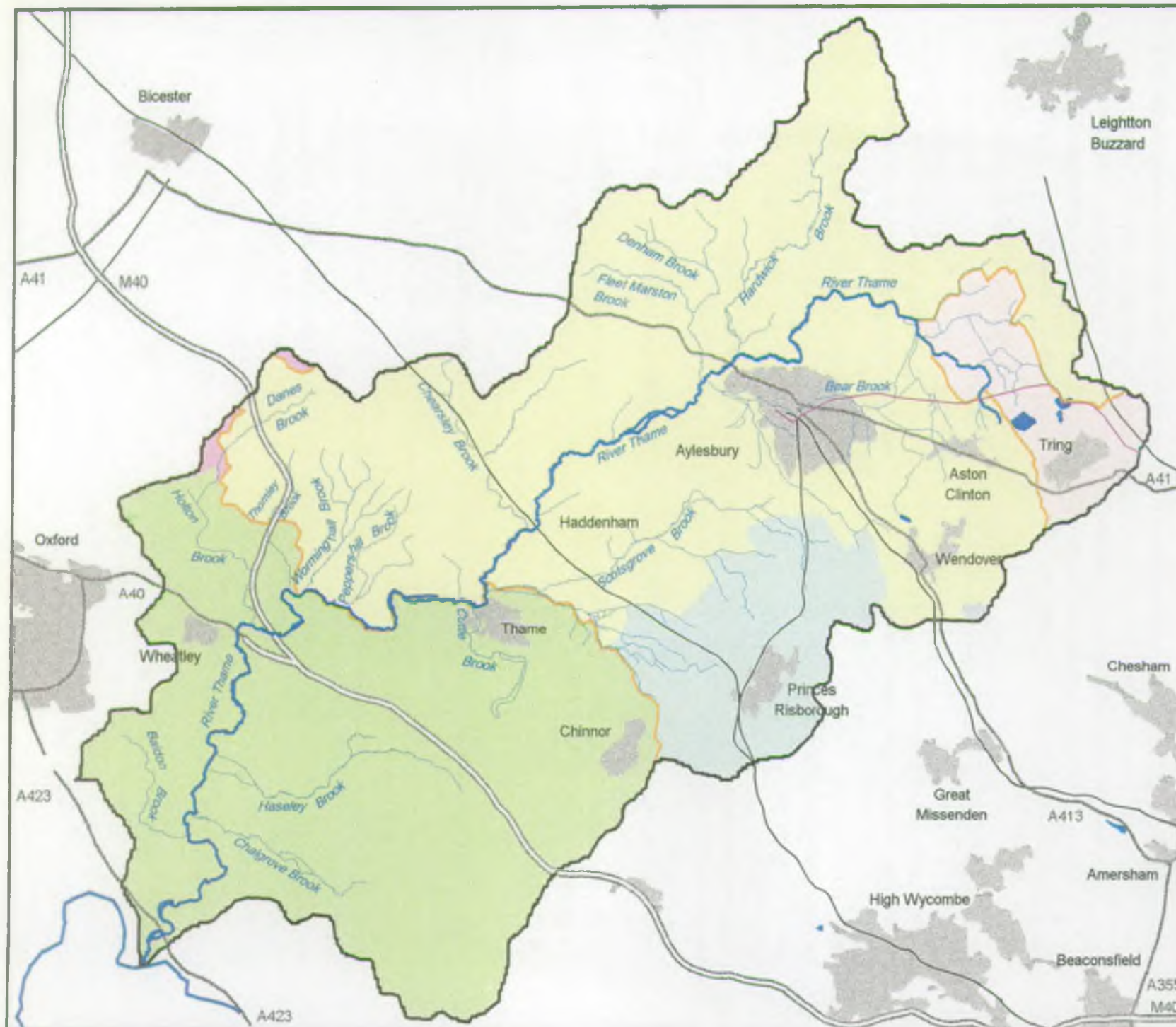
Urban Areas

Scale:-

10km



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## 2.0 THE CURRENT STATUS OF THE WATER ENVIRONMENT

### 2.1 OVERVIEW

The Catchment Review study area covers the Thame catchment, as illustrated by Map 1. The study area covers 684 km<sup>2</sup> and is predominately rural in character with the main urban area being Aylesbury, with a population of 55,700. There are also a number of smaller settlements including Thame, Tring and Princes Risborough. The study area has a total population of approximately 90,000.

There are a number of tributaries of the Thame including:- Fleet Marston, Denham, Hardwick, Bear, Scotsgrove, Cuttle, Haseley, Chalgrove, Baldon, Holton, Danes, Thomley, Worminghall, Peppers Hill and Chersley Brooks.

### 2.2 GEOLOGY

The solid geology of the Thame catchment is characterised by a sequence of Jurassic and Cretaceous strata all dipping comparably in a south-easterly direction. As such, the geology appears as a succession of south-west to north-easterly elongated outcrops, with a progressively younger strata to the south-east. The geology of the catchment is illustrated on Map 2.

Much of the north and west of the catchment is underlain by Oxford Clay and Kimmeridge Clay. These soft clays and mudstones form the flat relatively low-lying vales of the catchment, and the floodplain across which the Thame flows. This is only broken by the Corallian limestone and marls to the east of Oxford, and where isolated outcrops of higher ground occur such as at Brill and Long Crendon. Here, the harder limestones, silts and sands of the Portland Beds, Purbeck Beds and Whitchurch Sands cap the hills. These younger rocks also form a more continuous outcrop further to the east between Thame and Aylesbury.

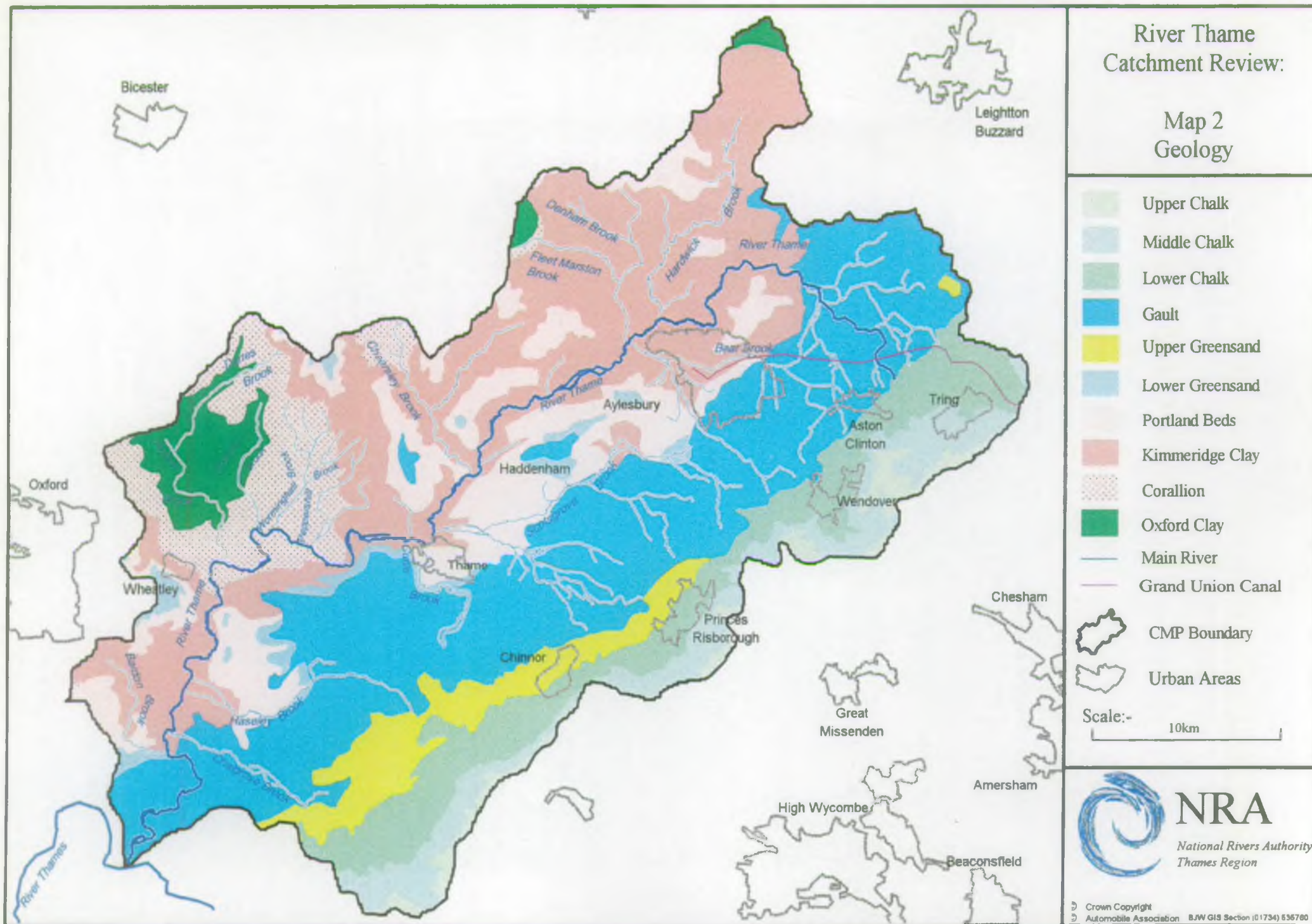
Several erosional surfaces, or unconformities, exist within the geological succession causing parts of the sequence to be absent in places. The Lower Greensand Formation is limited to a few patchy outcrops as a consequence of this, and has been deposited on the erosional surfaces of the Kimmeridge Clay and Purbeck Beds.

Further to the south and east, and up-sequence, the Gault clay forms another outcrop of flat clay-land. Above this, the Upper Greensand is present as a distinct escarpment at the base of the larger north-west facing escarpment of the Chalk.

The top of the steep-sided Chalk escarpment forms the south-eastern boundary of the Thame catchment, with the dip slope of the Chiltern Hills falling away to the south-east. The Chalk sequence comprises Lower Chalk at the base, rising through Middle Chalk, with Upper Chalk forming the top of the escarpment at the catchment boundary.

Several drift formations have been deposited overlying the solid geology. Glacial and glacio-fluvial sands, gravels and clays cap parts of the higher ground outside of the valley





bottoms in the northern part of the catchment. The Thame valley and its main tributaries are lined by a thin covering of alluvium and terrace gravels.

### 2.3 HYDROGEOLOGY

Much of the catchment is underlain by impermeable clays in which there is little groundwater flow of any significance. Where these clays outcrop, surface run-off will provide the dominant input to the river system.

The only major aquifers within the catchment are the Chalk and Upper Greensand. In places these can form a single aquifer, but the presence of a double spring-line within the Chalk and Upper Greensand would suggest that the low permeability Chalk Marl that forms the lower part of the Lower Chalk acts as an aquiclude between the two. Spring-lines emerge from within the Lower Chalk at the Chalk Marl boundary, and near the contact between the Upper Greensand and the underlying impermeable Gault clay. To obtain higher yields, it is common for boreholes and wells in the area to extend through the Chalk and into the Upper Greensand.

The Portland and Purbeck Beds, Whitchurch Sands and Lower Greensand Formation all yield small quantities of groundwater that are tapped for domestic and agricultural use. Where these strata form outliers on high ground, the outcrop is drained by springs emerging at the base of the Portland Beds where they overlie the Kimmeridge Clay. Several small abstractions also exist within the Corallian beds.

### 2.4 WATER RESOURCES

The NRA's principal aim in relation to water resources is to:

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

To achieve this aim the NRA seeks to:

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



### **Hydrometric Data**

In order to ensure that there is sufficient information on water resources the NRA carries out regular measurements from flow gauging stations, groundwater monitoring boreholes, current meter gauges, and rain gauges which are located throughout the catchment.

A proportion of the rainfall falling on the catchment is subsequently lost as evaporation or transpiration. The remainder, termed the 'effective rainfall' is the total water resource available to the catchment in the form of either surface run-off or groundwater recharge.

The Thame catchment has an average annual rainfall of 650mm (taken from 1941-70). The average effective rainfall for the same time period, (ie. water resource available to the catchment as runoff or groundwater recharge) is 175mm. Figs 1, 2 and 3 show rainfall, percolation for the Thame catchment and a hydrograph of the River Thame at Wheatley respectively.

### **Abstraction Licensing**

The NRA administers a system of licensing abstractions and has wide powers as to whether or not to grant a licence and to apply conditions.

There are currently 110 abstraction licences in force within the Thame catchment area. Map 3 shows the location of the major abstraction points and flow gauging stations within the study area, while Fig. 4 shows the type of licensed abstractions and actual abstractions for 1993.

Thames Water Utilities Limited (TWUL) are the sole water and sewerage undertaker operating within the study area. The four Thames Water abstraction sites are linked together, in that there is a total limit on the total of the four abstractions which is less than if they could abstract independently.

### **Development and Water Resources**

Local Councils have expressed concern about the adequacies of water supply for Aylesbury. However there is no deficit in supply before 2011 unless the growth in demand follows the high NRA forecasts. Recent growth has been below the low forecast.

The catchment is a net importer of water for public supply from Farmoor, New Ground and Hawridge, and Medmenham as shown by the arrows on Map 3.

Fig 1 Rainfall

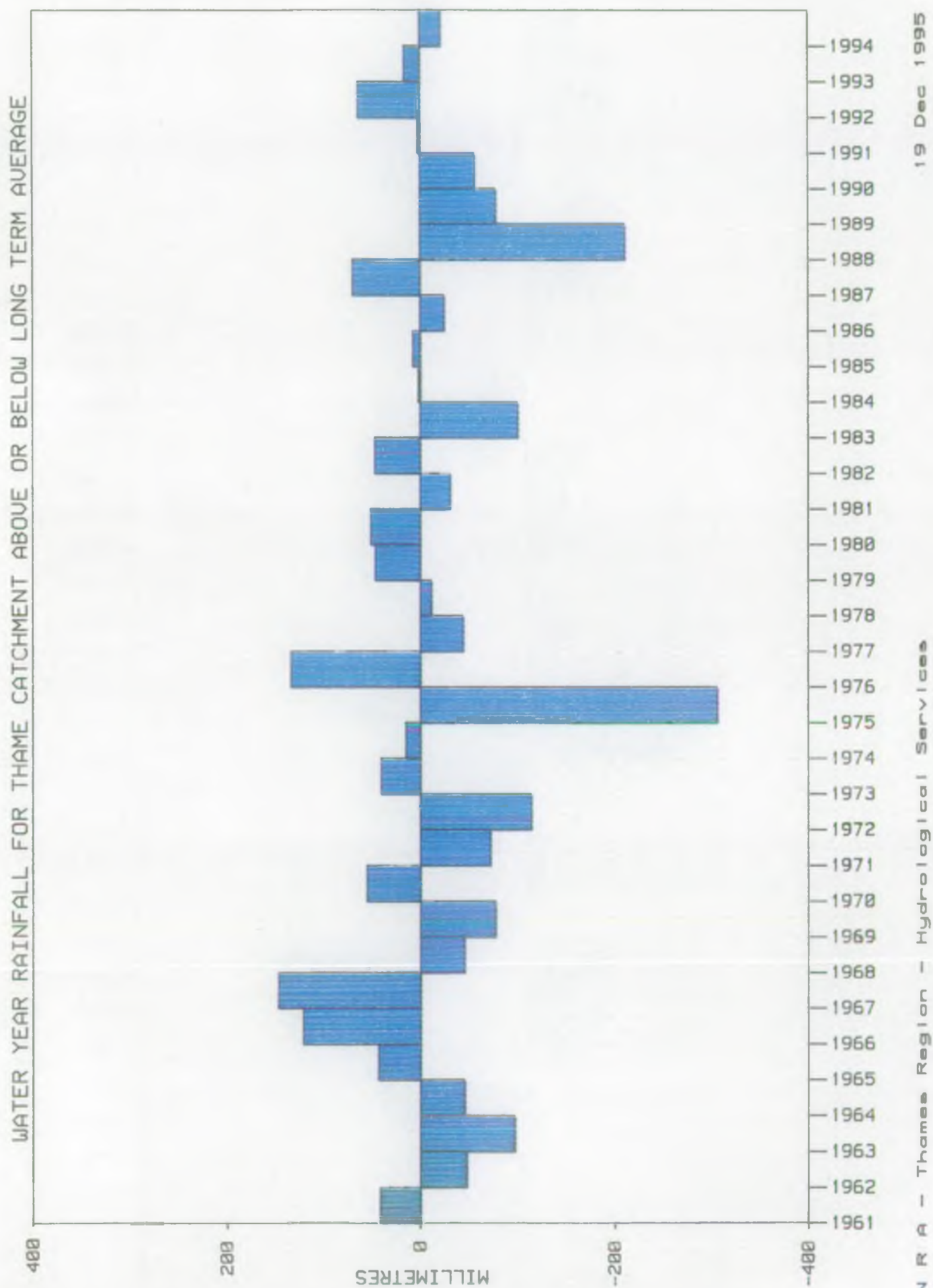


Fig 2 Percolation

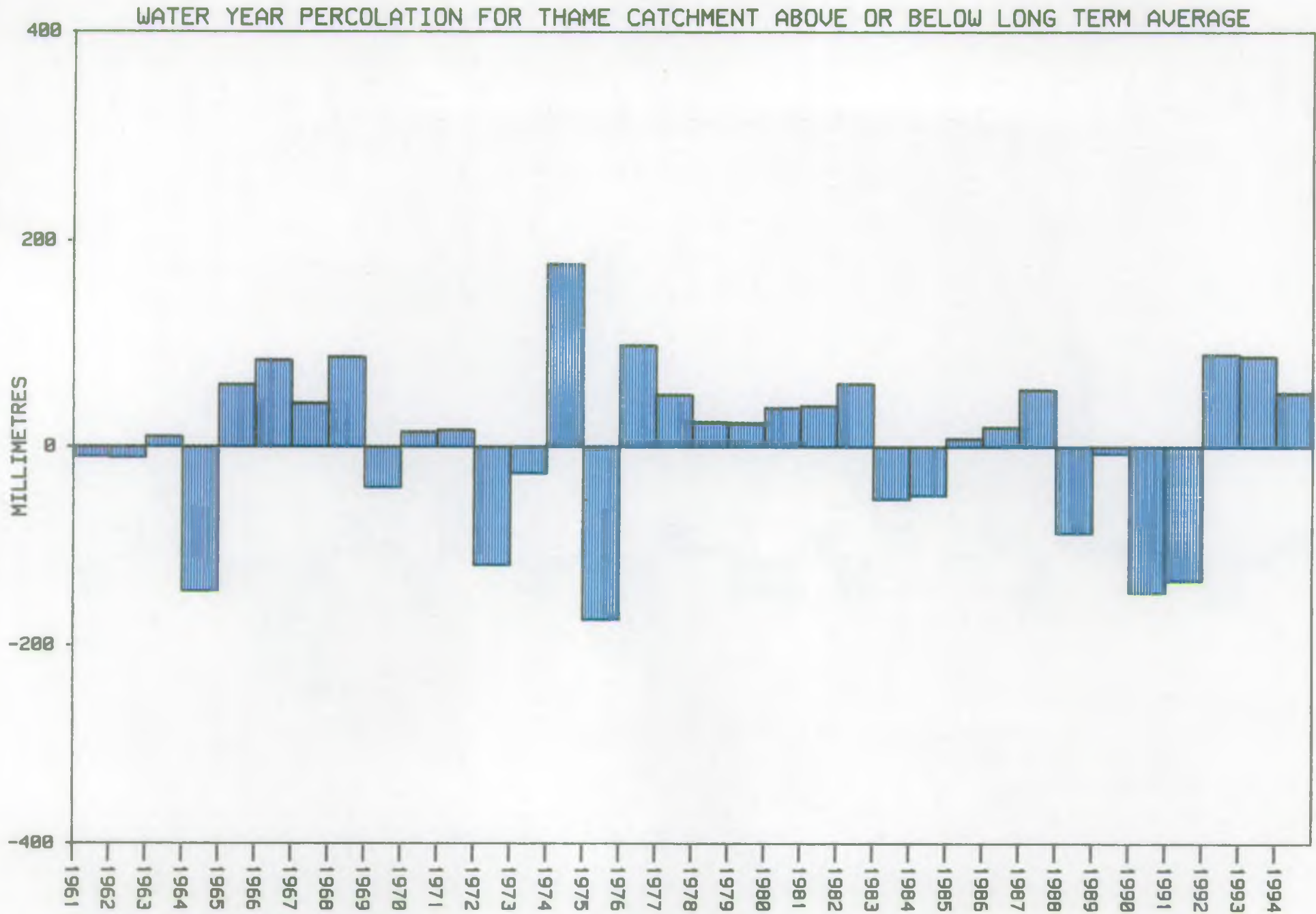
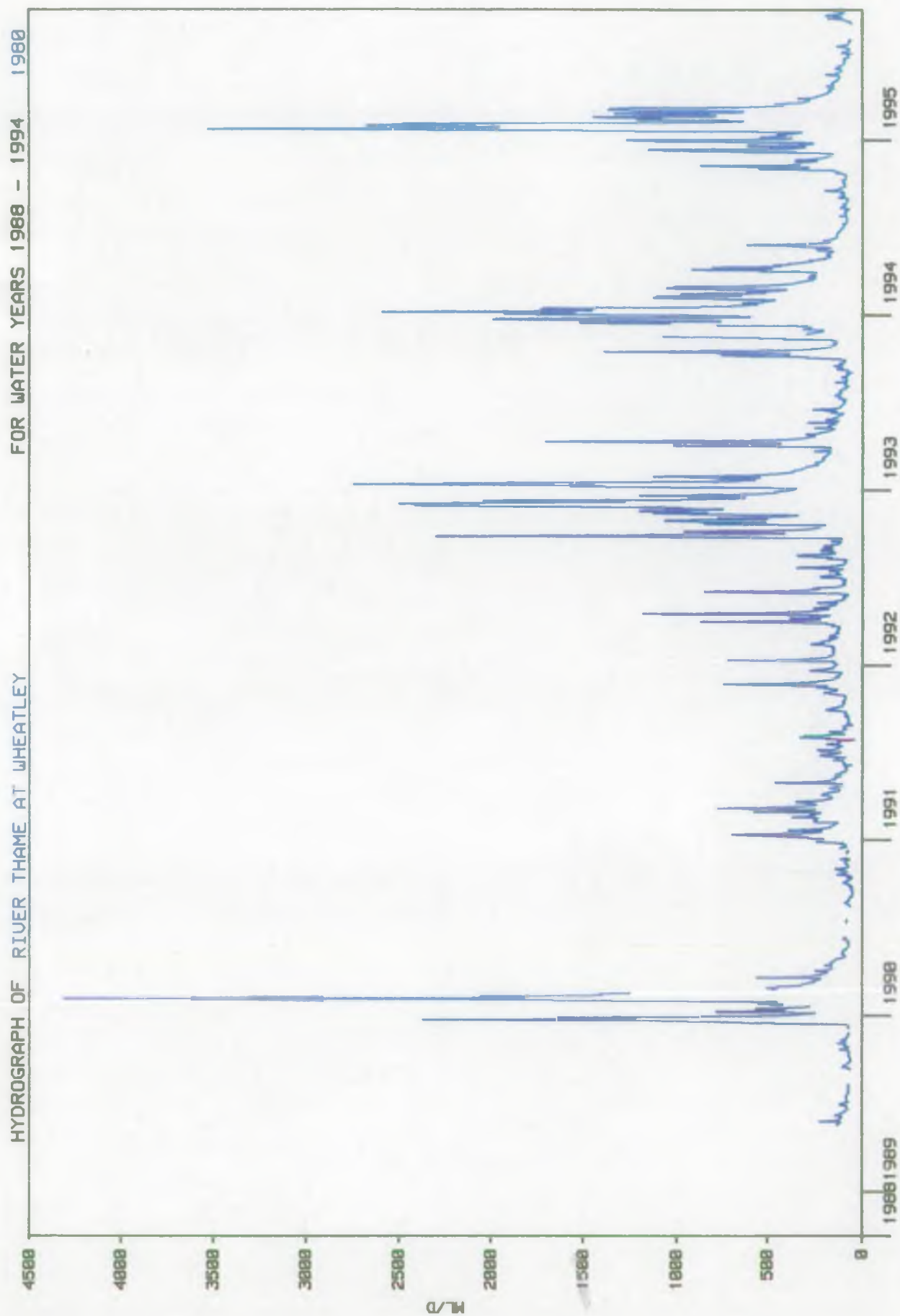




