



NRA

*National Rivers Authority
Thames Region*



NRA THAMES 254

**River Thames (Eynsham to Benson)
and Ock**

110

Catchment Review

October 1994

NRA Thames Region

Document for INTERNAL CIRCULATION only

ENVIRONMENT AGENCY



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National River Authority
Thames Region
Catchment Planning - West

**River Thames (Eynsham
to Benson) and Ock**

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CONTENTS

	Page
1. INTRODUCTION	1
2. THE CURRENT STATUS OF THE WATER ENVIRONMENT	2
Overview	2
Geology and Topography	2
Hydrology	2
Water Resources	5
Water Quality	9
Pollution Control	14
Consented Discharges	15
Flood Defence	18
Fisheries	18
Conservation	19
Landscape	21
Recreation	23
Navigation	26
Land Use Planning Context	29
Minerals	31

	Page
3. CATCHMENT ISSUES	34
South West Oxfordshire Reservoir Proposal	34
Ground water Pollution	35
River Levels & Flows	35
Habitat Degradation	35
Wolvercote Pit	36
Eutrophication of the Thames	36
River Thames : Seacourt Stream Relationship	36
The River Thames Through Oxford	37
Oxford Structures Study	37
Oxford Sewage Treatment Works	37
Kidlington Sewage Treatment Works	38
Oxford Sewers	38
Development Pressure	38
Navigation Issues	39
Landscape Issues	39
Recreation Issues	39
Wiltshire Berkshire Canal	40
Summary of Key Issues	41
4. CATCHMENT ACTIONS	43
5. CONCLUSIONS AND RECOMMENDATIONS	51

LIST OF TABLES

	Page
2.1 Details of Licensed Ground/Surface Water Abstractions of Greater than 1ML/day	9
2.2 RQOs, NWC Classification, RE Objectives and GQAs for the Study Area	12
2.3 Consented Discharges and Percentage Compliance	15
2.4 Discharge Consents of Volumes Greater than 10,000m ³ /day	16
2.5 Pedestrian Counts: Abingdon	25
2.6 Pedestrian Counts: Thames Towpath at Kennington	25
2.7 Thames Lock Traffic (Eynsham to Benson)	26
4.1 Summary of Recent NRA Activity (Post September 1989)	44
4.2 Summary of NRA Activity (1993/94)	46
4.3 Summary of Planned NRA Activity (1994/95 and Beyond)	48
5.1 Summary of Recommendations	52

LIST OF FIGURES

	Page
1 The Study Area - Key Features	3
2 Geology	4
3a-c Hydrology	6
4 Water Resources	10
5 Water Quality (GQA)	11
6 Reported Pollution Incidents 1993	14
7 Biological Water Quality	17
8 Nature Conservation	20
9 Planning Policy	22
10 Recreation	24
11 Minerals	32
12 Catchment Issues	42

Please Note:

You will notice that the grid references used on the maps above differ from those given in the text through the use of 'SU' in the latter. For conversion, the first digit of the Easting and Northing can be replaced by the relevant letter as follows;

S	U	S	O
4	1	3	2

S	P	S	T
4	2	3	1

eg OS system SU390271 is equivalent to 439127 (within the grid coordinates of 430000 and 120000).

The use of grid letters to divide up Great Britain was devised by Ordnance Survey to ease location. For greater accuracy six figure grid references are then utilised. Alternatively, a purely numerical system can be adopted ie digitally for GIS purposes.

1. INTRODUCTION

- 1.1 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, ground waters, estuaries and coastal waters.'

- 1.2 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.

- 1.3 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:

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

- 1.4 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.

2. THE CURRENT STATUS OF THE WATER ENVIRONMENT

OVERVIEW

- 2.1 The Catchment Review study area covers the Ock catchment and the section of the River Thames from Eynsham Lock to Benson Lock as illustrated in Figure 1. The study area covers approximately 544 km² and is predominantly rural in character, with the two significant urban areas being Oxford and Abingdon. The study area has a population of approximately 189,000. Oxford has a population of approximately 127,000, Abingdon 31,000 and Didcot 16,000 (1991 figures).