Fig 3 Hydrograph



# River Thames Catchment Review:

## Map 3 Water Resources

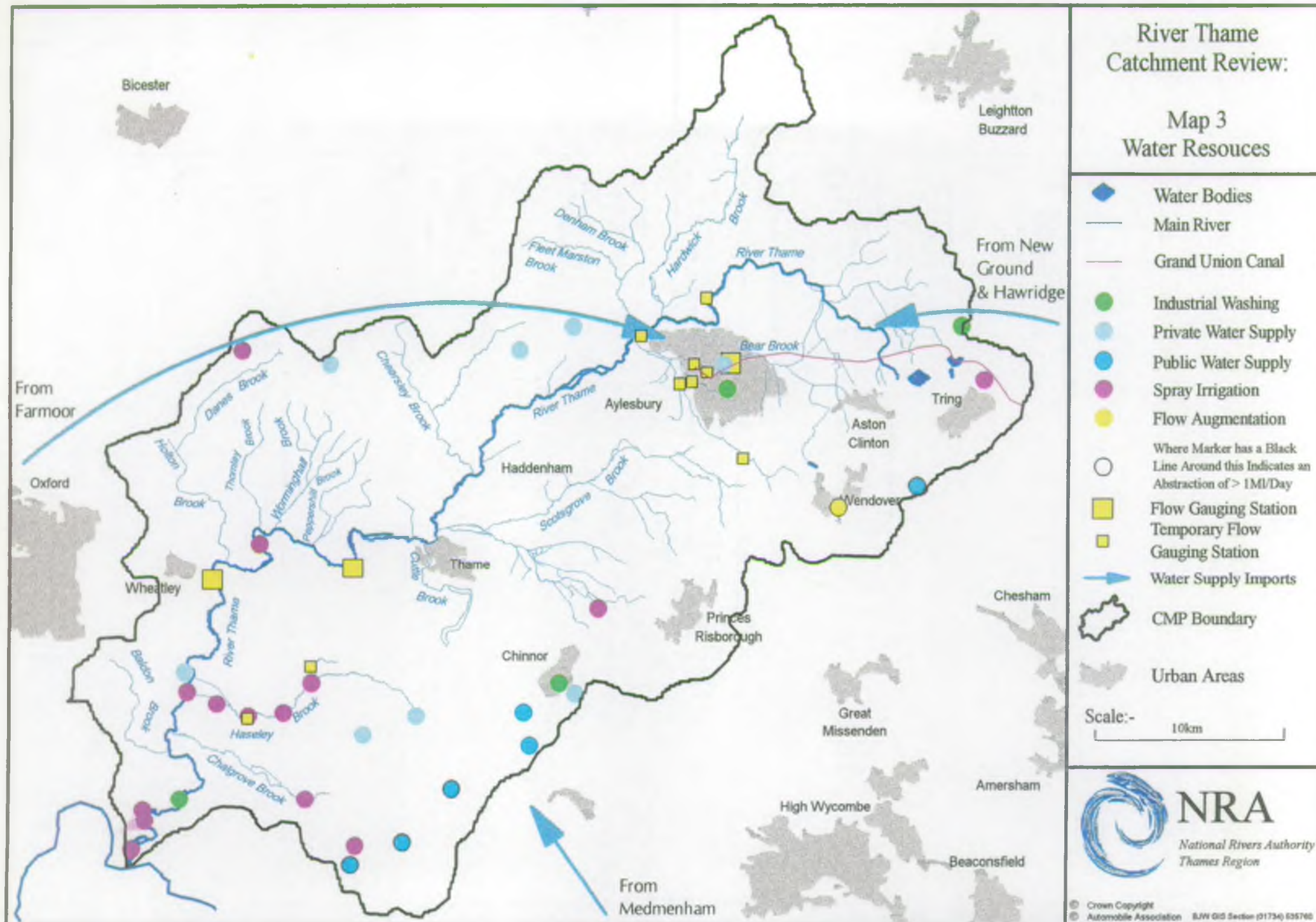


Fig. 4

Licensed and Actual Abstractions for 1993 (Ml/d)						
Use	Licensed Abstraction			Actual Abstraction (1993)		
	Surface	Ground water	Total	Surface	Ground water	Total
Public water supply	-	5.88	5.88	-	3.54	3.54
Private water supply	0.05	0.01	0.06	0.01	0.01	0.02
Agricultural spray irrigation	0.93	0.05	0.98	0.22	0.01	0.23
Non-agricultural spray irrigation	0.03	0.04	0.07	0.01	0.01	0.02
Agriculture	0.03	0.83	0.86	0.02	0.75	0.77
Cooling	-	0.05	0.05	-	0.05	0.05
Industrial Process	0.63	1.16	1.79	-	0.70	0.70
Fish farm	0.36	-	0.36	0.01	-	0.01
Transfer	0.01	-	0.01	-	-	-
Augmentation/canal	-	4.80	4.80	-	4.80	4.80
Total	2.04	12.82	14.86	0.27	9.87	10.14

## 2.5 WATER QUALITY

One of the NRA's principal aims in relation to water quality 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 water quality
- improve waters of poorer quality
- ensure all waters are of an appropriate quality for their agreed uses

### Assessment of Surface Water Quality

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



## General Quality Assessment

The GQA scheme is used to make regular assessments of the quality of rivers to monitor trends over time and to compare rivers in different areas. Four components are being developed for the GQA assessment -general chemistry, nutrients, aesthetics and biology - each providing a discrete 'window' on the quality of the river stretches. The general chemistry component of the GQA is now in use. It is made up of six grades defined by standards for Dissolved Oxygen, BOD and Total Ammonia (see Fig. 5 below).

**Fig. 5 GQA CLASSIFICATION**

Class	Dissolved Oxygen % saturation  10%ile	BOD mg l <sup>-1</sup>  90%ile	Total Ammonia mg N l <sup>-1</sup>  90%ile
A	> 80	< 2.5	< 0.25
B	> 70	< 4.0	< 0.6
C	> 60	< 6.0	< 1.3
D	> 50	< 8.0	< 2.5
E	> 20	< 1.5	< 9.0
F	-	-	-

The remaining three windows are still under development and will be applied when available. The GQA chemical quality of watercourses in the Thame Catchment for the period 1992-1994 is shown at Map 4, and for periods since 1988 details are given in Appendix 1.

## Water Quality Objectives

The WQO scheme establishes quality targets based on the uses of the watercourse, to provide a commonly agreed planning framework for regulatory bodies and dischargers. The proposed SWQO scheme is based upon the recognised uses to which a river stretch may be put. These uses could eventually include: River Ecosystem; Special Ecosystem; Abstraction for Potable Supply; Agricultural/Industrial Abstraction; and water sports. The standards defining the five River Ecosystem (RE) use classes, which address the chemical quality requirements of different types of aquatic ecosystems, were introduced by the Surface Waters (River Ecosystem Classification) Regulations 1994. Standards for further uses are still under development. For each stretch of river, an RE class RQO will be assigned, including a date by which this level of water quality should be achieved. Until SWQOs are formally established by legal Notice served by the Secretary of State, and therefore exist on a statutory basis, RQOs will be applied on a non-statutory basis with

# River Thames Catchment Review:

## Map 4 Water Quality (GQA)

### General Quality Assessment 1992 - 1994

- A
- B
- C
- D
- E
- F
- Unclassified

● Major Sewage Treatment Works

  CMP Boundary

Urban Areas

Scale:-  
10km



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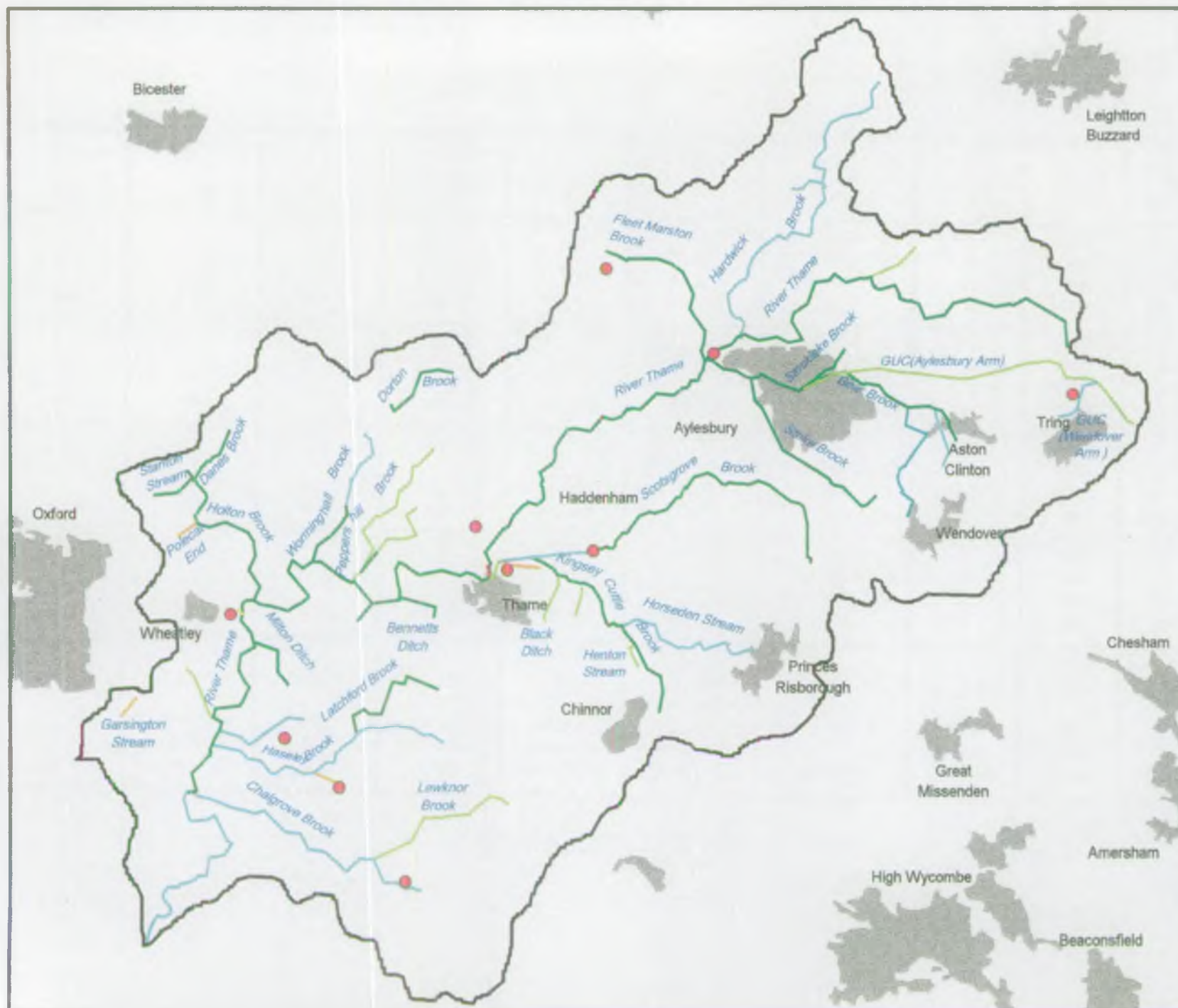


Fig 6 Chemical water Quality

RIVER ECOSYSTEM CLASSIFICATION

Class	Dissolved Oxygen % saturation  10%ile	BOD mg l <sup>-1</sup>  90%ile	Total Ammonia mg N l <sup>-1</sup>  90%ile	Un-ionised Ammonia mg N l <sup>-1</sup>  95%ile	pH lower limit as 5%ile upper limit as 95%ile	Hardness mg/l CaCO <sub>3</sub>	Dissolved Copper µg/l  95 %ile	Total Zinc µg/l  95 %ile	General Description
RE1	> 80	< 2.5	< 0.25	< 0.021	6.0-9.0	≤ 10 > 10 and ≤ 50 > 10 and ≤ 100 > 100	5 22 40 112	30 200 300 500	Very good quality (suitable for all fish species)
RE2	> 70	< 4.0	< 0.6	< 0.021	6.0-9.0	≤ 10 > 10 and ≤ 50 > 10 and ≤ 100 > 100	5 22 40 112	30 200 300 500	Good quality (suitable for all fish species)
RE3	> 60	< 6.0	< 1.3	< 0.021	6.0-9.0	≤ 10 > 10 and ≤ 50 > 10 and ≤ 100 > 100	5 22 40 112	300 700 1000 2000	Fair quality (suitable for high class coarse fish populations)
RE4	> 50	< 8.0	< 2.5	-	6.0-9.0	≤ 10 > 10 and ≤ 50 > 10 and ≤ 100 > 100	5 22 40 112	300 700 1000 2000	Fair quality (suitable for coarse fish populations)
RE5	> 20	< 15.0	< 9.0	-	-	-	-	-	Poor quality (likely to limit coarse fish populations)



appropriate RE classes and target dates, that is, dates when the objectives are to be achieved.

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

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

#### **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 water 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 standards are given in Fig 6.

The new River Ecosystem classes will be used to set river quality objectives for the Thame Catchment. The objectives will be set in line with the CMP timetable. The water quality objectives will have been set taking into account current and future uses of the watercourses in this catchment. The compliance of watercourse reaches with their objectives is judged against a rolling, three calendar year period.

RQOs expressed as River Ecosystem (RE) classes have yet to be derived for the Thame Catchment. This will be done in time for the CMP Consultation Report.

## **2.6 EFFLUENT DISPOSAL**

All effluent disposal is controlled by discharge consents which have a quality standard as part of the conditions of disposal. They are sampled regularly to assess their achievement against these quality standards. Any discharger who consistently fails to comply with the consented standard is liable to be prosecuted by the NRA.

There are a total of 187 consented discharges within the Thame catchment. Appendix 2 lists all consented discharges with sample points in the catchment.

### Improvements to Sewerage Disposal

A number of improvements to sewage disposal systems have recently been carried out in the Thame Catchment Review including the following:-

- At Little Haseley, in Oxfordshire, pollution from septic tanks is being investigated by a closed circuit TV specialist company who have been employed to film a section of culverted watercourse.
- Sewage disposal schemes have been completed at Lower & Nether Winchendon and Marsworth.
- Diversion of sewage flows from Weedon Sewage Treatment Works to Aylesbury have been completed.
- Improvements at Thame and Wheatley STW have been carried out.

## 2.7 POLLUTION CONTROL AND PREVENTION

The reporting of pollution incidents has continued to grow over recent years largely due to better communications and reporting lines and better understanding by the public of water pollution following greater publicity. Pollution incidents are categorised into major, significant and minor.

During 1995 there were 77 pollution incidents reported in the Thame catchment which were substantiated as being actual cases of pollution. There were a further 29 reports which were unsubstantiated. A breakdown of the different types of pollution is shown in the table below.

**Fig. 7**                                      **Pollution Incident Data 1995**

Type of Pollutant	Number of Incidents
Oil	32
Chemical	7
Sewage	17
Natural	1
Agriculture	2
General	16
Urban Runoff	1
Fire Water	1
Not Known	0
Total substantiated incidents	77

Some pollution incidents result in prosecution cases. Examples of cases, within the Thame catchment, that have resulted in prosecution over recent years is given below.

**Fig. 8 Prosecutions for pollution offences**

Company	Pollutant	Year	Fine (£)
Luton & District Transport Ltd, Aylesbury	Oil	1993	2000
Cherry Tree Nursing Home, Bledlow-cum-Saunderton	Sewage Effluent	1993	Caution
Agetur (UK) Ltd, Development site at Tring	Silt	1994	2,500
Sony Music Entertainment (UK) Ltd, Aylesbury	Oil	1994	Caution
C J Davis, Corner Farm, Bierton	Cattle slurry	1994	500
R W Davis, Corner Farm, Bierton	Cattle slurry	1994	500
Central Fuel Supplies, Chalgrove	Oil	1994	Caution

One way of reducing the numbers of incidents is to encourage the use of pollution prevention techniques. In the Thame catchment area various campaigns are in progress and planned to extend the principles of prevention being better than cure.

Visits by the pollution prevention team have been carried to most of the industrial premises on the Rabans Lane, Gatehouse Way, Broadmeads and Stocklake areas in Aylesbury. Further visits are planned for the industrial areas of Tring, Wendover and Thame during 1996/97.

In addition there is an on-going farm campaign covering the Upper Thame from source to Tring Bourne which is now around 60% complete. Farms in the catchment which drain directly to the River Thame from Rousham Brook to Fleet Marston Brook including Bucks County Council farms and small holdings within this area are also currently being visited. This work will be continued in the Tring/Halon/ Wendover area to complete the 'umbrella' above Aylesbury during 1996/97.

## 2.8 GROUNDWATER QUALITY

The NRA has a duty under the Water Resources Act, 1991 to monitor and protect the quality of groundwater. To demonstrate its commitment to meeting this duty the NRA has published a document entitled "Policy and Practice for the Protection of Groundwater" which is used as a framework for decision-making on groundwater issues.



NRA (TR) have produced a groundwater vulnerability map for the region and are in the process of defining groundwater protection zones.

## 2.9 BIOLOGICAL WATER QUALITY

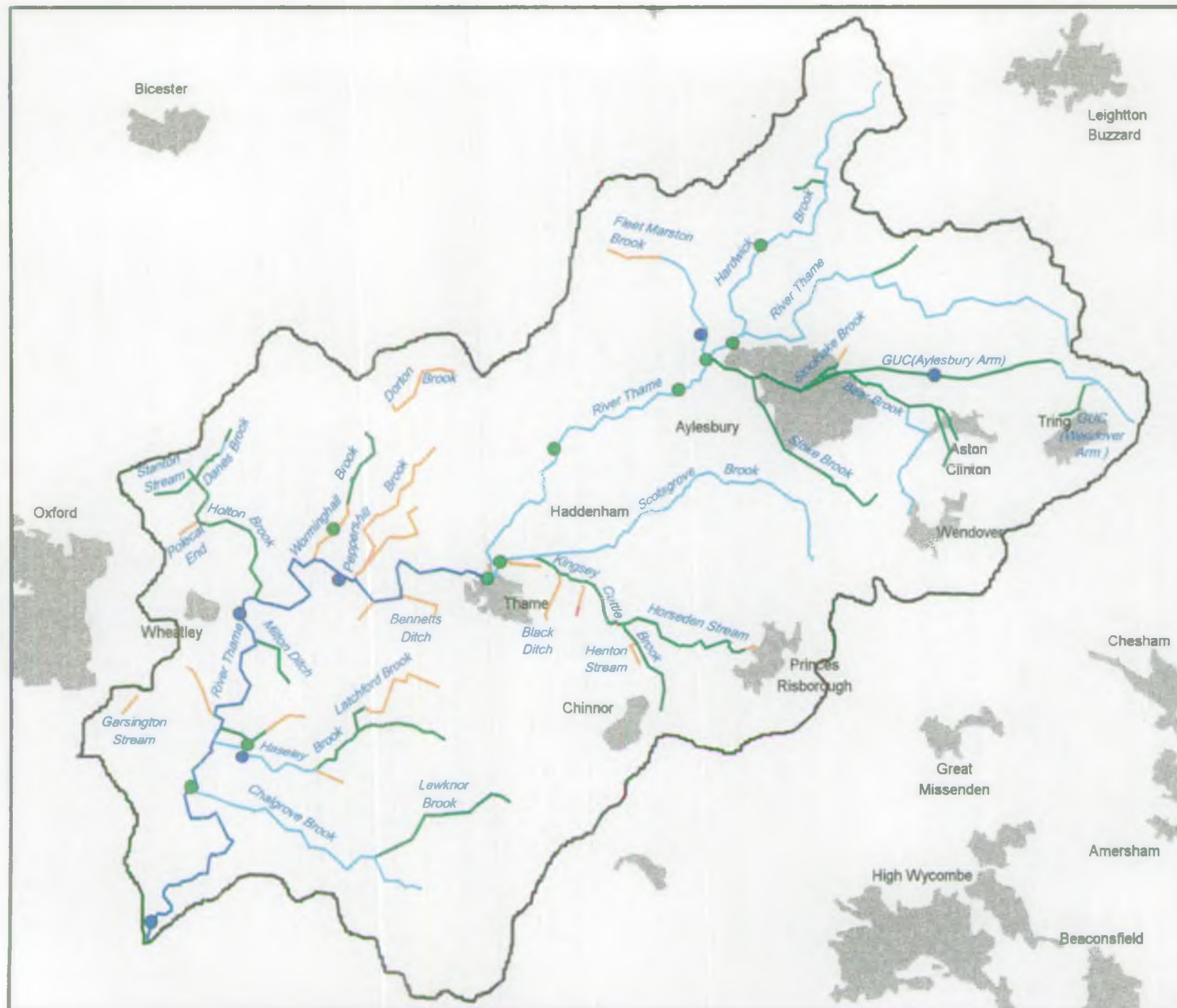
The NRA also carries out biological monitoring to provide additional water quality information. The health of rivers is reflected by the variety and abundance of the animal and plant life that they support. NRA biologists routinely monitor the number and variety of aquatic organisms which act as indicators to the effects of water quality. Biological indicators provide an assessment of water quality integrated over a time period of similar scale to the organisms generation time.

Families of macroinvertebrates, which are small and relatively immobile animals (including insects larvae, snails, crustaceans etc.) are the principal indicator organisms monitored. Each group has been assigned a score of 1 to 10 on the basis of its sensitivity to organic pollution. A Biological Monitoring Working Party (BMWP) score for a sample is the cumulative score for all the families present. The presence of pollution sensitive families will produce a high BMWP and scores over 100 generally indicate good biological quality while scores below 20 suggest severe pollution. Care is required in interpretation of results since habitat and other physical factors also effect the BMWP score.

Biological assessments are made at sites which complement chemical monitoring programmes, with sites chosen to represent water quality in river reaches. Further spatial coverage is provided by more detailed surveys of individual catchments timed to coincide with CMP production. Standard sampling methods which are used by the NRA have been developed in collaboration with the Institute of Freshwater Ecology (IFE). Results are validated by an internal quality control procedure (IQC) and an external audit conducted by IFE.

A summary of the biological monitoring in the Thame Catchment is given in the Table at Appendix 3 and on Map 5. BMWP scores shown are for those from the most recent sample since 1990. In general biological quality is very high throughout the catchment with scores well in excess of 100 at most sites. It can be seen that the only sites with very poor biological quality, scoring less than 15, are on Wheatley ditch and sites at the top of Towersey Brook and Milton Common Ditch. The site on Wheatley ditch is regularly sampled and normally obtains BMWP scores over 20. Most of the main tributaries are of moderate (BMWP scores 50-100) to good (BMWP 100-150) quality. There are 18 smaller ditches which are of poor quality scoring under 50. Four other tributaries have poor quality in their upper reaches.

Under the EC Urban Waste Water Treatment Directive (UWWTD), water identified as eutrophic (nutrient enriched), or at risk of shortly becoming so, and which receive a qualifying STW discharge (population equivalent > 10,000) can be designated as Sensitive Areas. Aylesbury STW is the main qualifying discharge in the catchment, and



# River Thames Catchment Review: Map 5 Water Quality (Biology & Bacteriology)

**Biological Monitoring  
Working Party Score 1993**

Class A	151 +
Class B	101 - 150
Class C	51 - 100
Class D	16 - 50
Class E	< 15
Unclassified	

**Bacteriological Quality:  
Geometric Mean Values for  
'E.Coli'/100ml (1991-95)**

0-1000	Low
1001-10000	Moderate
10001-100000	High
>100000	Very High

**Faecal Coliform Level**

0-1000 Low  
1001-10000 Moderate  
10001-100000 High  
>100000 Very High

**CMP Boundary**

**Urban Areas**

**Scale:-** 10km



eutrophication in the River Thame is being assessed by plant surveys above and below the discharge.

### **Bacteriological Status**

Faecal coliform bacteria, which are normally resident in the guts of warm-blooded animals, are used as indicators of pollution in all types of waters. The presence of such bacteria also indicates the potential presence of pathogens. Faecal material may originate from point sources (eg. effluents from sewage treatment works), or diffuse sources (eg. agricultural land, urban run-off or misconnections of sewerage into surface water drains). Faecal bacteria can survive in water for varying lengths of time but do not multiply.

NRA Thames Region has a rolling programme for bacteriological monitoring of surface waters. Map 5 summarises the results of monitoring to date in the Thame Catchment. The following is a brief interpretation of the monitoring to date:

Sixteen sites in the Thame catchment were each sampled four times during 1992.

Of the eight sites sampled on the River Thame, those at Wheatley, Ickford and Dorchester Bridges had low geometric mean levels of faecal coliforms ( $< 1000/100\text{ml}$ ), while those from the other six were considered moderate ( $1000 - 10\,000/100\text{ml}$ ). Aylesbury STW was responsible for elevating mean faecal coliform counts from  $1012/100\text{ml}$  at Stone Bridge, Aylesbury to  $6370/100\text{ml}$  upstream of Eythorpe Lake.

The Grand Union Canal at Aston Clinton had an exceptionally low geometric mean faecal coliform count of  $86/100\text{ml}$ . Of the other tributaries sampled, the Fleet Marston and Haseley Brooks had faecal coliforms present at low levels, while the Bear, Scotsgrove, Hardwick, Gainsbridge and Worminghall Brooks all had geometric means at moderate levels. (Each of the tributaries was sampled just upstream of their confluence with the main River Thame).

## **2.10 FLOOD DEFENCE**

The NRA's principal aims in relation to flood defence are to:

- provide effective defence for people and property against flooding from rivers;
- provide adequate arrangements for flood forecasting and warning.

To achieve this aim the NRA will seek to:

- develop plans for defences owned and maintained by them;
- encourage development of information technology which will improve warning procedures;



- highlight awareness of the need to control development in flood plains or which will increase surface water run-off;
- identify opportunities for the enhancement of environmental, recreational and amenity facilities;
- encourage the control of surface water run-off from new development by the appropriate use of storage ponds, soakaways and source control facilities.

There is a quick flood response time owing to the Thame being a clay catchment. The Thame generally has a wide flood plain which is shown on Map 6.

The Grand Union Canal's Aylesbury arm has quite an influence in the area east of Aylesbury, on the smaller tributaries of the Thame, owing to spring flows and the reservoirs which feed the canal.

Much drainage work took place from the 1940s onward to enhance the growing potential of agricultural land and increase domestic food production for the country. The effect of this work in the longer term has meant a need for more frequent maintenance for the rivers which had been engineered. A great deal of environmental damage was also caused to these altered watercourses which is now gradually being rectified.

### **Flood Defence Standards of Service**

As an aid to making decisions on priorities, the NRA has determined Standards of Service (SOS) for flood defence based on land usage within the flood plain. A hierarchical series of five land use bands has been established, based on the presence and concentration of certain features of land use. Each land use band has a target for the maximum flood risk to which it should be exposed. The standards are expressed as a percentage which reflects the likelihood that during any year a flood event may occur which exceeds the magnitude for which protection is available or should ideally be provided. The land use band table and SOS Reaches in the Thame Catchment appear in Appendix 4, and these tables are in the process of being updated.

### **Routine Maintenance**

Regular maintenance is essential if the optimum hydraulic capacity of the river system is to be preserved. Such maintenance works include vegetation control, obstruction and blockage removal and dredging. Maintenance of the integrity of the banks themselves is the responsibility of the riparian owner. A regime of regular maintenance can contribute significantly to reducing the risk of flooding. At times of heavy rainfall, the NRA's operational priorities are to check river control structures and clear debris and identified obstructions where possible.

Towns and villages are inspected as a priority and some worked on over a five year cycle to minimise the flood risk in each settlement. Agricultural land where susceptible to crop

### Map 6 Flood Plain

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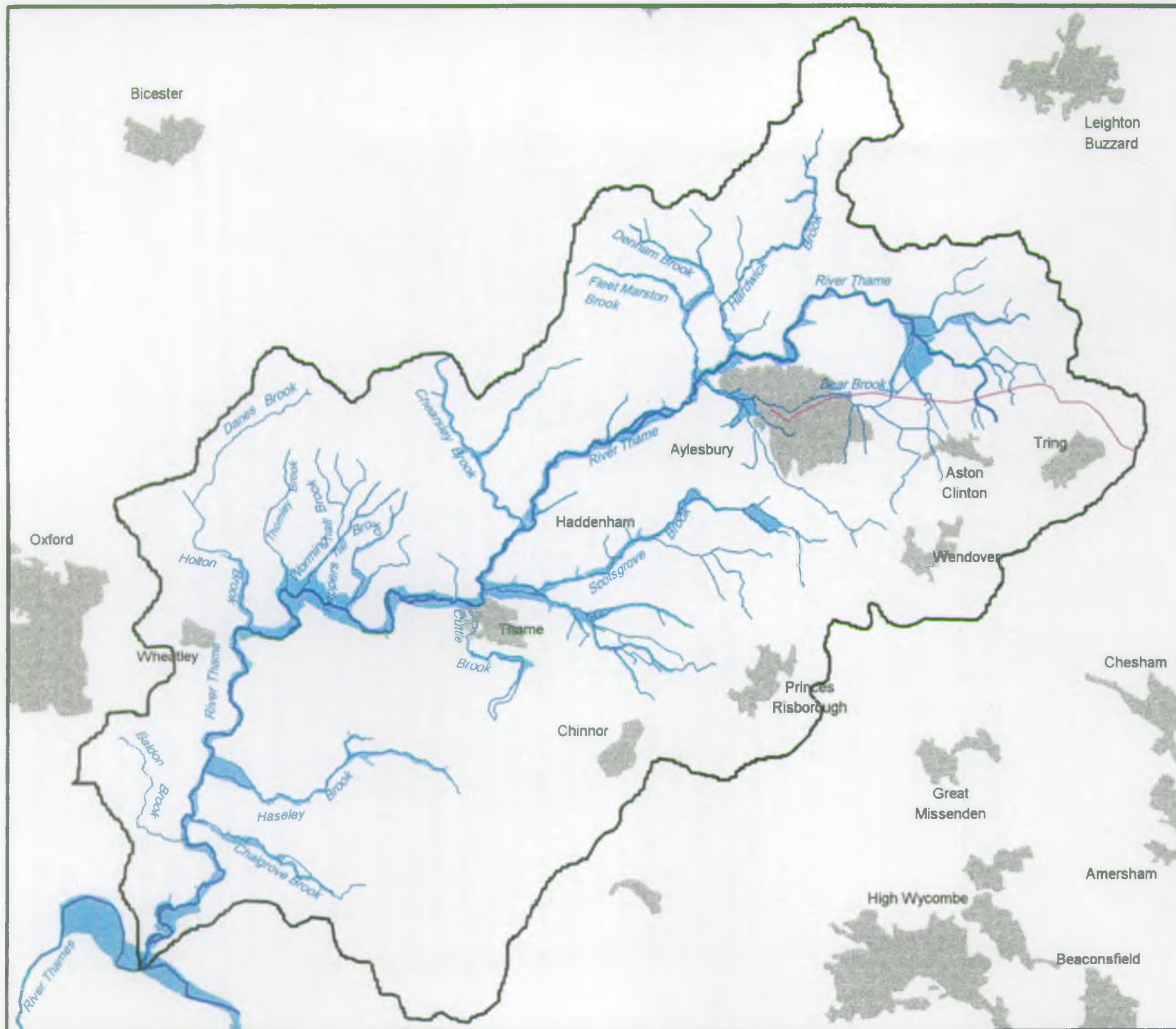


10km



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damage due to flooding and poor drainage may also be maintained by the Authority but as a lesser priority. An assessment of the benefits of such maintenance is not cost effective.

### **Section 105 Surveys**

Local planning authorities and the NRA are required by the Department of the Environment circular 30/92 on Development and Flood Risk, to liaise closely on flooding and surface water run-off matters. The aim is to ensure that flood defence risks of development are an integral part of the decision making process undertaken by local planning authorities on relevant planning applications. In this respect the NRA has responsibility to prepare surveys under Section 105 of the Water Resources Act 1991 to define the nature and extent of flood risks. The preparation of such surveys is a commitment included in a 'Memorandum of Understanding' drawn together in March 1994 between representatives of local planning authorities and the NRA.

### **Flood Defence Schemes**

There are a number of flood defence schemes within the Thame catchment, listed as follows:

- Aylesbury Flood Alleviation Scheme. The flood alleviation scheme (FAS) in the town, which was completed in 1995 is designed to deal with flooding taking account of the level of development set out in the Aylesbury Town Local Plan.
- Minor Alleviation Schemes on Bear Brook at Aston Clinton were completed in 1993 and involved the removal of a culvert and replacement with a simple span bridge; Also at Aston Clinton three undersized culverts and farm crossings were replaced on the Draytonmead Brook together with desilting works and highway culvert clearance.
- Heavy maintenance work took place at Chalgrove during 1995, involving the desilting of a narrow section of the Chalgrove Brook and the protection of three properties and the Church access road.
- Land drainage improvement works at various locations including a dredging scheme on the Scotsgrove Brook.
- A Flood Defence funded Environmental Enhancement project was completed at Nether Winchendon in 1994 and at Chearsley in 1993.

### **Water Level Management Plans**

Recent guidance has been issued by the government on the preparation of WLMPs for Sites of Special Scientific Interest (SSSI) or other areas of high ecological or landscape importance. Where the NRA is the operating authority it will liaise with English Nature to agree a programme of works which safeguards key water levels where the river forms part of, or runs adjacent to a designated site. However there are no water dependant SSSIs within the Thame catchment



## 2.11 FISHERIES

The NRA has a general duty to maintain, improve and develop fisheries under its jurisdiction. It has powers to regulate and protect fisheries as defined in the Salmon and Freshwater fisheries Act, 1975 and the Salmon Act, 1986. It also has further duties to control fish disease and monitor fish stocks.

The EC Directive 78/659/EEC instructs member states to designate river and canal reaches capable of supporting salmonid or cyprinid fisheries. These watercourses are required to comply with stipulated water quality parameters in order to protect fish life. There are two reaches designated under the EC Fish Directive in this catchment described in Fig. 8 below.

**Fig. 9** **EC Fish Directives**

Watercourse	Reach	Length (km)	Designation
GUC Aylesbury arm	GUC at source to GUC at California Brook SP91801436 to SP 82241350.	9.9	cyprinid
Thame	Thame at Cuddington to Thames SP73801190 to SU7809321.	46.0	cyprinid

The designated area of the Thame is a coarse fishery with a Target Biomass of 20gm<sup>-2</sup>. The River Thame supports a good to excellent coarse fishery from approximately Nether Winchendon downstream to the confluence with the Thames (SP 732118). No game fishery exists within the Thame catchment. The Scotsgrove Brook system has relatively unknown fish populations. There are a number of still water fisheries in the catchment including:- Tring reservoirs (3 or 4 pits); Hotton Reservoirs (SSSI); Milton pools (commercial fishery); Various estate lakes (smaller waters), also the Grand Union Canal (Aylesbury Arm) is an important fishery.

The fisheries features within the Thame catchment are shown on Map 7.

There are several angling clubs and consultative associations within the catchment which have been listed below:-

Leighton Buzzard Angling Club  
 St Nicholas Angling Club  
 Thame Fisheries Consultative  
 Aylesbury Federation of Anglers  
 Aylesbury and District IWA  
 Dorchester Angling Association  
 Dorchester Angling Club

Tring Anglers  
Thame Utility Fish Preservation Consultative

## 2.12 CONSERVATION AND ECOLOGY

The NRA has a duty under the Water Resources Act, 1991 and Land Drainage Act, 1991 to further and promote the conservation of flora and fauna associated with the water environment. In order to do this it has developed a strategy which is aimed at conserving and enhancing wildlife, landscape and archaeological features associated with inland waters (and coastal waters). This strategy is encapsulated in the objectives to assess and monitor conservation status, in ensuring that the NRA's regulatory, operational and advisory activities take full account of conservation requirements; and in the pursuit of habitat enhancements and the promotion of conservation of the water environment.

These objectives mean that conservation is linked with all the activities carried out by the NRA, and its importance in the Thame catchment area is no exception. There is extensive conservation input within the NRA to all operational and regulatory functions including advising on planning issues, flood defence projects, habitat improvement schemes, fishery issues and recreational projects.

### Designated sites

The NRA has a particular duty towards Sites of Special Scientific Interest (SSSIs) and other statutory sites in ensuring that its own operational, regulatory and advisory activities pay special regard to protecting the interest of these sites, and therefore entails close liaison with English Nature.

In the Thame catchment there are 34 SSSIs. Of these 9 are also County Trust Nature Reserves and 8 are ancient woodlands. A list of these sites appear as Fig 10. The catchment contains a considerable number of ancient and semi-ancient beech woods in the Chilterns. It also includes other important woodland sites and chalk grassland SSSIs. The Tring reservoirs have high regional ornithological importance.

The catchment includes part of the Chiltern beech woods proposed Special Area of Conservation (SAC), designated under the Habitats Directive, which includes five existing SSSIs including Aston Rowant Woods, Ellesborough and Kimble Warrens and Naphill Common.

There is a Local Nature Reserve (LNR) on the Cuttle Brook at Thame, designated in 1994. The NRA are represented on the management committee for this site.

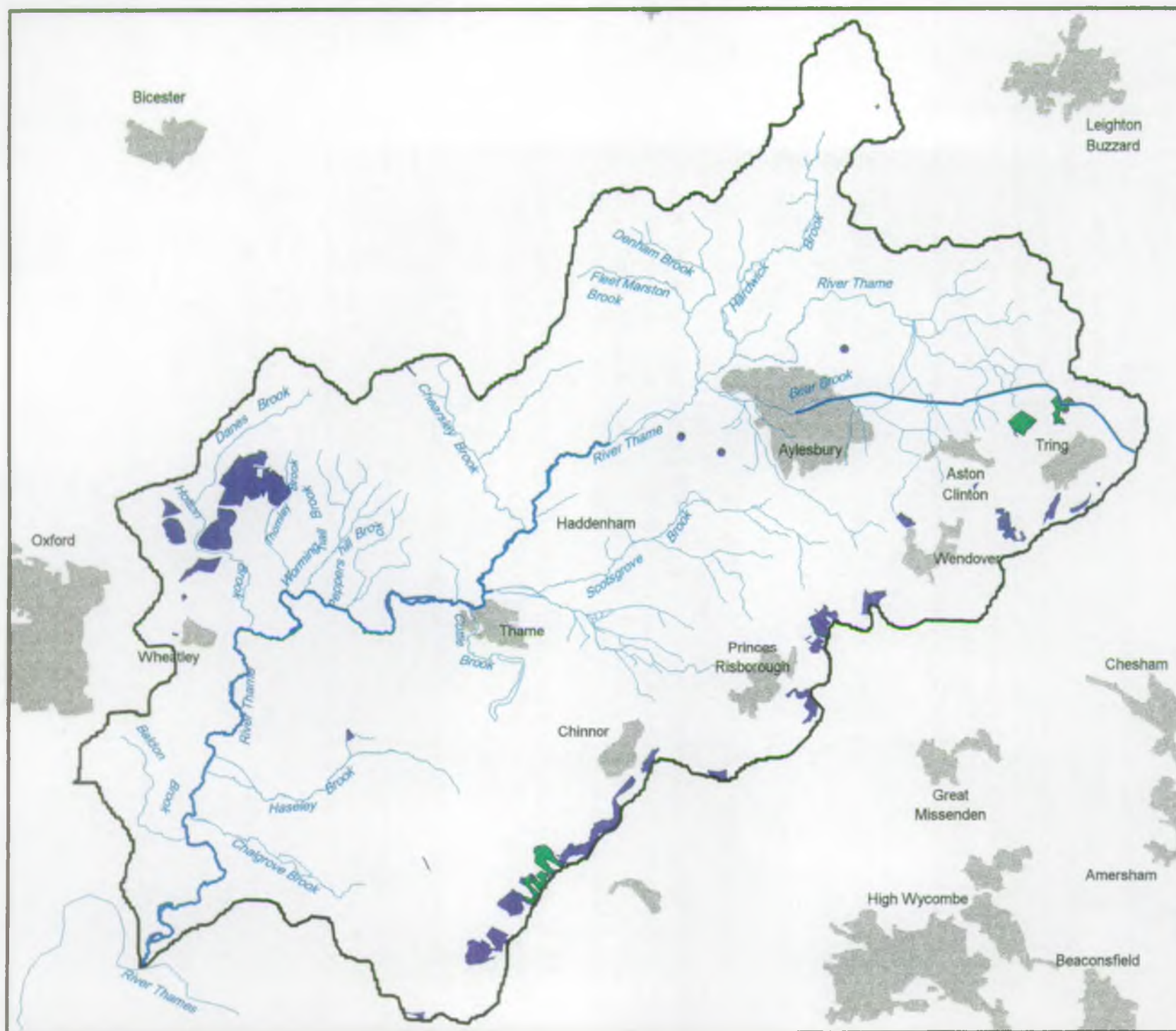
There are also 318 other sites of wildlife value, other than SSSIs, on the NRAs database which fall within the catchment.

Features of conservation interest are shown on Map 7.



# River Thames Catchment Review:

## Map 7 Conservation & Fisheries



National Nature Reserve

Main River

SSSI

EC Designated Fish  
Reaches

Salmonid

Cyprinid

CMP Boundary

Urban Areas

Scale:-  
 10km

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Fig. 10 SSSIs WITHIN THE THAME CATCHMENT

Key:- SSSI - Sites of Special Scientific Interest

AW - Ancient Woodlands

CTNR - County Naturalist Trust

SITE	GRID-REF	AREA (Ha)	COUNTY	STATUS
Aldbury Nowers	SP 951 135	19.7	Hertfordshire Bedfordshire	SSSI AW
Aston Clinton Ragpits	SP 888 108	2.9	Buckinghamshire	SSSI CTNR
Aston Rowant Cutting	SP 728 965	4.0	Oxfordshire	SSSI
Aston Rowant Woods	SU 750 984	209.7	Buckinghamshire Oxfordshire	SSSI AW
Bierton Clay Pit	SP 839 157	0.1	Buckinghamshire	SSSI
Bugle Quarry	SU 793 121	0.1	Buckinghamshire	SSSI
Chinnor Chalk Pit	SU 755 998	66.1	Oxfordshire	SSSI
Chinnor Hill	SP 766 007	27.3	Oxfordshire	SSSI
Coombe Hill	SP 849 066	51.2	Buckinghamshire	SSSI
Dancersend	SP 900 094	81.3	Buckinghamshire	SSSI
Dancersend Waterworks	SP 906 090	4.0	Buckinghamshire	SSSI CTNR
Ellesborough & Kimble Warrens	SP 831 058	68.9	Buckinghamshire	SSSI CTNR
Grangelands and Pulpit Hill	SP 829 050	25.5	Buckinghamshire	SSSI
Hollywood	SP 588 100	24.4	Oxfordshire	SSSI AW
Holton Wood	SP 603 080	49.5	Oxfordshire	SSSI AW
Knightsbridge Lane	SU 683 969	1.7	Oxfordshire	SSSI
Littleworth Brick Pit	SU 588 054	1.2	Oxfordshire	SSSI
Lodge Hill	SP 794 001	31.8	Buckinghamshire	SSSI
Lyehill Quarry	SP 592 068	3.0	Oxfordshire	SSSI
Oddy Hill & Tring Park	SP 934 109	35.6	Hertfordshire	SSSI
Pitstone Hill	SP 950 145	47.2	Buckinghamshire	SSSI CTNR
Pitstone Quarry	SP 934 145	10.3	Buckinghamshire	SSSI CTNR
Shabbington Woods Complex	SP 615 110	308.6	Buckinghamshire Oxfordshire	SSSI AW
Shirburn Hill	SU 715 955	64.5	Oxfordshire	SSSI
Spartum Fen	SP 654 016	8.0	Oxfordshire	SSSI
Stanton Great Wood	SP 588 093	57.5	Oxfordshire	SSSI AW

Stone	SP 778 126	0.2	Buckinghamshire	SSSI
Swyncombe Downs	SU 672 915	46.4	Oxfordshire	SSSI
Tring Reservoirs	SP 919 136	106.5	Buckinghamshire Hertfordshire	SSSI
Tring Woodlands	SP 917 100	23.8	Hertfordshire	SSSI AW
Warren Farm, Stewkley	SP 851 242	1.5	Buckinghamshire	SSSI
Waterperry Wood	SP 605 090	140.2	Oxfordshire	SSSI AW
Watlington and Pyrton Hills	SU 705 938	112.9	Oxfordshire	SSSI
Weston Turville Reservoir	SP 862 096	18.4	Buckinghamshire	SSSI CTNR
Windsor Hill	SP 825 027	61.8	Buckinghamshire	SSSI
Wormsley Chalk Banks	SU 737 932	14.1	Buckinghamshire Oxfordshire	SSSI

### Countryside Projects

This catchment has a considerable number of Countryside Stewardship agreements for example land at Nether Winchendon by the River Thame which the NRA has been involved in.

Recently the NRA have helped to fund the creation of a wetland area as part of the Bear Brook Flood Storage Area and accompanying information board, in conjunction with the Aylesbury Vale Countryside Management Project (ACMP).

### Black Poplars

Pollarded willows and black poplars are two of the characteristic features of the Thame Valley. Both species support a wide variety of wildlife including nesting and foraging birds, roosting bats and a considerable diversity of insect species. Their root systems can provide habitat for aquatic invertebrates and shelter and even spawning sites for fish. This diversity of wildlife depends on the continued management of these trees. The Thame catchment is a key area for the nationally rare native Black Poplar. The NRA is helping to promote expansion of their population and manage the existing population by pollarding.

### Conservation Groups

Consultation with wildlife and nature conservation groups, both locally and nationally based, as well as local authorities is an important part of the Conservation sections work. Some of the groups with which regular contact is maintained are listed below:-

Berks, Bucks and Oxon Naturalist Trust (BBONT)  
 Aylesbury Countryside Management Project (District Council funded)  
 Bucks Nature Conservation Forum (includes whole range of organisations)  
 Oxon Nature Conservation Forum (includes whole range of organisations)  
 English Nature (Thames and Chilterns team)

RSPB (Central England office)

### Ecology

The ecology of streams and rivers reflects both natural influences associated with the physical and chemical characteristics of the catchment and artificial influences resulting from human activities. The whole catchment, and the River Thame in particular, supports an exceptionally diverse macroinvertebrate community with a strong component of pollution sensitive mayflies, caddisflies and other groups. Kingsey Cuttle Brook, Gainsbridge Brook, Chalgrove Brook, Scotsgrove Brook, Hardwick Brook and five sites along the length of the Thame all support semi-natural macroinvertebrate assemblages with 27 or more scoring families.

The well developed margins and varied channel in the lower catchment also support a range of taxa associated primarily with still water, which are relatively unusual in rivers. These include Libellulid dragon flies and Mesovelid bugs. The club tailed dragonfly larvae (*Gomphus vulgatissimus*) which has a highly restricted distribution in lowland England, is found at Dorchester on the River Thame.

The native crayfish (*Austropotamobius pallipes*) and signal crayfish (*Pacifastacus leniusculus*) are both found in the Thame catchment. Routine biological samples provide a useful record of their distribution for conservation purposes. Using pond-nets, native Crayfish have been capture in the upper reaches of the River Thame at Notley Abbey and Ickford Bridge. They have also been found in the Scotsgrove Brook at Scotsgrove Mill. Signal Crayfish have been found in the River Thame at Shabbington Bridge and also Haseley, Tiddington, and Latchford Brooks. Signal crayfish are commercially fished on the River Thame between Cuddesdon Mill and Stadhampton, with half a tonne removed each year.

Other notable taxa in the catchment include Beraeidae caddis fly larvae which are present throughout the Danes Brook. Analysis of the NRA National Database showed that these were found in less than 1% of samples taken prior to 1990.

## 2.13 LANDSCAPE

The NRA's principal aim in relation to landscape is to conserve and enhance the natural beauty and amenity of inland and coastal waters and associated lands. In particular, its conservation strategy seeks, through appropriate management, to conserve existing landscape features, to restore landscape character where this has been eroded, and to create new landscapes through enhancement.

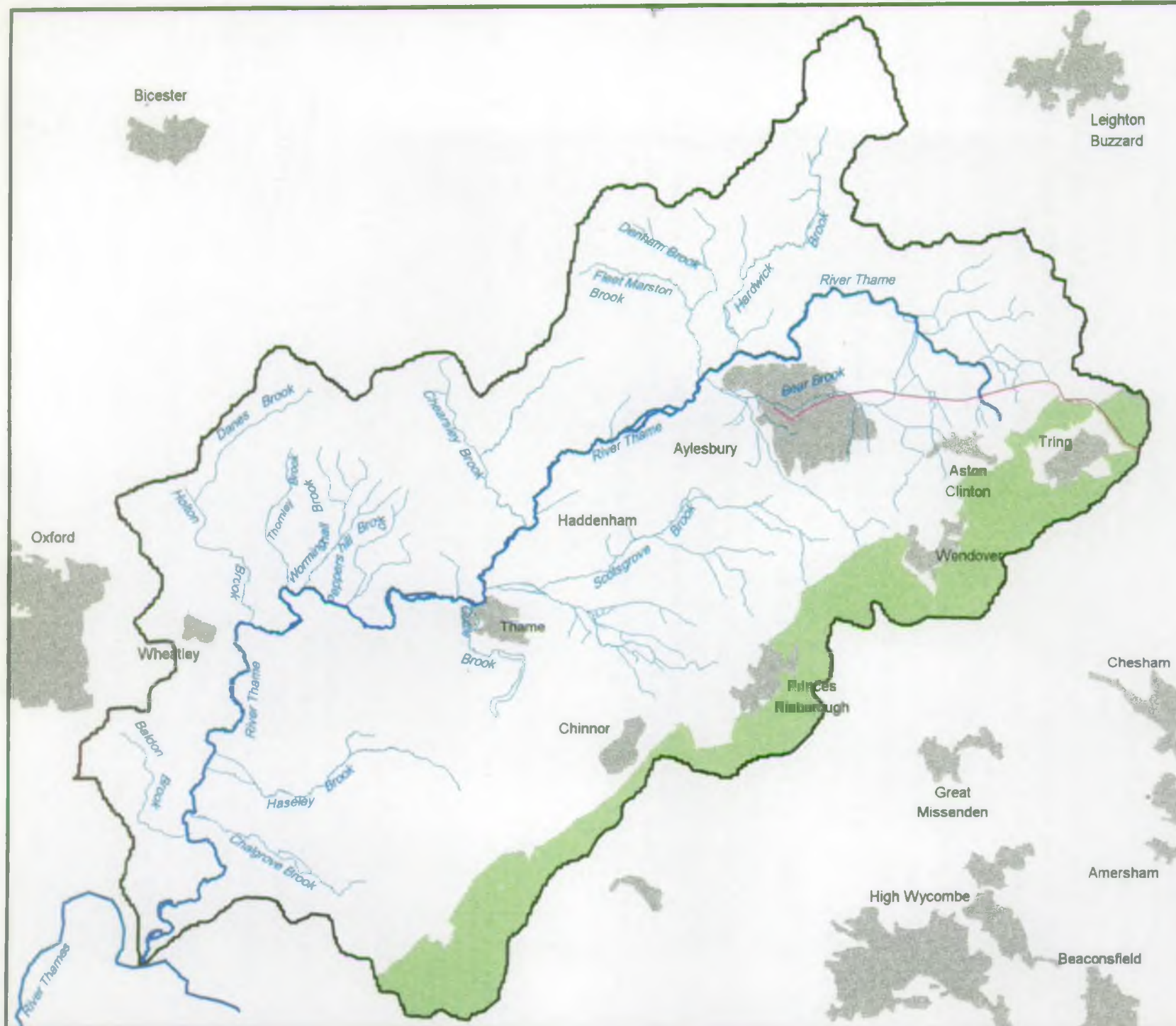
The majority of the Thame catchment is characterised by flat pastoral landscape with low limestone hills. The Chilterns escarpment skirts the southern edge of the catchment and is covered by the Chilterns Area of Outstanding Natural Beauty designation which is shown Map 8.


There are large tracts of land in the catchment which are covered by Area of Attractive Landscape (AAL) designation including:- the Thame valley downstream of Aylesbury; the



# River Thames Catchment Review:

## Map 8 Landscape



 AONB

 Main River

 Grand Union Canal

 CMP Boundary

 Urban Areas

Scale:-  
 10km

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Brill-Winchendon hills; the Quainton-wing hills; Halton-Wendover area. An extensive area within South Oxfordshire District's jurisdiction is covered by the Area of Great Landscape Value (AGLV) designation and there is a proposal to extend this to include the area between the Thame valley and the Chilterns escarpment.

The Grand Union Canal is an important feature to the east of Aylesbury in terms of landscape & heritage value.

There is a lack of baseline data and evaluation of the type and quality of river landscapes, and a landscape assessment is therefore required to provide this. Poor environmental quality of many of the watercourses within Aylesbury justifies the need to fully survey the catchment in order to conserve the remaining high quality watercourses and to identify and bid for resources to enhance others where most appropriate.

## 2.14 RECREATION

The NRA's principal aim in relation to recreation is to:

- develop the amenity and recreational potential of inland (and coastal) waters and associated land.

Its specific objectives are:

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

The main recreational value of the catchment is the attraction of its pastoral landscape and diversity of wildlife interest which is suitable for passive recreational activities such as walking, rambling, birdwatching and other country pursuits. The Thame also has numerous country houses, parks and historic settlements which are an added attraction to visitors. There is generally good access to the River Thame with an extensive system of rights of way, two fords and one stepping stone crossing.

Fishing represents a direct recreational use of the river and there are many pathways which give river access for the angler. There are also several fishing clubs which have rights on the Thame river banks.

The countryside agencies responsible for the catchment are highly motivated to promoting walking routes in promoting the Thame valley's assets. There are a number of long distance footpaths which run through the catchment including the Ridgeway, Oxfordshire Way and North Buckinghamshire Way. In addition there is a Thame linear path which is a 15 mile walk linking the North Bucks Way with the Oxfordshire Way. The NRA has contributed to a leaflet on this walk, which has been produced by Aylesbury Vale District Council as part of the Aylesbury Vale Countryside Project. The promotion of river walks and their development to connecting main walks should continue.

The Grand Union Canal is an important recreational resource for both boating and informal recreation to the east of Aylesbury which is managed by the British Waterways Board.

## **2.15 NAVIGATION**

The NRA's principal aim in relation to navigation is to improve and maintain inland navigable waterways and their facilities for use by the public.

The Thame is not a public navigation although it is used for navigation, probably under private agreements and the NRA has no navigation jurisdiction. The Thame enters the Thames (over which the NRA does have navigation jurisdiction) just downstream of Days Lock, near Dorchester.

The Grand Union Canal (Aylesbury arm) is used for boating but is managed by the British Waterways Board.

In terms of navigation the Thame is used for cruising for a limited stretch between the Thames and Dorchester. Several small cruisers are moored on the banks. This is a valuable recreation amenity for navigation of the River Thames reaches. Mooring enhancements at Dorchester and appropriate liaison with landowners would benefit Dorchester's recreation and tourism economy.

Canoes travel a lot further upstream, although this can be difficult as the channel is liable to blockages by fallen trees. There is a lack of data on the demand for or availability of access for canoeing on the Thame.

## **2.16 LAND USE PLANNING**

While the NRA is well placed to influence some of the factors affecting the water environment, it has no direct control over the mechanisms which determine land use activities. This function is primarily the responsibility of Local Planning Authorities through the implementation of Town and Country Planning legislation. The NRA is nevertheless involved in the planning system as a statutory consultee, receiving both development plans and planning applications for comment.

The study area covers part of the counties of Oxfordshire, Buckinghamshire and Hertfordshire. The relevant local planning authorities and their most recently produced development plans are listed below:

### **Buckinghamshire**

Buckinghamshire County Council - The New Buckinghamshire County Structure Plan 1991-2011 (Deposit draft April 1994)

Aylesbury Vale District Council - Rural Areas Local Plan (Adopted June 1995); Aylesbury Town Local Plan (Adopted 1991)



Chiltern District Council - Chiltern District Local Plan (Deposit draft May 1995)

Wycombe District Council - Wycombe District Local Plan (Adopted June 1995)

### **Oxfordshire**

Oxfordshire County Council - Oxfordshire Structure Plan 2001, (Consultation draft August 1995);

Cherwell District Council - Cherwell Local Plan, (Deposit draft, November 1992);

South Oxfordshire District Council - South Oxfordshire Local Plan, (Deposit Draft December 1993)

### **Hertfordshire**

Hertfordshire County Council - Hertfordshire Structure Plan Alteration no. 1 July 1992 (new Deposit plan expected Autumn 1996)

Dacorum District Council - Dacorum District Local Plan (Adopted April 1995)

### **Other studies**

The local authorities and other bodies within the Thame catchment have also produced other documents which are of relevance to the catchment including: Buckinghamshire Landscape study; Buckinghamshire Nature Conservation Strategy; Oxfordshire Nature Conservation Strategy; Oxfordshire Environmental Strategy; Chilterns AONB Management Plan.

### **Future expansion of Aylesbury**

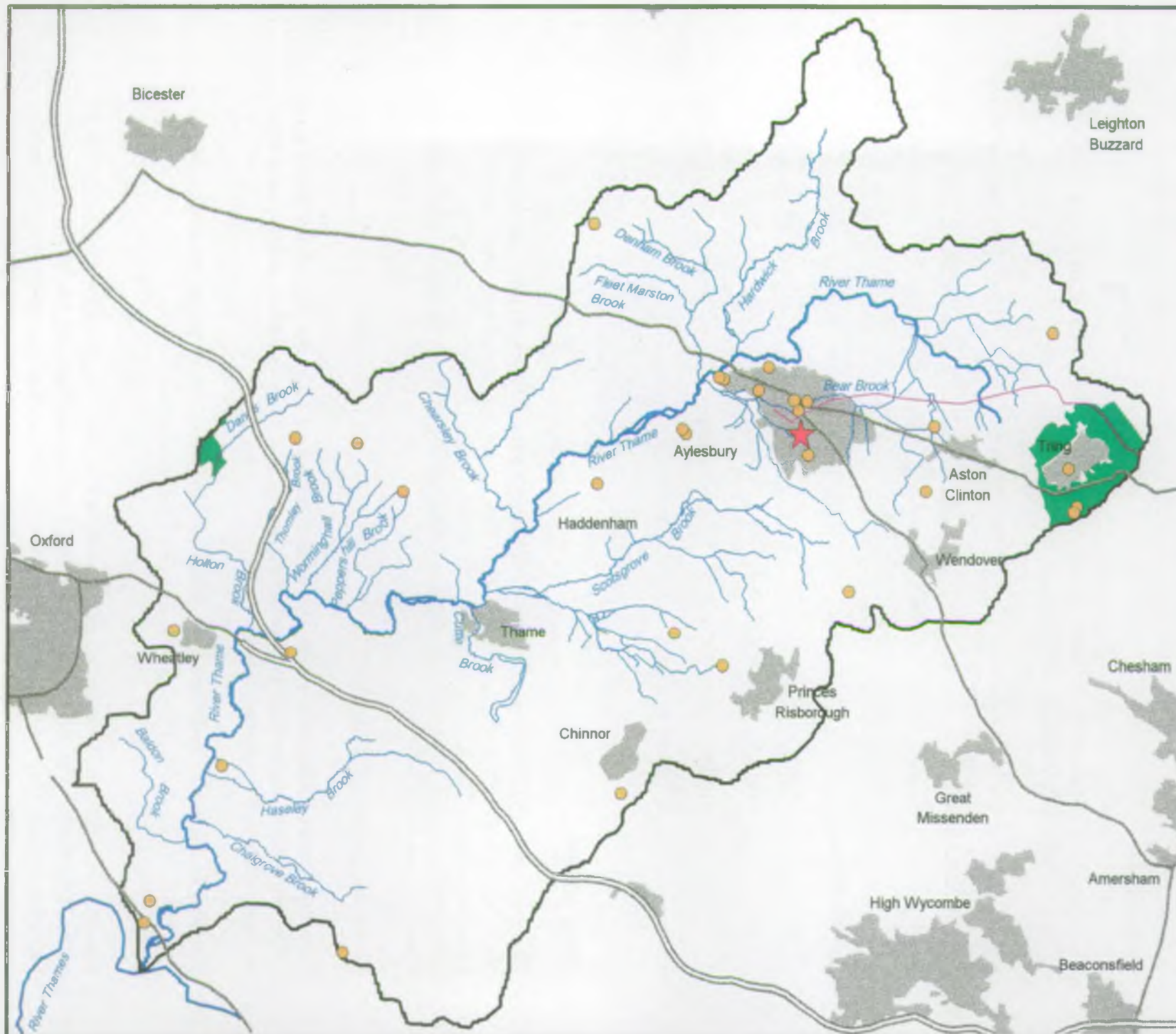
Regional Planning Guidance (RPG 9) for the South East suggests Aylesbury is an area where the local economy is in need of restructuring, and there is a need to take advantage of the development opportunities that arise.

The Buckinghamshire Structure Plan identifies Aylesbury as a major strategic growth settlement, with housing development and employment growth planned for the town in the period 1991-2011.

The flood alleviation scheme (FAS) in the town, which was completed in 1995 is designed to deal with flooding taking account of the level of development set out in the Aylesbury Town Local Plan. However this excluded the additional housing sites now proposed by the

# River Thames Catchment Review:

## Map 9 Land Use



-  Green Belt
-  Major Development Location
-  Waste Disposal Site
-  Motorway
-  Primary Road
-  Main River
-  Grand Union Canal

-  CMP Boundary
-  Urban Areas

Scale:-  
10km





Structure Plan. The additional housing is therefore likely to worsen the flooding situation unless appropriate mitigation methods are agreed.

The NRA TR has published a strategic planning initiative called "Thames 21 - A Planning Perspective and a Sustainable Strategy for the Thames Region", which provides a regional context for the preparation of CMPs by identifying strategic development issues including future development pressure points, of which Aylesbury is one (see Map 9).

Meetings between Aylesbury Vale District Council and the NRA on the expansion of Aylesbury, particularly as regards proposals for housing and link roads, have recently taken place but specific sites have yet to be chosen (see map 10). The NRA has also received direct approaches from consultants working for various developers.

Source control measures to attenuate the increases in surface water run-off must be incorporated into any new development to avoid further flooding. Development in the floodplain should be resisted in order to retain its capacity, extent and natural flow routes. Aylesbury Vale District Council supports this view, and has, notably excluded the flood plain of the River Thame around Aylesbury from land available for development

The NRA does not comment on all planning applications but targets its resources at the more significant proposals. Hence the promotion of source control techniques on those developments not passed for consultation to the NRA should be coordinated by the development control and building regulation departments of the local planning authorities. However the NRA will assist with information and advice on these issues as much as possible. A working group has been formed within the NRA to produce improved guidance on matters relating to source control and the protection of groundwater quality.

In addition the Grand Union Canal, the Bedgrove, Bearbrook and the Southcourt Brooks together offer opportunities for integrated open space within Aylesbury town centre, and they are of important amenity value.

### **Specific Development Sites**

Approximately 250 planning applications are received annually by the NRA from Local Planning Authorities within the catchment area. The following is a list of some of the current development proposals which have implications for the water environment:-

- Oxford Road Mill, Aylesbury site to be redeveloped along with Shell premises next door. Improvements to the Bear Brook river corridor and mill channel by-pass. Also there is the opportunity to redesign the weir to Aylesbury FAS standards.
- Walton Mill, Aylesbury - the mill site is to be redeveloped for housing. A large area of land is to be provided to allow for the existing development on the opposite bank and so there is an opportunity for river corridor improvements along the Bear Brook.



- Coldharbour farm - work has started out on this large development which incorporates major works in connection with the restoration of part of the Bear Brook and several small tributaries which pass through the site (see map 10).
- A41 Aston Clinton By-pass - details agreed but construction may well be shelved. Wendover Bypass has commenced work, but has limited impact on the water environment.
- Housing sites are being considered at Haddenham which will effect non-main rivers in the area.
- Magnolia Park Golf Course on tributary of Danes Brook is under construction. Proposals to abstract water for irrigation are being considered.
- A Motorway service station has been granted planning permission at Wheatley, following a Public Inquiry. The potential impact of this development on the River Thame will be closely investigated.
- The redevelopment of "BETEC" site in Aylesbury town will allow the enhancement to a concrete lined channel, with the existing building covering approximately 30 metres of channel.

### **Derelict Sites**

There are a number of sites in the catchment which have become derelict or disused and are likely to be redeveloped for alternative uses which may have an impact on the water environment, these include:- The RAF base at Halton near Wendover, St Johns Hospital at Stone and the Pitstone Cement works.

### **Minerals**

The relevant minerals policies for the study area are contained in the following plans: Oxfordshire Minerals and Waste Plan (Deposit Draft 1993); The Buckinghamshire Minerals Plan (adopted 1995); and the Hertfordshire Minerals Plan (Post deposit modifications January 1995). There are no minerals sites of any significance in the catchment area.

### **Waste**

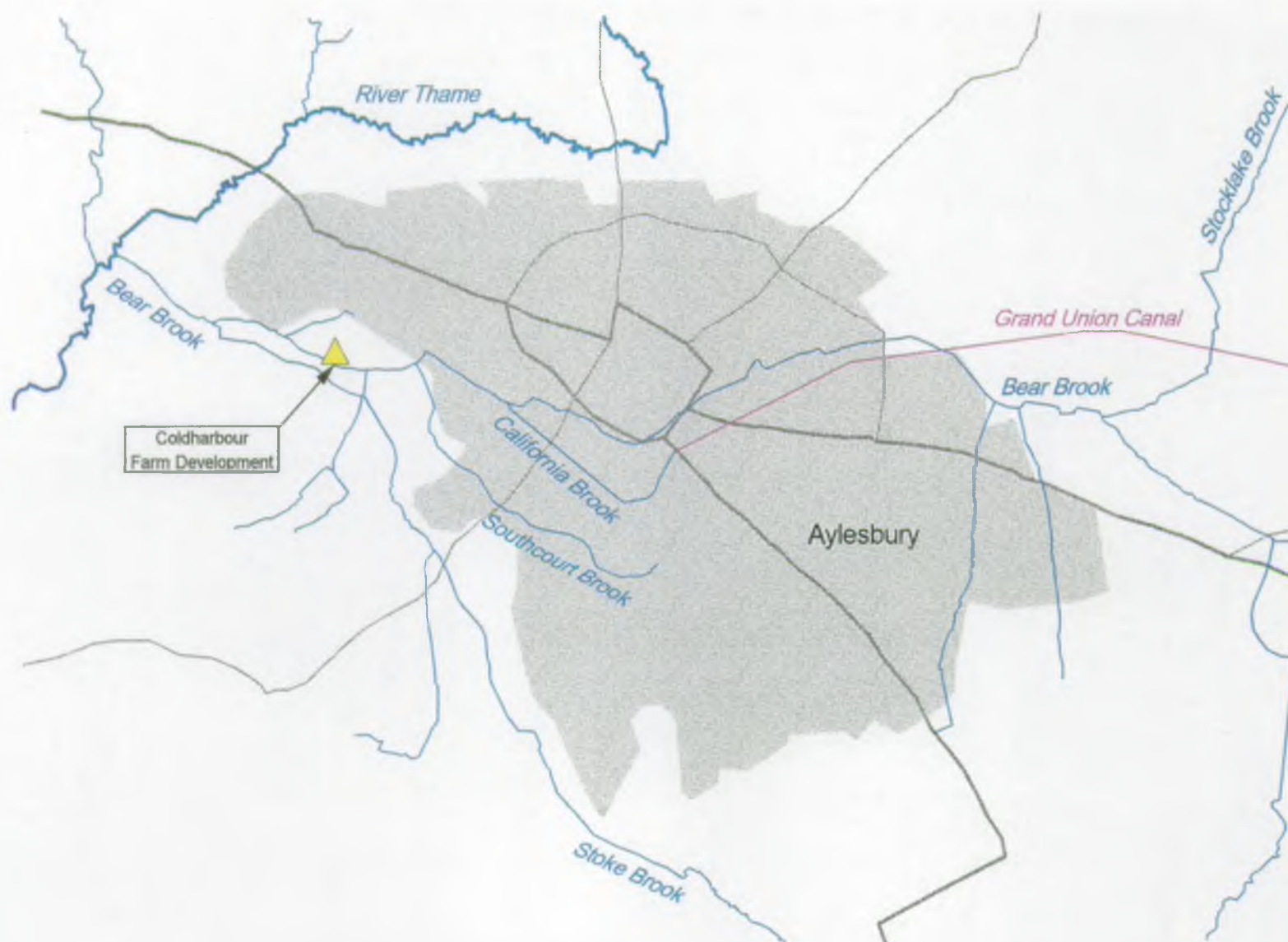
In recognition of the potential threats that waste management activities can pose to the water environment, the NRA has a statutory role in relation to waste regulation. The Environmental Protection Act 1990 (EPA) identifies the NRA as a statutory consultee of Waste Regulation Authorities with respect to the issue, modification, subsistence, and surrender of licences that are a prerequisite to the operation of waste management facilities and handling controlled wastes. The Environment Agency will take over the role of waste regulation authorities after 1 April 1996.

The NRA also has an important, complementary role in the planning of waste management facilities. Local authorities are required to consult with the NRA when preparing waste local plans. The NRA is also consulted on applications for planning permission for waste management facilities.


The waste sites in the Thame catchment are identified in the following plans:- Oxfordshire Minerals and Waste Plan (Deposit draft 1993); Buckinghamshire Waste Local Plan (Deposit draft February 1996); and Hertfordshire Waste Local Plan (Deposit draft May 1996). The main waste disposal sites are featured at Fig 14.


# River Thame Catchment Review:

## Map 10 Aylesbury Inset



- Primary Road
- Secondary Road
- Main River
- Grand Union Canal

 CMP Boundary

 Urban Areas

Scale:- 10km





### 3.0 CATCHMENT ISSUES

This section discusses the main issues relating to the water environment within the Review area. It includes current problems and issues known by the NRA and those which are anticipated to become issues or problems in the future.

#### ISSUE 1 - CONTINUED EXPANSION OF AYLESBURY

- i. Major development at Aylesbury, has caused problems of flooding from the increased amount of surface water run-off. Source control could be introduced on certain sites to attenuate these problems.
- ii. Many of the watercourses within Aylesbury have no natural river corridors and the associated habitats and river quality have been badly effected by the impact of urbanisation. For example sections of the California and Bear Brooks have been completely culverted. There are opportunities for river corridor enhancement and for linking areas of open space.

#### ISSUE 2 - FLOOD DEFENCE

- i. Future issues include proposed development within the flood plain - notably the Coldharbour Farm proposal which has had much input from the NRA Operations. Other developments are expected to follow this 'model'.
- ii. Chalgrove is a major problem spot. Work to reduce local flooding and restore channel capacity through the mill is under consideration.

#### ISSUE 3 - GRAND UNION CANAL

- i. Flooding problems have been experienced on the Grand Union Canal.

#### ISSUE 4 - CRAYFISH PROTECTION

- i. The native crayfish (*Austropotamobius pallipes*) and signal crayfish (*Pacifastus leinusculus*) are both found in the Thame catchment. They are fished commercially in the area (see page 24). It is thought that the presence of signal crayfish in the lower catchment may restrict the downstream range of the native species. An up to date and more detailed understanding of the distribution of both species is required. In addition, monitoring to identify any impact of the signal crayfish on the native population should be conducted.

The abundance of Signal crayfish throughout catchment has caused complaints from anglers.

**ISSUE 5 - CONSERVATION OF HIGH BIOLOGICAL DIVERSITY**

- i. Sites on the lower reaches of the River Thame achieve some of the highest BMWP scores in the region, consistently scoring above 150. In particular, the site at Dorchester Bridge is the best regional site, usually scoring over 200 and supporting rare Gomphid and Libellulid Dragon fly larvae. These diverse macroinvertebrate communities reflect good water quality and river habitat.
- ii. There are 18 small watercourses within the Thame catchment which achieve BMWP scores consistently below 50. These are mainly small ditches and all receive discharges from small or private STWs. Poor habitat is also likely to be a cause of restricted invertebrate communities. Monitoring is required to ensure there is no further deterioration in water quality.
- iii. It is important to maintain high water quality and to protect it from riverside development adjacent to the River Thame.

**ISSUE 6 - EUTROPHICATION IN THE THAME CATCHMENT**

- i. Macrophyte (plant) surveys suggest that the discharge from Aylesbury STW raises the trophic status of the River Thame. Results show an increase in total cover and a decrease in species diversity below the discharge at Eythrope Lake. There is also a change in dominant taxon from Reed Sweet Grass, upstream at Stone Bridge, to Yellow Water Lilies which are more tolerant of nutrient enrichment.
- ii. The biological scores show that there is a decline in biological quality below the STW discharge.
- iii. Fish mortality downstream of Aylesbury at Eythrope. Thame becomes a broadwater here and therefore oxygen sags in summer due to sewage effluent discharge upstream.

**ISSUE 7 - SURVEY WORK**

- i. Lack of baseline data and evaluation of the type and quality of river landscapes, ie. a landscape assessment is required.
- ii. Need for more river habitat information.

**ISSUE 8 - LACK OF WETLAND HABITAT**

- i. There is a lack of wetland habitats in the catchment due to past land drainage schemes. Opportunities for wetland restoration should therefore be sought in collaboration with landowners and other bodies (eg. Countryside Stewardship, Aylesbury Countryside Management Project).

**ISSUE 9 - NEED FOR HABITAT ENHANCEMENTS**

- i Problems include poor diversity in channel morphology, and particularly the lack of spawning gravel for fish on significant lengths of the upper half of the Thame main channel.
- ii. Habitat enhancements required to the channel of the River Thame to compensate for past land drainage improvement works and agricultural change at numerous locations within the catchment.
- iii. Much of the immediate river corridor is lacking in bankside cover, particularly in the upper reaches of the catchment. Opportunities for appropriate tree and shrub planting should be sought.
- iv. There are very few channel features upstream of Eythrope Park and this problem should be addressed.
- v. Management and enhancement are both needed at Cuttle Brook Local Nature Reserve.

**ISSUE 10 - BLACK POPLARS**

- i Seek to bring existing Black Poplars into conservation management by pollarding, and collaboration with Aylesbury Countryside Management Project.
- ii Encourage expansion of the Black Poplar population further down the Thame catchment, through planning consultation and internal enhancement schemes.

**ISSUE 11 - NAVIGATION/RECREATION ISSUES**

- i Access to the Thame for canoes is not good. Data is needed on both the availability and demand for access to the river.
- ii Although there is not a public right of navigation, powered craft do sometimes travel up from the Thames to Dorchester along the Thame. To facilitate this and improve the recreation amenity, the creation of moorings in Dorchester should be considered. This would involve liaison between the landowners and local authorities.



## **4.0 CATCHMENT ACTIONS**

This section sets out a summary of NRA activity within the Thame catchment. Many of the actions have been initiated in response to the issues outlined in the previous sections and these have been listed under "issue related actions", following the numbering from the previous section.

The actions have been divided up, as far as possible, into recent NRA activity (post 1990), a summary of current NRA activity (1995/96) and a summary of planned Environment Agency activity (1996/97 and beyond).

### **CONTINUED EXPANSION OF AYLESBURY (ISSUE 1)**

Post scheme appraisal/flood maps etc for Aylesbury FAS to tie into new development proposals.

Minor improvement works eg. trash screens to protect culverts at High Street, Aylesbury and other urban sites.

The new housing development proposed for Coldharbour Farm, Aylesbury has involved considerable negotiation which will hopefully result in substantial channel enhancements once work proceeds.

### **FLOOD DEFENCE (ISSUE 2)**

Chalgrove Flood Alleviation works.

West Area Operational Levels Information - a small project to install remote monitoring or represent data from existing remote monitoring stations so as to assist in operational control and patrolling of rivers during high flows; and to assist in passing objective data to Regional Flood Warning staff.

Section 105 surveys are planned during 1996/97 to identify flood plains and overland flow routes are to be carried out, to an agreed programme, particularly upstream of the Fleet Marston Brook and the Thame confluence.

British Waterways/NRA study for 1996/7 - joint scheme to rebuild a small river control structure on the Wilstone Brook.

### **GRAND UNION CANAL (ISSUE 3)**

West Area staff are actively promoting jointly funded studies to identify and record the flooding problems; it is hoped to capitalise on the cooperation and come up with a joint British Waterways/NRA strategy for Water Level Management in the Upper Thame. This would involve co-funding capital works.

**CRAYFISH PROTECTION (ISSUE 4)**

A contract for an R&D project entitled "Impact of the cray fishery on the River Thame" has just been drawn up. Signal crayfish are commercially fished on the River Thame between Cuddesdon Mill and Stadhampton, with half a tonne removed each year. The project will assess the impact of this fishery on the flora and fauna of the River Thame, including potential effects on the nature of the crayfish population.

**CONSERVATION OR HIGH BIOLOGICAL DIVERSITY (ISSUE 5)**

Routine macroinvertebrate monitoring of sites with high biological diversity to ensure high quality is maintained and any problems are rapidly detected.

**EUTROPHICATION IN THE THAME CATCHMENT (ISSUE 6)**

Continued monitoring of Aylesbury STW using macrophyte surveys and possibly other methods, with a view to designation of the River Thame as a Sensitive Area in future Department of Environment reviews.

Aylesbury STW had been identified as requiring investment under the Asset Management Plan Process (AMP 2) for the addition of storm tanks and screens.

**SURVEY WORK (ISSUE 7)**

Strategic and detailed landscape assessment planned for 1996/97

Strategic River Corridor Surveys are expected during 1997 or 1998 subject to availability of funds.

**WETLAND CREATION (ISSUE 8)**

Enhancements (Wetland Creation) incorporated into Bear Brook Flood storage Area (Aylesbury)

**GENERAL HABITAT ENHANCEMENTS (ISSUE 9)**

Channel enhancements have been undertaken during 1995/96 on the River Thame at Chearsley and Nether Winchendon, and also Scotsgrove Brook. These have included two-stage channels, narrowing and bed nourishment with gravel riffles. The site at Nether Winchendon received considerable pre-scheme survey and post-project appraisal is now underway to determine the impact on macro-invertebrate and plant communities. Chub were noted spawning on the new riffles at Chearsley in the first spring following construction.

Extensive tree-planting has also been undertaken alongside the Thame at Aylesbury and Shabbington. The River Thame has also received a considerable amount of de-silting activity in the last few years and conservation advice has been provided to ensure essential features are retained and to incorporate enhancement features such as islands and low wet marginal shelves.

### **Planned Activity 1996/97**

Possible Pond Restoration at Notley Farm.

Enhancements at Cuttle Brook in conjunction with the Local Nature Reserve Committee.

Complete maintenance requirements of tree-planting schemes at Aylesbury and Shabbington.

Investigation of options to redirect flow at Eythrope back to the original channel to isolate the presently on-line lake, in order to improve habitat and flow velocities in the river upstream of the lake where it currently experiences poor channel diversity and compromises water quality potential.

### **BLACK POPLARS (ISSUE 10)**

Black Poplar pollarding is taking place at various sites along the river Thame and its tributaries and will continue through 1996 and beyond.

### **RECREATION/NAVIGATION (ISSUE 11)**

Investigation on the availability and demand for access for canoes on the River Thame.

Look at ways to improve the moorings in Dorchester.



## CONCLUSIONS AND RECOMMENDATIONS

There are clearly a range of problems and issues within the Thame catchment area. Some of these issues only affect certain departments within the NRA whereas other issues are multifunctional. As our mission statement reinforces, it is the NRA's duty to "*protect and improve the water environment*". In order to address these current catchment issues, it is important that all departments of the NRA work together as a team in order to eliminate these problems. This is by firstly making sure that the planned and routine activities are carried out, and secondly, highlighting any further actions that are required.

THAME CATCHMENT REVIEW TABLE OF RIVER QUALITY GOA AND RE

WATERCOURSE	REACH	LENGTH (KM)	UPNGR	DOWNNGR	CHEMCODE	CHEMNGR	CHEMNAME	RE 91-93 OPT	RE 92-94 OPT	GOA 1985-1990	GOA 1991-1993	GOA 1992-1994
BEAR BROOK	Wellonhead Stream - Thame	12.3	SP8794 1182	SP7856 1461	PTAR 0003	SP786 146	BEAR BK US THAME	2	2	B	C	C
BENNETTS DITCH	Source - Thame	2.0	SP6833 0508	SP6708 0578	PTAR 0058	SP6745 0575	BENNETTS DITCH AT A418 ROADBRIDGE	3	3	D	C	C
BLACK DITCH	Railway - Kingsey Cuttle Brook	1.9	SP7252 0494	SP7292 0662	PTAR 0109	SP729 062	BLACK DITCH AT A4129	4	4	E	D	D
CHALGROVE BROOK	Source - Thame	12.1	SU6781 9500	SU5938 9871	PTAR 0052	SU5942 9873	CHALGROVE BK, CHISELHAMPTON BR	2	2	B	B	B
CRENDON STREAM	Nr. Crendon STW - Thame	1.1	SP700 083	SP7051 0770	PTAR 0110	SP7056 0781	CRENDON STREAM ABOVE THAME	6	6	E	F	F
CRESLOW BROOK	Whitchurch STW - Hardwick Brook	1.6	SP817 208	SP8292 2105	PTAR 0114	SP828 211	CRESLOW BROOK ABOVE HARDWICK BROOK	2	1	B	B	B
DANES BROOK	Horton-c-Studley STW - Holton Brook	2.3	SP608 119	SP5960 1018	PTAR 0005	SP597 104	DANES BK US HOLTON BK	2	2	D	C	C
DENTON BROOK	Cuddesdon STW - Thame	1.1	SP597 022	SP6010 0137	PTAR 0100	SP6011 0138	DENTON BROOK AT CHIPPINGHURST MANOR, LITTLE MILTON	4	4	C	E	D
DENTON BROOK	Source - Cuddesdon STW	1.5	SP5892 0306	SP597 022	PTAR 0124	SP5930 0244	DENTON BROOK AT DENTON	5	4	C	F	D
DORTON BROOK	Brill - Chearsley Bk (Thame)	3.8	SP6668 1275	SP6902 1403	PTAR 0099	SP6848 1419	DORTON BROOK ABOVE CHEARSLEY BROOK, DORTON	3	3	E	D	C
FLEET MARSTON BROOK	Franks Ditch - Thame	7.7	SP7480 1859	SP7845 1454	PTAR 0007	SP784 155	FLEET MARSTON BK US THAME	3	3	E	D	C
GAINSBIDGE BROOK	Little Milton STW - Thame	2.0	SP621 005	SP6038 0088	PTAR 0051	SP615 004	GAINSBIDGE BK, LTL MILTON	2	2	C	C	B
GAINSBIDGE BROOK	Haseley Wood - Little Milton STW	1.7	SP6344 0133	SP621 005	PTAR 0101	SP6210 0051	GAINSBIDGE BROOK ABOVE LITTLE MILTON STW	2	2	B	B	B
GARSINGTON STREAM	Garsington STW - Baldon Brook	0.6	SP573 020	SP5689 0158	PTAR 0115	SP5720 0192	GARSINGTON STREAM AT B480, GARSINGTON	4	3	F	E	E
GUC (AYLESBURY ARM)	Source - California Brook	9.9	SP9180 1438	SP8224 1350	PTAR 0009	SP872 140	GUC, COLLEGE BR ASTON CLINTON	4	4	D	E	D
GUC (PITSTONE REACH)	Summit - GUC (Aylesbury Arm)	3.9	SP9448 1221	SP9180 1438	PTAR 0135	SP9199 1418	GUC (PITSTONE REACH) AT MARSWORTH	3	4	<D	O	D
GUC (WENDOVER ARM)	Source - GUC (Pitstone Reach)	2.0	SP9170 1288	SP9289 1386	PTAR 0008	SP924 132	GUC WENDOVER, TRING BR	1	1	C	B	B
HALTON BROOK	Halton - Bear Brook	2.4	SP8743 1062	SP8710 1278	PTAR 0010	SP871 123	HALTON BK, A41 US BEAR BK	2	1	B	B	B
HARDWICK BROOK	Source - Thame	16.1	SP8497 2485	SP7982 1546	PTAR 0047	SP8067 1878	HARDWICK BK, HARDWICK	2	2	D	B	B
HASELEY BROOK	Source - Warpsgrove Ditch	8.3	SP6860 0046	SU6393 9931	PTAR 0116	SU6410 9963	HASELEY BROOK ABOVE WARPSGROVE DITCH	3	2	C	C	B
HASELEY BROOK	Warpsgrove Ditch - Thame	5.9	SU6393 9931	SP6007 0039	PTAR 0013	SU613 999	HASELEY BK US THAME	2	2	C	B	B
HENTON STREAM	Chinnor STW - Kingsey Cuttle Brook	1.6	SP759 033	SP7588 0410	PTAR 0111	SP755 042	HENTON STREAM ABOVE KINGSEY CUTTLE BROOK	4	4	E	E	O
HOLTON BROOK	Source - Thame	7.8	SP5938 1046	SP6158 0565	PTAR 0014	SP618 062	HOLTON BK US THAME	3	3	C	D	C
HORSENDEN STREAM	Princes Risboro' STW - Kingsey Cuttle Bk	6.5	SP799 039	SP7540 0478	PTAR 0089	SP776 040	HORSENDEN STREAM AT THE FORD, BLEDLÖW	2	2	D	B	B
HORSENDEN STREAM	Princes Risboro' - Princes Risboro' STW	0.4	SP8036 0390	SP799 039	PTAR 0118	SP8050 0359	HORSENDEN STREAM AT BROOKE ROAD, PRINCES RISBORO	2	2	B	B	B
KINGSEY CUTTLE BROOK	Source - Scotsgrove Brook	9.7	SP7682 0184	SP7184 0718	PTAR 0017	SP735 064	KINGSEY CUTTLE BK US SCOTSGROVE BROOK	3	3	C	C	C
LASHLAKE STREAM	Thame STW - Scotsgrove Brook	0.5	SP711 067	SP7092 0708	PTAR 0112	SP7118 0674	LASHLAKE STREAM ABOVE SCOTSGROVE BROOK	5	5	E	E	E
LATCHFORD BROOK	Tetsworth Common - Haseley Brook	5.3	SP6847 0250	SP6544 0074	PTAR 0102	SP653 013	LATCHFORD BROOK AT LATCHFORD	2	2	B	C	D
LEWKNOR BROOK	Lewknor STW - Chalgrove Brook	6.7	SU709 982	SU6822 9620	PTAR 0117	SU679 975	LEWKNOR BROOK AT ROADBRIDGE, NR PYRTON	3	3	C	D	D
MILTON DITCH	Great Milton STW - Thame	1.6	SP625 034	SP6162 0417	PTAR 0063	SP619 043	MILTON DITCH AT GREAT MILTON ROAD, WHEATLEY	2	2	C	C	C
MILTON DITCH	Great Milton - Great Milton STW	1.1	SP6284 0254	SP625 034	PTAR 0103	SP6250 0328	MILTON DITCH AT GREAT MILTON	2	2	B	C	C
PEPPERSHILL BROOK	Chilton - Shabbington Brook	6.6	SP6835 1124	SP6558 0670	PTAR 0043	SP659 073	PEPPERSHILL BROOK, ICKFIELD BRIDGE	4	4	D	E	D
PEPPERSHILL BROOK	Shabbington Brook - Thame	0.5	SP6558 0670	SP6533 0638	PTAR 0107	SP6532 0650	PEPPERSHILL BROOK ABOVE THAME	3	3	E	D	D
POLECAT END DITCH	Forest Hill - Holton Brook	0.9	SP5905 0810	SP5972 0858	PTAR 0121	SP5926 0830	POLECAT END DITCH AT POLECAT END LANE, FOREST HILL	5	5	C	E	E
ROWSHAM BROOK	Wingrave STW - Thame	2.4	SP884 187	SP8471 1759	PTAR 0119	SP8470 1762	ROWSHAM BROOK ABOVE THAME	3	3	E	C	O
SCOTSGROVE BROOK	Haddenham STW - Lashlake Stream	4.5	SP7450 0750	SP7092 0708	PTAR 0034	SP719 071	SCOTSGROVE BK, SCOTSGROVE MILL	3	2	O	C	B
SCOTSGROVE BROOK	Little Kimble - Haddenham STW	14.5	SP8244 0710	SP7450 0750	PTAR 0032	SP752 077	SCOTSGROVE BK US HADDENHAM STW	3	2	D	C	D
SCOTSGROVE BROOK	Lashlake Stream - Thame	1.0	SP7092 0708	SP7039 0652	PTAR 0033	SP709 071	SCOTSGROVE BK US THAME	3	3	D	D	D
SHABBINGTON BROOK	Westfield - Shabbington STW	3.3	SP6761 0903	SP662 073	PTAR 0044	SP677 090	SHABBINGTON BK, WESTFIELD	3	2	E	C	C
SHABBINGTON BROOK	Shabbington STW - Peppershill Brook	1.1	SP662 073	SP6558 0670	PTAR 0045	SP661 071	SHABBINGTON BK, SHABBINGTON BR	4	3	C	E	O
STANTON STREAM	Stanton STW - Holton Brook	1.2	SP586 097	SP5967 1006	PTAR 0108	SP591 096	STANTON STREAM ABOVE HOLTON BROOK	2	2	C	C	C
STOCKLAKE BROOK	Source - Bear Brook	1.8	SP8382 1502	SP8277 1395	PTAR 0120	SP8282 1400	STOCKLAKE BROOK ABOVE BEAR BROOK	3	3	E	D	C
STOKE BROOK	Source - Bear Brook	8.8	SP8485 0953	SP7927 1416	PTAR 0036	SP806 129	STOKE BROOK ABOVE BEAR BROOK	2	1	B	B	B
THAME	Mains Bridge, Winchendon - Scotsgrove Bk	10.5	SP7491 1229	SP7039 0652	PTAR 0021	SP729 113	THAME, CUDDINGTON BR	3	2	E	C	C
THAME	Marworth - Fleet Marston Brook	23.9	SP9217 1508	SP7845 1454	PTAR 0028	SP796 152	THAME, STONE BR AYLESBURY	4	3	D	E	C
THAME	Fleet Marston Bk - Mains Br, Winchendon	5.2	SP7845 1454	SP7491 1229	PTAR 0020	SP776 135	THAME US EYTHROPE LAKE	4	3	E	D	C
THAME	Peppershill Brook - Chalgrove Brook	16.1	SP6533 0638	SU5938 9871	PTAR 0030	SP612 052	THAME, WHEATLEY BR	2	2	C	C	C
THAME	Scotsgrove Brook - Peppershill Brook	8.8	SP7039 0652	SP6533 0638	PTAR 0029	SP704 065	THAME, THAME BR	3	3	C	C	C
THAME	Chalgrove Brook - Thame	10.3	SU5938 9871	SU5780 9321	PTAR 0022	SU579 939	THAME, DORCHESTER BR	2	2	B	B	B
TIDDINGTON BROOK	Tiddington STW - Thame	0.8	SP649 057	SP6490 0646	PTAR 0105	SP6492 0580	TIDDINGTON BROOK ABOVE THAME, TIDDINGTON	2	2	D	C	C
TOWERSEY BROOK	Towersey - Kingsey Cuttle Brook	1.3	SP7346 0500	SP7303 0613	PTAR 0113	SP7380 0619	TOWERSEY BROOK ABOVE KINSEY CUTTLE BROOK	3	3	C	D	D
WARPSGRAVE DITCH	Chalgrove STW - Haseley Brook	1.1	SU649 988	SU6393 9931	PTAR 0065	SU642 993	WARPSGRAVE DITCH NEAR RESERVOIR, CHALGROVE COMM	5	5	E	E	E
WENDOVER BROOK	Wendover STW - Bear Brook	5.4	SP8618 0894	SP8614 1280	PTAR 0038	SP861 127	WENDOVER BK, BROOK END	2	1	C	B	B
WHEATLEY DITCH	Wheatley STW - Thame	0.3	SP609 051	SP6121 0514	PTAR 0062	SP611 053	WHEATLEY DITCH AT SUPERSTORE CAR PARK, WHEATLEY	5	5	E	E	E
WORMINGHALL BROOK	Worminghall STW - Thame	3.4	SP650 091	SP6376 0706	PTAR 0087	SP6468 0832	WORMINGHALL BROOK AT ICKFORD ROAD, WORMINGHALL	2	2	D	B	9
WORMINGHALL BROOK	Source - Worminghall STW	3.6	SP6575 1176	SP650 091	PTAR 0039	SP657 118	WORMINGHALL BK, B4011 BR	2	2	C	C	C

## Appendix 2

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ALL CONSENTED DISCHARGES WITH SAMPLE POINTS THAMES REGION  
12/10/94 PREPARED BY CH  
29/11/94 TABULATED BY AWN

NGR	NAME	QUALIFIER	VOLUME	SUB TYPE	CATCH	URN
SP	6340001300 CHURCH FARM T/E :GREAT HASELEY		4.5	EA WW		19 PTAE 0034
SP	8900014800 POTASH FARM T/E :PUTTENHAM (HERTS)		2.2	EA WW		19 PTAE 0062
SP	8770011900 PARK FARM T/E :ASTON CLINTON		2.2	EA WW		19 PTAE 0006
SP	6660012800 PARK PALE FARM T/E :BRILL		4.5	EA WW		19 PTAE 0015
SP	6770010600 CANONCOURT FARM T/E :CHILTON		3.6	EA WW		19 PTAE 0017
SP	8470011800 COUNTY FARM T/E :STOKE MANDEVILLE		22.7	EA WW		19 PTAE 0069
SP	8050003600 BROOKE ROAD 375MM SWO :PRINCES RISBOROUGH			ED WW		19 PTAE 0059
SP	8020014200 KYLE STEWART LTD WEST SWO :AYLESBURY			ED WW		19 PTAE 0008
SP	9180014200 WATERY LANE 225MM SWO :MARSWORTH			ED WW		19 PTAE 0053
SP	8180015300 HOLMANS BRIDGE 1200MM SWO :AYLESBURY			EDXWW		19 PTAE 0007
SP	7464005230 ICHI BAN FISH INDUSTRIES T/E :TOWERSEY	<	100	EF WW		19 PTAE 0151
SP	9310013800 COLLEGE FARM QUARRY :PITSTONE		2 886 8	EM WW		19 PTAE 0058
SP	8810017260 BOARSCROFT COTTAGE STW :LONG MARSTON :TRING RURAL	<	1	ES WW		19 PTAE 0211
SP	8552008920 LODWATER FARM STW :WENDOVER	<	2	ES WW		19 PTAE 0163
SP	9180014100 PINETREE COTTAGE STW :MARSWORTH	<	1	ES WW		19 PTAE 0052
SP	9050014480 LOCK VIEW STW :WILSTONE :TRING RURAL	<	1	ES WW		19 PTAE 0157
SP	8437017740 BRIDGE FARM STW :ASTON ABBOTTS	<	1	ES WW		19 PTAE 0155
SP	7919004170 LONGWICK MILL STW :LONGWICK	<	1	ES WW		19 PTAE 0152
SP	7712005620 LOWER FARM STW :LONGWICK-CUM-ILMER	<	1	ES WW		19 PTAE 0176
SP	9195015300 CHURCH FARM BARNS STW :MARSWORTH	<	3	ES WW		19 PTAE 0187
SP	6359013070 FORRESTERS ( 26 THE ) STW :OAKLEY	<	1	ES WW		19 PTAE 0164
SP	7953002100 STREAMSIDE STW :BLEDLOW CUM SAUNDERTON	<	3	ES WW		19 PTAE 0150
SP	7220014130 WATBRIDGE FARM STW :ASHENDON	<	3	ES WW		19 PTAE 0173
SP	8398024390 PENTON FARM STW :STEWKLEY	<	1	ES WW		19 PTAE 0166
SP	8381018850 LOWER BURSTON FARM STW :ASTON ABBOTTS	<	1	ES WW		19 PTAE 0209
SP	7288006200 PILMOOR ARCH STW :TOWERSEY	<	1	ES WW		19 PTAE 0145
SP	6670009030 LOWER PEPPERSHILL FARM STW :LONG CRENDON	<	2	ES WW		19 PTAE 0201
SP	8570016800 MANOR BARNS STW :HULCOTT	<	5	ES WW		19 PTAE 0184
SP	7839015520 CHURCHDENE STW :FLEET MARSTON	<	5	ES WW		19 PTAE 0138
SP	8760011000 RAF STW :HALTON			ES WW		19 PTAE 0037
SP	8710014500 KLARGESTER LTD STW :ASTON CLINTON		7	ES WW		19 PTAE 0005
SP	8428024100 KINGSBRIDGE FARM STW :STEWKLEY	<	1	ES WW		19 PTAE 0128
SP	8720014000 REDHOUSE STW :ASTON CLINTON	<	1	ES WW		19 PTAE 0194
SP	6385000660 BLACKALLS BARN STW :GREAT HASELEY	<	1	ES WW		19 PTAE 0202
SP	8416023100 NEW DAIRY FARM STW :CUBLINGTON	<	1	ES WW		19 PTAE 0165
SP	6790015400 LAWN FARM STW :WOTTON UNDERWOOD	<	1	ES WW		19 PTAE 0141
SP	8830016200 RED HOUSE FARM STW :LONG MARSTON :TRING RURAL	<	2	ES WW		19 PTAE 0168
SP	6510003600 BELFRY HOTEL NO 2 STW :TIDDINGTON WITH ALBURY	<	11	ES WW		19 PGWE 031
SP	7266005510 WESTFIELD FARM STW :TOWERSEY	<	1	ES WW		19 PTAE 0146
SP	7360017700 LITTLETON MANOR FARM STW :WADDESdon	<	3	ES WW		19 PTAE 0191
SP	7720005700 BENDOX DEVELOPMENTS STW :LONGWICK CUM ILMER	<	2	ES WW		19 PTAE 0140
SP	9046014460 VICTORY HOUSE STW :WILSTONE :TRING RURAL	<	1	ES WW		19 PTAE 0158
SP	8867014780 WOODLANDS STW :PUTTENHAM :TRING RURAL	<	2	ES WW		19 PTAE 0170
SU	6850096600 KNIGHTSBRIDGE HOUSE STW :SHIRBURN	<	1	ES WW		19 PGWE 016
SU	7150093000 FORESTRY COTTAGES ( 1-6 ) STW :WATLINGTON			ES WW		19 PGWE 019
SU	6090096600 NEWINGTON H/S STW			ES WW		19 PGWE 014
SU	7093099560 PLOT 3 STW :POSTCOMBE :LEWKNO	<	1	ES WW		19 PTAE 0122
SU	7093099560 PLOT 4 STW :POSTCOMBE :LEWKNO	<	1	ES WW		19 PTAE 0123
SU	6742093500 DENNIS COTTAGE STW :BRITWELL	<	1	ES WW		19 PTAE 0110
SU	6095096730 HOLCOMBE LANE STW NO 3 :NEWINGTON	<	1	ES WW		19 PTAE 0109
SU	6920008500 SEPTEMBER COTTAGE STW :LONG CRENDON	<	1	ES WW		19 PGWE 028
SP	9030011200 THE CROWS NEST STW :BUCKLAND	<	14	ES WW		19 PGWE 003
SU	7093099560 PLOT 1 STW :POSTCOMBE :LEWKNO	<	1	ES WW		19 PTAE 0120
SU	7105099520 RICKSHAW INN STW :POSTCOMBE :LEWKNO	<	4.5	ES WW		19 PTAE 0135
SU	7082099480 LORNA DOONE STW :POSTCOMBE :LEWKNO	<	5	ES WW		19 PTAE 0118
SU	7093099560 PLOT 2 STW :POSTCOMBE :LEWKNO	<	1	ES WW		19 PTAE 0121
SU	6095096720 HOLCOMBE LANE STW NO 2 :NEWINGTON	<	1	ES WW		19 PTAE 0108
SU	6555095100 GLEBE BARN STW :BRIGHTWELL BALDWIN	<	1	ES WW		19 PTAE 0130
SP	7015007020 THAME MEAD FARM STW :LONG CRENDON	<	2	ES WW		19 PTAE 0167
SP	7740003600 WALTONS FARM STW :BLEDLOW CUM SAUNDERTON	<	1	ES WW		19 PTAE 0208
SP	6300005300 WATERSTOCK GOLF CLUB STW :WATERSTOCK	<	8	ES WW		19 PTAE 0212
SP	8507024300 WARREN FARM STW :STEWKLEY	<	2	ES WW		19 PTAE 0207
SP	8980012400 OLD BARN STW :DRAYTON BEAUCHAMP	<	1	ES WW		19 PTAE 0100
SP	7380006700 TYTHROP LODGE STW :KINGSEY	<	1.1	ES WW		19 PTAE 0043
SP	6441014080 TOUCHBRIDGE STW :BOARSTALL	<	2	ES WW		19 PTAE 0205
SP	5620000800 TOOT BALDON H/S STW		4.7	ES WW		19 PTAE 0079
SP	9040014500 WILSTONE VICARAGE STW :TRING RURAL	<	2	ES WW		19 PTAE 0081
SP	8297020950 WILLOW BROOK FARM STW :ASTON ABBOTS	<	1	ES WW		19 PTAE 0147
SP	8430019800 THE ABBEY STW :ASTON ABBOTTS	<	1	ES WW		19 PTAE 0190
SP	8447019870 WINDMILL HILL BARN STW :ASTON ABBOTTS	<	5	ES WW		19 PTAE 0189
SP	6157009750 WOOD FARM STW :WORMINGHALL	<	1	ES WW		19 PTAE 0136
SP	7750002350 WESTFIELD FARM STW :BLEDLOW CUM SAUNDERTON	<	2	ES WW		19 PTAE 0161
SP	8990012400 THE BARNS STW :DRAYTON BEAUCHAMP	<	3	ES WW		19 PTAE 0027
SP	7961003670 SUMMERLEYS COTTAGE STW :PRINCES RISBOROUGH	<	1	ES WW		19 PTAE 0132
SP	8352021980 MANOR FARM STW :CUBLINGTON	<	1	ES WW		19 PTAE 0103
SP	7217004470 RED ROOF STW :THAME	<	2	ES WW		19 PTAE 0186
SP	9270013910 CANAL COTTAGE STW :LOCK 44 :MARSWORTH	<	1	ES WW		19 PTAE 0178
SP	7030003400 MORETON GAP STW :THAME	<	1	ES WW		19 PTAE 0095
SP	7570011810 SPRINGHILL CENTRE STW :DINTON WITH FORD AND UPTON	<	3	ES WW		19 PTAE 0156
SP	8525011950 GOLF CLUB STW NO 1 :WESTON TURVILLE	<	1	ES WW		19 PTAE 0183
SP	7777003570 GREAT BARN STW :SANDPIT LANE :BLEDLOW CUM SAUNDERTON	<	2	ES WW		19 PTAE 0171
SP	8590008900 DRIFTWOOD STW :NASH LEE ROAD :WENDOVER	<	1	ES WW		19 PGWE 025
SP	7802018050 2 WHITESFIELD FARM COTTAGES STW :QUARRENDON	<	1	ES WW		19 PTAE 0195
SP	5610001600 GARSINGTON SUB STATION STW		0.4	ES WW		19 PTAE 0033
SP	7709005550 FOLLY COTTAGE STW :LONGWICK-CUM-ILMER	<	1	ES WW		19 PTAE 0177
SP	8950015100 OAKLEY HOUSE STW :ASTROPE :TRING RURAL	<	1	ES WW		19 PTAE 0210
SP	9190014100 ANGLERS RETREAT PUBLIC HOUSE STW :MARSWORTH	<	2	ES WW		19 PTAE 0050
SP	8840011500 GREEN PARK YTC STW :ASTON CLINTON	<	16	ES WW		19 PTAE 0004
SP	6480006000 DRAYCOTT MANOR FARM STW :TIDDINGTON WITH ALBURY	<	2	ES WW		19 PGWE 027
SP	7980012900 HARTWELL HOUSE PUMPING STATION EMERGENCY DISCHARGE :HARTWE	<	37	ES WW		19 PTAE 0175
SP	8370026100 DEAN TITHE FARM STW :STEWKLEY	<	1	ES WW		19 PTAE 0185
SP	7938006550 STOCKWELL LANE FARMHOUSE STW :LONGWICK CUM ILMER	<	3	ES WW		19 PTAE 0160
SP	8706014490 KEE SERVICES STW :ASTON CLINTON	<	3	ES WW		19 PTAE 0144



SP	6273012550	SLATTERS FARM STW :BOARSTALL	<	1	ES WW	19	PTAE 0139
SP	7501020200	SAYE AND SELE HALL STW :QUAINTON	<	1	ES WW	19	PTAE 0214
SP	8158006760	DOE HILL COTTAGE STW :GREAT & LITTLE KIMBLE	<	1	ES WW	19	PTAE 0154
SP	8760008900	JASMINE CHINESE TAKE AWAY STW :HALTON	<	1	ES WW	19	PTAE 0097
SP	6510003600	BELFRY HOTEL STW :TIDDINGTON WITH ALBURY	<	25	ES WW	19	PTAE 0096
SP	8986012660	COTTAGE STW :DRAYTON BEAUCHAMP	<	1	ES WW	19	PTAE 0105
SP	6180012400	NEW FARM STW :OAKLEY	<	1	ES WW	19	PTAE 0101
SP	6884014840	BERRYFIELD FARM STW :WOTTON UNDERWOOD	<	1	ES WW	19	PTAE 0153
SP	7781003000	RIDGEWAY MEADS STW :BLEDLOW-CUM-SAUNDERTON	<	4	ES WW	19	PTAE 0099
SP	6310011800	JERICHO FARM STW :OAKLEY	<	1	ES WW	19	PTAE 0115
SP	7936016330	BERRYFIELDS LODGE STW :QUARRENDON	<	1	ES WW	19	PTAE 0159
SP	8615023700	DWELLING 1A FACCEA CHICKENS STW :WING	<	1	ES WW	19	PTAE 0213
SP	7240005510	COTMORE WELLS STW :THAME	<	2	ES WW	19	PTAE 0149
SP	7936016320	BERRYFIELDS STW :QUARRENDON	<	1	ES WW	19	PTAE 0134
SP	7780003900	CULPEPERS STW :BLEDLOW	<	1	ES WW	19	PGWE 031
SP	8124013540	HARTWELL SIDINGS STW :AYLESBURY	<	1	ES WW	19	PTAE 0179
SP	5930010600	DANESBROOK FARM STW :STANTON ST JOHN	<	2	ES WW	19	PTAE 0203
SP	9290016700	GREAT SEABROOK FARM STW :IVINGHOE	<	2	ES WW	19	PTAE 0199
SP	8250010850	HALL END FARM STW :STOKE MANDEVILLE	<	1	ES WW	19	PTAE 0200
SU	6095096710	HOLCOMBE LANE STW NO 1 :NEWINGTON	<	1	ES WW	19	PTAE 0107
SP	9106015080	GUBBLECOTE FARM DWELLINGS STW :MARSWORTH	<	3	ES WW	19	PTAE 0206
SP	9185014140	RESERVOIR HOUSE STW :MARSWORTH	<	1	ES WW	19	PTAE 0114
SP	7005013080	MANOR FARM STW :ASHENDON	<	1	ES WW	19	PTAE 0174
SP	8722013680	NEW FORGE STW :ASTON CLINTON	<	2	ES WW	19	PTAE 0131
SP	7950002000	CHERRY TREE NURSING HOME STW :BLEDLOW CUM SAUNDERTON	<	7	ES WW	19	PTAE 0098
SP	7133009150	NOTLEY FARMHOUSE STW :LONG CRENDON	<	1	ES WW	19	PTAE 0113
SP	8520019100	BURSTON RIDGE FARM STW :ASTON ABBOTTS	<	1	ES WW	19	PTAE 0204
SP	6880004500	OXFORDSHIRE GOLF CLUB STW :TETSWORTH	<		ES WW	19	PTAE 0181
SP	8705018600	MITCHELL LEYES FARM STW :WINGRAVE	<	2	ES WW	19	PTAE 0193
SP	7214004540	BLACKDITCH FARM STW :THAME	<	2	ES WW	19	PTAE 0116
SP	7768003000	MEADOWCROFT STW :BLEDLOW CUM SAUNDERTON	<	1	ES WW	19	PTAE 0162
SP	8592009140	MARQUIS OF GRANBY PUBLIC HOUSE STW :WENDOVER	<	6	ES WW	19	PTAE 0117
SP	8864014720	CHURCH BARN STW :PUTTENHAM :TRING RURAL	<	1	ES WW	19	PTAE 0143
SP	7772003360	CHILTERN MEADOW STW :BLEDLOW-CUM-SAUNDERTON	<	1	ES WW	19	PTAE 0119
SP	9162017360	CHEDDINGTON MANOR STW :CHEDDINGTON	<	1	ES WW	19	PTAE 0172
SP	7059003920	PARK GRANGE FARM STW :THAME	<	1	ES WW	19	PTAE 0126
SP	7781006200	PENNS FLOWER NURSERY STW :LONGWICK	<	1	ES WW	19	PTAE 0148
SP	7680008300	ASTON MULLINS FARMHOUSE STW :DINTON	<	2	ES WW	19	PTAE 0223
SP	8864014750	OAKLEY GRANGE STW :PUTTENHAM :TRING RURAL	<	1	ES WW	19	PTAE 0142
SP	8158009650	MOAT COTTAGE STW :GREAT & LITTLE KIMBLE	<	1	ES WW	19	PTAE 0198
SP	8577008950	FOX CLOSE FARM STW :WENDOVER	<	1	ES WW	19	PTAE 0188
SP	8961014750	DOVER HOUSE STW :ASTROPE :TRING RURAL	<	1	ES WW	19	PTAE 0169
SP	6940004700	MORETON H/S STW	<	6.8	ES WW	19	PTAE 0055
SP	8345008740	NORTH LEE HOUSE STW :ELLESBOROUGH	<	1	ES WW	19	PTAE 0111
SP	8950014800	ASTROPE FARM STW :TRING RURAL	<	1	ES WW	19	PTAE 0102
SP	6905008430	CARTERS PIECE ( 29A ) STW :LONG CRENDON	<	1	ES WW	19	PTAE 0127
SP	6119002720	MILL STW :CUDESODON	<	1	ES WW	19	PTAE 0125
SP	9240013300	TRING STW 600MM OUTLET	<	9 500	ESAWWW	19	PTAE 0083
SP	7420014400	UPPER WINCHENDEN STW	<	15.9	ESAWWW	19	PTAE 0085
SP	7487017900	WADDESODON STW	<	550	ESAWWW	19	PTAE 0086
SP	7860014600	AYLESBURY STW ( LAND AREA )	<	26 775	ESAWWW	19	PTAE 0010
SP	6840014200	DORTON STW	<	71.5	ESAWWW	19	PTAE 0025
SU	6740095400	WATLINGTON STW	<	2 000	ESAWWW	19	PTAE 0087
SP	8640018700	WINGRAVE STW	<	272	ESAWWW	19	PTAE 0092
SU	6020097800	STADHAMPTON STW	<	270	ESAWWW	19	PTAE 0086
SU	6900096500	SHIRBURN H/S STW	<		ESAWWW	19	PGWE 016
SU	7090098200	LEWKNOR STW	<	91	ESAWWW	19	PTAE 0044
SU	5800093600	DORCHESTER STW	<	605	ESAWWW	19	PTAE 0024
SU	6490098800	CHALGROVE STW	<	1 231	ESAWWW	19	PTAE 0016
SP	6500009100	WORMINGHALL STW	<	5 382	ESAWWW	19	PTAE 0093
SP	7810010600	STONE STW	<	909	ESAWWW	19	PTAE 0071
SP	9240013200	TRING STW 2M OUTLET	<	9 500	ESAWWW	19	PTAE 0082
SP	7560003900	CHINNOR STW NO.1	<	1 900	ESAWWW	19	PTAE 0019
SP	6250003400	GREAT MILTON STW	<	243	ESAWWW	19	PTAE 0035
SP	6850002500	TETSWORTH STW	<	153	ESAWWW	19	PTAE 0072
SP	5910008100	FOREST HILL STW	<	136	ESAWWW	19	PTAE 0031
SP	6820011200	CHILTON ( BUCKS ) STW	<	325	ESAWWW	19	PTAE 0018
SP	7590003300	CHINNOR STW NO 2	<	3 310	ESAWWW	19	PTAE 0020
SP	8480017700	ROWSHAM STW	<	18	ESAWWW	19	PTAE 0064
SP	7110006700	THAME STW	<	2 498	ESAWWW	19	PTAE 0076
SP	7370005700	TOWERSEY STW	<	109	ESAWWW	19	PTAE 0080
SP	5970002200	CUDESODON STW	<	137	ESAWWW	19	PTAE 0022
SP	7380011900	CUDDINGTON STW	<	95	ESAWWW	19	PTAE 0021
SP	7990003900	PRINCES RISBOROUGH STW	<	3 900	ESAWWW	19	PTAE 0060
SP	6490005700	TIDDINGTON STW	<	218	ESAWWW	19	PTAE 0078
SP	6620007300	SHABBINGTON STW	<	54	ESAWWW	19	PTAE 0065
SP	6220013200	HONEYBURGE H/S STW :BOARSTALL	<	4	ESAWWW	19	PTAE 0014
SP	5860009700	STANTON ST JOHN STW	<	182	ESAWWW	19	PTAE 0067
SP	7000008300	LONG CRENDON STW	<	1 092	ESAWWW	19	PTAE 0049
SP	6090005100	WHEATLEY STW	<	920	ESAWWW	19	PTAE 0091
SP	7890014800	AYLESBURY STW ( 900MM OUTLET )	<	27 775	ESAWWW	19	PTAE 0009
SP	6060011900	HORTON CUM STUDLEY STW	<	125	ESAWWW	19	PTAE 0042
SP	7450007500	HADDENHAM STW	<	2 050	ESAWWW	19	PTAE 0036
SP	6210000500	LITTLE MILTON STW	<	186.7	ESAWWW	19	PTAE 0046
SP	8490024800	STEWKLEY STW	<	136	ESAWWW	19	PTAE 0068
SP	7860014600	AYLESBURY STW ( LAND AREA ) STORMWATER	<		ESZWWW	19	PTAE 0106
SP	7980003800	PRINCES RISBOROUGH STW STORM DISCHARGE	<		ESZWWW	19	PTAE 0061
SP	9178014190	WATERY LANE PUMPING STATION :MARSWORTH	<		ESZWWW	19	PTAE 0182
SP	8150013500	SAFEWAYS T/E :AYLESBURY	<		ET WWW	19	PTAE 0197
SP	8051014110	REDLAND READYMIX T/E :AYLESBURY	<		ET WWW	19	PTAE 0180
SP	7250004800	BRITISH OXYGEN CO LTD T/E :THAME	<		ET WWW	19	PTAE 0104
SP	6098005280	DAVENPORT VERNON (OXFORD) LTD T/E :WHEATLEY	<		ET WWW	19	PTAE 0192
SP	8094004610	WHITELEAF SERVICE STATION, MONKS RISBOROUGH T/E :PRINCES RISBOROUGH	<		ET WWW	19	PTAE 0196
SP	8974008490	CHIVERY RESERVOIR T/E :WENDOVER	<	910	ETXWWW	19	PGWE 036

KEY  
 < MAX FLOW total 187 discharges  
 > DWF  
 \ MAX FLOW  
 \$ COMPLEX

**Appendix 3 BIOLOGY****Summary of Macro-invertebrate Monitoring Results**

<b>SITE URN</b>	<b>SITE NAME</b>	<b>NGR</b>	<b>BMWP Score</b>
<b>River Thame</b>			
PTAR.0026	At Rowsham Bridge	SP84601760	123
PTAR.0028	At Stone Bridge	SP79601520	147
PTAR.0020	Above Eythrope Lake	SP77601350	98
PTAR.0166	At Nether Winchendon	SP73801192	110
PTAR.0163	Ridge Barn Fm., Cuddington	SP74601240	125
PTAR.0021	At Cuddington Bridge	SP72901130	129
PTAR.0025	At Notley Abbey	SP71500910	113
PTAR.0027	At Shabbington Bridge	SP66800650	152
PTAR.0030	At Wheatley Bridge	SP61200520	173
PTAR.0022	At Dorchester Bridge	SU57909390	188
<b>Hardwick Brook</b>			
PTAR.0047	At Hardwick	SP80701880	119
<b>Bear Brook</b>			
PTAR.0003	Above River Thame	SP78601460	61
<b>Fleet Marston Brook</b>			
PTAR.0127	Above Frank's Ditch	SP74851860	32
PTAR.0126	Below Glebe Ditch	SP76001825	45
PTAR.0007	Above River Thame	SP78401550	108
<b>Scotsgrove Brook</b>			
PTAR.0032	Above Haddenham STW	SP75200770	136
PTAR.0034	At Scotsgrove Mill	SP71900710	107
PTAR.0033	Above River Thame	SP70900710	146
<b>Peppershill Brook</b>			
PTAR.0042	At Westfield Farm	SP67000930	50
PTAR.0107	Above Thame	SP65300650	47
<b>Worminghall Brook</b>			
PTAR.0039	At B4011 Road Bridge	SP65701180	64
PTAR.0087	Ickford Rd., Worminghall	SP64700830	32
<b>Danes Brook</b>			
PTAR.0006	At Honeyburge, Boarstall	SP62301320	89

PTAR.0156	Below Honeyburge House STW	SP62101310	103
PTAR.0005	Above Holton Brook	SP59701040	54
<b>Holton Brook</b>			
PTAR.0014	Above River Thame	SP61800620	89
<b>Haseley Brook</b>			
PTAR.0116	Above Warpsgrove Ditch	SU64109963	62
PTAR.0013	Above Thame	SU61309990	107
<b>Baldon Brook</b>			
PTAR.0002	Above River Thame	SU57609870	106
<b>Chalgrove Brook</b>			
PTAR.0052	At Chislehampton Bridge	SU59409870	128
<b>Shabbington Brook</b>			
PTAR.0044	At Upper Farm	SP66400760	33
PTAR.0045	At Shabbington Roadbridge	SP66100710	43
<b>Bennetts Ditch</b>			
PTAR.0058	At A418 Roadbridge	SP67400580	20
<b>Tiddington Brook</b>			
PTAR.0105	Above Thame, Tiddington	SP64920580	39
<b>Stanton Stream</b>			
PTAR.0108	Above Holton Brook	SP59150965	78
<b>Wheatley Ditch</b>			
PTAR.0062	At ASDA Car Park	SP61100530	12
<b>Milton Ditch</b>			
PTAR.0103	At Great Milton	SP62500328	65
PTAR.0063	At Great Milton Rd., Wheatley	SP61900430	71
<b>Denton Brook</b>			
PTAR.0124	At Denton	SP59530244	40
PTAR.0100	At Chippinghurst Manor	SP60110138	45
<b>Latchford Brook</b>			
PTAR.0128	Below Tetsworth STW	SP67300290	33
PTAR.0064	At Peggs Farm	SP65400110	61
<b>Warpsgrove Ditch</b>			
PTAR.0065	Chalgrove Common	SU64209930	48
<b>Dorton Brook</b>			



PTAR.0099	Above Chearlsey Brook	SP68481419	42
<b>Lashlake Stream</b>			
PTAR.0112	Above Scotsgrove Brook	SP71180694	42
<b>Black Ditch</b>			
PTAR.0056	Below A4129	SP72700660	34
<b>Towersey Brook</b>			
PTAR.0149	1km Above Towersey	SP73100430	12
PTAR.0113	Above Kingsey Cuttle Brook	SP73800620	44
PTAR.0138	At Towersey Village Green	SP73500510	45
<b>Henton Stream</b>			
PTAR.0147	Below Chinnor STW	SP75870360	26
PTAR.0154	Below Badger Brook	SP75670396	20
<b>Halton Brook</b>			
PTAR.0010	At A41, Above Bear Brook	SP87101230	69
<b>Wendover Brook</b>			
PTAR.0038	At Brook End	SP86101270	112
<b>Stocklake Brook</b>			
PTAR.0175	Above Burcott Lane	SP84301534	40
PTAR.0174	At Footbridge, Bierton	SP85101525	44
PTAR.0120	Above Bear Brook	SP82821400	70
<b>Stoke Brook</b>			
PTAR.0036	Above Bear Brook	SP80601290	75
<b>Creslow Brook</b>			
PTAR.0114	Above Hardwick Brook	SP82802110	79
<b>Rowsham Brook</b>			
PTAR.0119	Above Thame	SP84701762	53
<b>Gainsbridge Brook</b>			
PTAR.0101	Above Little Milton STW	SP62100051	46
PTAR.0051	At Little Milton	SP61500040	56
<b>Horsenden Stream</b>			
PTAR.0118	At Brook Rd, Princess Risborough	SP80500359	32
PTAR.0089	At the Ford, Bledlow	SP77600400	93
<b>Kingsey Cuttle Brook</b>			
PTAR.0017	Above Scotsgrove Brook	SP73500640	91

<b>Garsington Stream</b>			
PTAR.0115	At B480, Garsington	SP57200192	49
<b>GUC</b>			
PTAR.0009	College Bridge, Aston Clinton	SP87201400	83
PTAR.0136	At Bulbourne	SP93331364	104
PTAR.0135	At Marsworth	SP91991418	109
PTAR.0137	250m below Tring Feeder	SP92601358	107
PTAR.0008	At Road Bridge, Tring	SP92401320	95
<b>Tring Feeder</b>			
PTAR.0155	Below GUC, Tring	SP92241300	52
PTAR.0172	Below Admiral Homes Discharge	SP92501276	37
PTAR.0173	At Sutton Close, Tring	SP92571273	37
<b>Haydon Ditch</b>			
PTAR.0159	Above Bear Brook	SP79711413	23
<b>Marsh Baldon Ditch</b>			
PTAR.0150	At Marsh Baldon	SP56649946	47
<b>Milton Common Ditch</b>			
PTAR.0171	At Milton Pools Roadbridge	SP65280315	9
PTAR.0168	Below Harrington Field Farm	SP65200288	36
<b>Postcombe Brook</b>			
PTAR.0130	Below Postcombe	SP71100030	25
<b>Waddesdon Brook</b>			
PTAR.0152	Above Upper Winchendon Stream	SP72901495	40
PTAR.0152	Below Upper Winchendon Stream	SP72571445	47
<b>Pole Cat End Ditch</b>			
PTAR0121	At Pole Cat Lane, Forest Hill	SP59260830	23
<b>Kimblewick Ditch</b>			
PTAR.0145	Above Meadle Brook	SP80190758	22
<b>Lewknor Brook</b>			
PTAR.0117	At Roadbridge, Near Pyrton	SU67909750	80

## APPENDIX 4 FLOOD DEFENCE

Improvement and maintenance works can be targeted towards those rivers which do not meet their target standards, particularly where more urban land use bands are involved (A,B,C).

STANDARDS OF SERVICE FOR FLOOD DEFENCE - Land Use Bands and Targets		
Land Use Band	Description of typical land use	Target standard (Annual risk of flood damage)
<b>A</b> ( High density urban )	High density urban areas containing significant amounts of both residential and commercial property at risk.	1% - 2%
<b>B</b> ( Medium density urban )	Medium density urban areas, some parks and open spaces, or high grade agricultural use at risk.	1% - 4%
<b>C</b> ( Low density urban )	Low density urban areas or rural communities. Typically large areas of high grade agricultural land with some properties also at risk from flooding.	2% - 20%
<b>D</b> ( Arable farmland )	Generally farmland with occasional properties at risk. Medium productivity agriculture which may also be prone to the effects of waterlogging.	10% - 80%
<b>E</b> ( Grassland )	Typically low grade agricultural land or public open space, often grassland or scrub, with very few properties at risk.	Greater than 40%
<p>* Where saline flooding from tidal situations is likely, target standards will be higher.</p> <p>* A range is given for standards in acknowledgement of practical issues of implementation. They act as a starting point to guide the investigator of a potential flood alleviation scheme; the resulting standard provided would be the outcome of a case specific and appropriately detailed appraisal. This has to include feasibility of options, their incremental costs in relation to benefits, environmental impact, and any other significant factors. The overlap of target standards between bands is in recognition that varying concentrations of similar features may require equal standards.</p>		

## Appendix 5

## SOS REACHES IN THE THAME CATCHMENT (21/12/95)

River	Rch Len	Grid Ref		IIEs	LUB	Downstream Name	Upstream Name
		DS	US				
0154 /14	1	1.940	SP 75131240	75851401	1.0 E	R.THAME	M.R.L.
0154 /22	1	0.929	SP 89901663	90191740	0.1 E	R.THAME	M.R.L.
0154 /04	1	4.546	SP 65080882	66621100	0.5 E	WORMINGHALL BROOK	M.R.L.
0155 /01	1	4.738	SP 88821510	88861281	6.0 E	WILSTONE BROOK	M.R.L.
0156 /01	1	3.410	SP 86471616	85021358	0.8 E	DRAYTONMEAD BROOK	BEAR BROOK
0158 /00	1	6.798	SP 59399790	56890159	2.8 E	R.THAME	M.R.L.
0154 /12	1	2.144	SP 69510668	68790834	1.4 E	R.THAME	M.R.L.
0162 /00	1	4.447	SP 69930651	70990462	9.3 E	R.THAME	BOW BRIDGE
0162 /00	2	3.985	SP 70990462	70890220	0.5 E	BOW BRIDGE	M.R.L.
0165 /00	1	5.514	SP 71870925	69541273	8.5 E	R.THAME	FOOTBRIDGE
0165 /00	2	3.763	SP 69541273	69241543	0.5 E	FOOTBRIDGE	M.R.L.
0154 /13	1	1.840	SP 72340976	73961057	0.2 E	R.THAME	M.R.L.
0161 /01	1	7.165	SP 59601016	63901430	18.2 D	HOLTON	M.R.L.
0167 /00	1	5.960	SP 78071697	75942001	6.1 E	FLEET MARSTON BROOK	M.R.L.
0156 /00	1	7.109	SP 86071677	87851280	7.5 E	R.THAME	M.R.L.
0154 /16	1	3.714	SP 80061803	79972030	7.7 E	HARDWICK BROOK	M.R.L.
0163 /08	1	2.533	SP 80160993	81940896	4.8 E	SCOTSGROVE BROOK	M.R.L.
0166 /00	1	6.556	SP 78441456	75981825	0.9 E	R.THAME	ROADWAY
0166 /00	2	1.987	SP 75981825	73931823	0.3 E	ROADWAY	M.R.L.
0163 /01	1	1.137	SP 75340818	75090900	1.1 E	SCOTSGROVE BROOK MAIM ARM	M.R.L.
0164 /10	1	2.695	SP 75560480	76080417	0.7 E	HORSENDEN STREAM	M.R.L.
0164 /02	1	1.550	SP 73830614	74050485	9.0 D	TOWERSEY BROOK	M.R.L.
0160 /00	1	5.762	SP 60060040	64109957	24.0 D	R.THAME	TRACK
0160 /00	2	5.159	SU 64109957	67060109	6.3 E	TRACK	FIELD BDY (PARISH BDY)
0160 /00	3	3.617	SP 67060109	69609952	3.2 E	FIELD BDY (PARISH BDY)	M.R.L.
0163 /02	1	0.597	SP 76020878	75700928	0.1 E	SCOTSGROVE BROOK MAIN ARM	M.R.L.
0161 /00	1	5.205	SP 61590565	59730858	0.8 E	R.THAME	POLECAT END LANE
0161 /00	2	2.580	SP 59730858	59281063	2.7 E	POLECAT END LANE	M.R.L.
0164 /06	1	5.314	SP 77030631	77910431	1.3 E	LONGWICK BROOK	M.R.L.
0164 /00	1	6.323	SP 72340708	75710430	2.2 E	SCOTSGROVE MILL STREAM	RAILWAY
0164 /00	2	2.053	SP 75710430	76830290	0.6 E	RAILWAY	M.R.L.
0160 /01	1	2.451	SP 65440076	66370152	2.6 E	HASELEY BROOK	M.R.L.
0157 /00	1	4.733	SP 88451680	91471450	1.5 E	RIVER THAME	R.THAME
0164 /04	1	5.749	SP 74220620	78330564	11.6 E	KINGSLEY CUTTLE BROOK	M.R.L.
0163 /05	1	2.650	SP 78980834	81260818	2.7 E	MEADLE BROOK	M.R.L.
0163 /03	1	6.149	SP 76800894	80500586	7.8 E	SCOTSGROVE BROOK	M.R.L.
0164 /07	1	0.789	SP 74490605	74990551	0.3 E	ILMER UPPER DITCH	M.R.L.
0154 /08	1	5.970	SP 65340638	67611062	20.5 D	R.THAME	M.R.L.
0167 /01	1	2.958	SP 78661844	78202053	1.0 E	DENHAM BROOK	M.R.L.
0154 /03	1	4.390	SP 63780705	65231004	8.3 E	R.THAME	OAKLEY BROOK
0154 /03	2	7.002	SP 65231004	65761177	10.9 E	OAKLEY BROOK	M.R.L.
0155 /00	1	7.078	SP 86501668	90291368	3.9 E	R.THAME	M.R.L.
0165 /01	1	6.916	SP 70221178	74171533	0.8 E	CHEARSLEY BROOK	M.R.L.
0164 /01	1	1.322	SP 73760635	73570515	3.7 D	KINGSEY CUTTLE BROOK	M.R.L.
0154 /02	1	6.467	SP 63040708	63221212	0.2 E	R.THAME	M.R.L.
0154 /20	1	4.793	SP 87151673	89301883	0.1 E	R.THAME	M.R.L.
0163 /00	1	4.586	SP 70470699	74370750	7.4 E	R.THAME	RAILWAY
0163 /00	2	5.674	SP 74370750	77590955	11.3 E	RAILWAY	ROADWAY
0163 /00	3	4.983	SP 77590955	81660935	15.3 D	ROADWAY	ROADWAY



0163 /00	4	2.910	SP 81660935	82440709	6.7	E	ROADWAY	M.R.L.
0154 /09	1	4.303	SP 65580668	67670902	0.1	E	PEPPERSHILL BROOK	M.R.L.
0163 /10	1	0.968	SP 80481006	81181036	2.4	D	SCOTSGROVE BROOK	M.R.L.
0163 /04	1	1.979	SP 78590822	79530662	0.4	E	MEADLE BROOK	M.R.L.
0163 /11	1	1.415	SP 82190911	83320881	2.4	E	SCOTSGROVE BROOK	M.R.L.
0154B/00	10	4.478	SP 75131240	79151490	3.4	E	BEACHENDON BROOK	RAILWAY
0154B/00	11	4.191	SP 79151490	81771526	30.0	D	RAILWAY	HOLMAN'S
BRIDGE								
0154B/00	13	5.443	SP 84601759	88451680	4.1	E	ROWSHAM BRIDGE	LONG
MARSTON BROOK								
0154B/00	14	2.920	SP 88451680	90891669	2.9	E	LONG MARSTON BROOK	M.R.L.
0154A/00	1	5.458	SU 57829321	59889558	29.9	D	R.THAMES	FOOTBRIDGE
0154A/00	2	4.327	SU 59889558	59389875	9.4	E	FOOTBRIDGE	
CHISELHAMPTON BRIDGE								
0154A/00	3	6.239	SU 59389875	61260270	1.4	E	CHISELHAMPTON BRIDGE	
CUDDESDON MILL STREAM								
0154A/00	4	6.812	SP 61260270	63180546	5.8	E	CUDDESDON MILL STREAM	
WATERSTOCK MILL SIDE 0154A/00								
5	4.892	SP 63180546	64880647	5.7	E	WATERSTOCK		
MILL SIDE CHANNEL ICKFORD BRIDGE								
0154A/00	6	3.694	SP 64880647	67010618	1.6	E	ICKFORD BRIDGE	SHABBINGTON
LOOP								
0154A/00	7	4.214	SP 67010618	69510668	4.6	E	SHABBINGTON LOOP	CRENDON
STREAM								
0154A/00	8	6.113	SP 69510668	72300932	44.3	D	CRENDON STREAM	RAILWAY
BR. NOTLEY ABB								
0154B/00	9	6.319	SP 72300932	75131240	16.4	D	RAILWAY BR. NOTLEY ABBEY	
BEACHENDON BROOK								
0159 /00	1	5.000	SU 59399871	62789714	21.8	D	R.THAME	CHALGROVE MILL
STREAM								
0159 /00	2	4.300	SU 62789714	66089617	66.7	C	CHALGROVE MILL STREAM	M.R.L.
0154B/00	12	5.835	SP 81771526	84601759	26.0	D	HOLMAN'S BRIDGE	ROWSHAM
BRIDGE								
0168 /00	2	4.011	SP 84301368	87631231	7.8	E	BEDGROVE BROOK	M.R.L.
0168 /00	1	6.845	SP 78551462	84301368	920.7	A	R.THAME	BEDGROVE BROOK
0168 /03	1	2.250	SP 79181421	79741287	0.2	E	BEAR BROOK	M.R.L.
0168 /08	1	2.447	SP 80541394	84410853	38.4	C	BEAR BROOK	M.R.L.
0168 /12	1	4.500	SP 86131282	85930975	18.1	D	BEAR BROOK	M.R.L.
0168 /07	1	0.731	SP 84360914	84410853	2.1	D	STOKE BROOK	M.R.L.
0168 /02	1	8.774	SP 80201390	85550918	7.7	E	BEAR BROOK	M.R.L.
0168 /10	1	2.220	SP 84301368	83911156	24.1	C	BEAR BROOK	M.R.L.
0168 /11	1	1.833	SP 84451365	84751193	4.1	E	BEAR BROOK	M.R.L.
0168 /05	1	1.953	SP 80661275	80141156	0.3	E	STOKE BROOK	M.R.L.
0168 /13	1	2.024	SP 87101278	87551093	41.1	C	BEAR BROOK	M.R.L.
0164 /09	1	5.919	SP 75340479	79160417	79.2	C	KINGSEY CUTTLE BROOK	M.R.L.
0168 /04	1	0.519	SP 79991325	79351290	0.1	E	HARTWELL DITCH	M.R.L.
0167 /02	1	0.758	SP 76651944	76482020	3.1	D	DENHAM BROOK	M.R.L.
0165 /02	1	0.561	SP 69021404	68501416	0.3	E	CHEARSLEY BROOK	M.R.L.
0164 /05	1	0.713	SP 77030631	77250573	2.5	D	LONGWICK BROOK	M.R.L.
0156 /02	1	0.824	SP 86521463	85931408	0.1	E	DRAYTONMEAD BROOK	M.R.L.
0155 /04	1	1.067	SP 89551510	89871426	7.8	D	WILSTONE BROOK	M.R.L.
0154 /15	1	1.982	SP 79881592	81191696	5.4	D	HARDWICK BROOK	M.R.L.
0154 /10	1	0.418	SP 67060968	67011009	0.1	E	PEPPERSHILL BROOK	M.R.L.
0154C/00	1	4.750	SP 79811546	80061830	9.0	E	R.THAME	DUN MILL BROOK
0154C/00	2	7.301	SP 80061803	82862096	8.6	E	DUN MILL BROOK	ROADWAY
0154C/00	3	6.262	SP 82862096	83162334	5.2	E	ROADWAY	M.R.L.

## Appendix 5

## GLOSSARY

<i>AOD</i>	Above Ordnance Datum
<i>AONB</i>	Area of Outstanding Natural Beauty as designated by the Countryside Commission.
<i>Abstraction</i>	Removal of water from surface or groundwater, usually by pumping
<i>Abstraction Licence</i>	Licence issued by the NRA under Section 38 of the Water Resources Act 1991 to permit water to be abstracted. The maximum abstraction rates are specified in the licence.
<i>Aquifer</i>	A layer of underground porous rock which contains water and allows water to flow through it.
<i>Base flow</i>	That part of the flow in a watercourse made up of groundwater and discharges. It sustains the watercourse in dry weather.
<i>Biochemical Oxygen Demand (BOD)</i>	A measure of the amount of oxygen consumed in water, usually as a result of organic pollution, under specific conditions relating to natural biochemical breakdown.
<i>Biodiversity</i>	A mixture of habitats and species which increase the ecological value of a site.
<i>CMP</i>	Catchment Management Plan - integrated plan for the catchment which covers all functions of the NRA. These provide the strategy by which the catchment will be managed.
<i>Catchment</i>	Area from which river systems, lakes and reservoirs collect water.
<i>Confluence</i>	The point at which two rivers meet.
<i>Consent</i>	The statutory document issued by NRA under schedule 10 of the Water Resources Act 1991 to indicate any limits and conditions on the discharge of an effluent to a controlled water.
<i>County Structure Plans</i>	Statutory document produced by County Councils outlining their strategy for development over a 10-15 year timescale.
<i>Cross Functional Plans</i>	NRA produced plans which set out planned actions for the coming year based on the functional elements of CMPs. The available resources for the year in question and the relative priorities of the actions are both taken into account.
<i>Cyprinid</i>	Coarse fish of the carp family, ie roach, dace, bream.
<i>DoE</i>	Department of the Environment.
<i>Dangerous Substances</i>	Substances defined by the European Commission as in need of special control because of their toxicity, bioaccumulation or persistence. The substances are classified as List I or List II according to the Dangerous Substances Directive.
<i>Dissolved Oxygen (DO)</i>	The amount of oxygen dissolved in water. Oxygen is vital for life so this measurement is an important, but highly variable, indicator of the "health" of the water. It is used to classify waters.

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<i>District Local Plan</i>	Statutory document produced by District or Borough Councils to implement the development strategy set out in County Structure Plans. Specific land use allocations are identified.
<i>Directive</i>	A type of legislation issued by the European Community which is binding on the member states.
<i>EA</i>	Environmental Assessment
<i>EC</i>	European Commission (European Union, EU).
<i>ESA</i>	Environmentally Sensitive Area.
<i>Eutrophic/ Eutrophication</i>	The enrichment of water by nutrients, especially compounds of nitrogen and/or phosphorus, causing an accelerated growth of algae and higher forms of plant life to produce an undesirable disturbance to the balance of organisms present in the water and the quality of the water concerned.
<i>FDMM</i>	Flood Defence Management Manual.
<i>FDMS</i>	Flood Defence Monitoring System.
<i>Floodplain</i>	This includes all land (and washlands) adjacent to a watercourse over which water flows or would flow but for flood defences in times of flood.
<i>GIS</i>	Geographical Information System.
<i>GQA</i>	General Quality Assessment
<i>Groundwater</i>	Underground water contained in the pores and fissures of aquifers (water-bearing strata).
<i>ha</i>	hectare = 10,000 square metres.
<i>IBU</i>	Internal Business Unit (of the NRA).
<i>IPC</i>	Integrated Pollution Control.
<i>Invertebrate Fauna</i>	Animals which lack a vertebral column - used for biological classification. Especially macroinvertebrates (animals of sufficient size to be retained in a net with a specified mesh size).
<i>Local Agenda 21</i>	Local Agenda 21 is an initiative arising from the Rio Earth Summit (1992) for implementing sustainable development at a local level by local authorities.
<i>LA</i>	Local Authority.
<i>LPA</i>	Local Planning Authority.
<i>Landfill</i>	Site used for waste disposal into/onto land.
<i>MAFF</i>	Ministry of Agriculture, Fisheries and Food.
<i>MoD</i>	Ministry of Defence.
<i>Macrophytes</i>	Vascular aquatic plants visible to the naked eye.

<i>Main River</i>	Some watercourses are designated as "Main River" - this status must first be approved by MAFF. The NRA has the power to carry out works to improve drainage or protect land and property against flooding on such rivers.
<i>NNR</i>	National Nature Reserve.
<i>NRA TR</i>	National Rivers Authority - Thames Region.
<i>NVZ</i>	Nitrate Vulnerable Zone.
<i>PCBs</i>	Polychlorinated biphenyls.
<i>Percolation</i>	The descent of water through soil pores and rock crevices.
<i>Potable Water</i>	Water suitable for human consumption.
<i>Prescribed Flow (Flow Constraint)</i>	A river flow incorporated as a condition in an abstraction licence, such that abstraction must cease or be reduced appropriately once the flow falls below this value.
<i>RQO</i>	River Quality Objective.
<i>Riparian Owner</i>	A person/organisation with property rights on a river bank.
<i>River Corridor</i>	Of particular importance for conservation, such a corridor is a continuous area of land which has visual, physical or ecological links to a watercourse and is dependent on the quality or level of water within the channel.
<i>River Quality Objective (RQO)</i>	The water quality that a river should achieve in order to be suitable for agreed uses.
<i>SoS</i>	The NRA TR Standards of Service (Flood Defence) were developed for use with maintenance works as well as flood alleviation through capital schemes. These SoS differ marginally from the "Indicative Standards of Protection" used by MAFF to guide the prioritisation of capital schemes before they are subject to economic appraisal.
<i>SPA</i>	Special Protection Area (in terms of bird life).
<i>STW</i>	Sewage Treatment Works.
<i>SWQO</i>	Statutory Water Quality Objectives set by the Secretary of State, in relation to controlled waters.
<i>Section 105 Surveys</i>	These are surveys and studies being carried out by the NRA under the Water Resources Act 1991 in connection with DoE circular 30/92 and the Memorandum of Understanding with local planning authorities. The aim is to provide a better understanding of the flooding mechanism, risk and extent of flood plain. The Upper Thames is the pilot area in the NRA Thames Region's West Area for the programme of studies over the 5 year period 1995-1999.
<i>Septic Tank</i>	A small tank receiving and treating sewage by bacteria.
<i>Set-aside</i>	Temporary withdrawal of agricultural land from agricultural production.
<i>Silage</i>	A winter feed for cattle. Silage is produced in the summer by bacterial action on freshly cut grass.



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<i>Site of Special Scientific Interest (SSSI)</i>	A site that is given a statutory designation by English Nature to protect it because of its important conservation value.
<i>Slurry</i>	Animal waste in liquid form.
<i>Source Control</i>	A collective term to describe the management of run-off at or near the point of impact of rainfall and before it reaches the traditional piped drainage and sewer systems of urban areas.
<i>Spring</i>	Natural emergence of groundwater at the surface.
<i>Sustainable</i>	Capable of being maintained at a steady state without exhausting natural resources or causing ecological damage.
<i>Sustainable Development</i>	Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.
<i>Topography</i>	Physical features of a geographical area.
<i>TWUL</i>	Thames Water Utilities.
<i>UWWTD</i>	Urban Waste Water Treatment Directive.
<i>WLMP</i>	Water Level Management Plan.
<i>WRA</i>	Waste Regulation Authority.
<i>Watercourse</i>	A stream, river, canal or the channel, bed or route along which they flow.