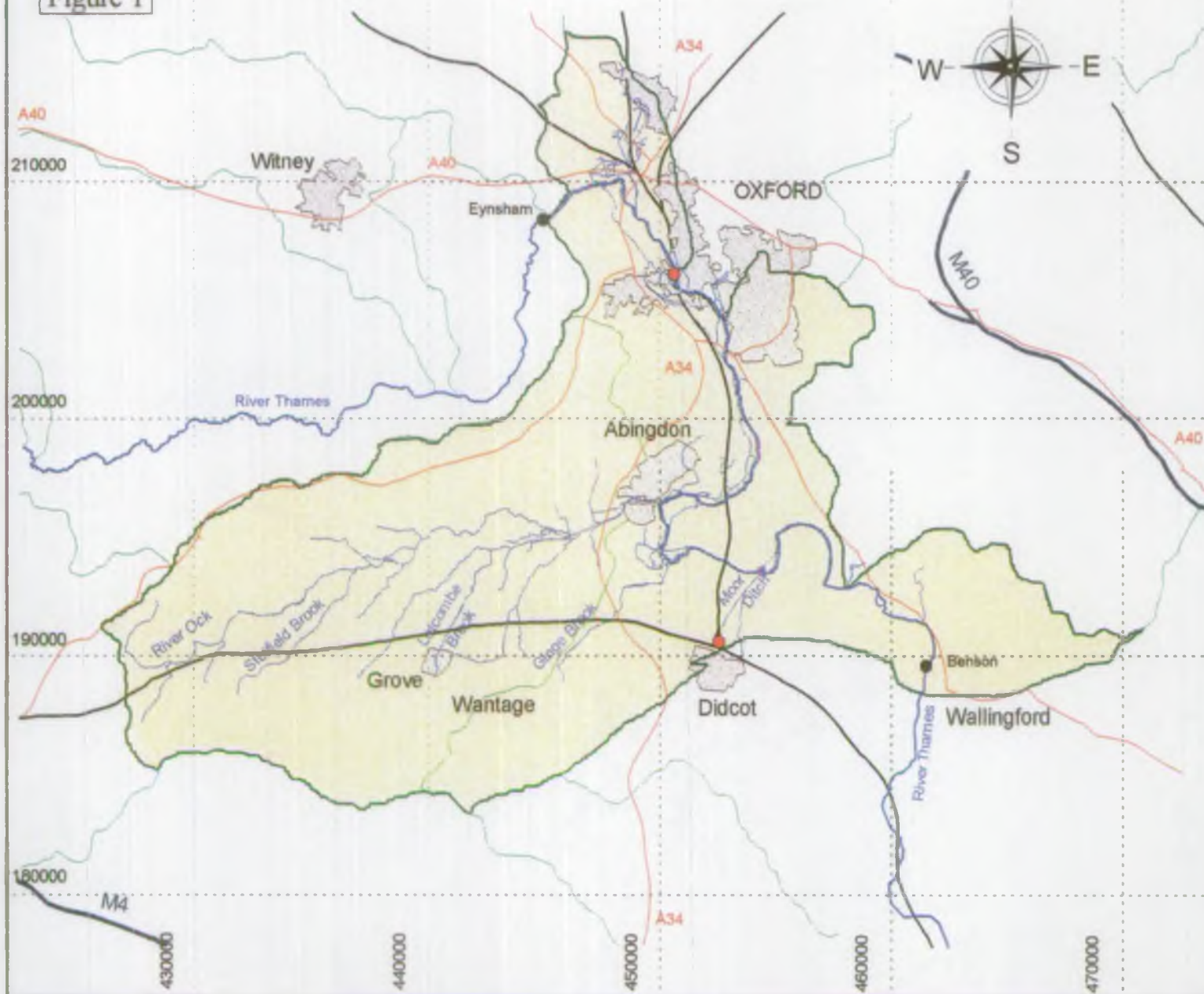
GEOLOGY AND TOPOGRAPHY

- 2.2 The Ock catchment is characterised by Gault and Kimmeridge clays, which are easily erodible and therefore promote lowland development. To the south the clays are overlain by Chalk rising up to form the rolling landscape of the Berkshire Downs. The Downs form an upland ridge with an average height of 210m AOD along the southern edge of the study area, rising up to a maximum height of 240m AOD at White Horse Hill.
- 2.3 To the north, the Corallian Series largely comprising sand and limestone beds forms a small discontinuous scarp overlain by the Lower Greensand Formation (Faringdon Sponge Beds). To the north east the land dips once more to expose the lowland Oxford Clays.
- 2.4 The River Ock rises at Little Coxwell and flows over the Corallian gaining flow from a number of spring fed tributaries. Downstream of Garford to its confluence with the River Thames the river flows over Kimmeridge Clays and Terrace Gravels overlying the clay. Along the Thames valley, the underlying geology is masked by Pleistocene alluvium and gravels. Figure 2 shows the solid geology of the study area.

HYDROLOGY

- 2.5 The Ock rises at Little Coxwell (SU 280935) and flows eastward for 38km to meet the Thames at Abingdon (SU 496967). The seven major tributaries of the Ock are: the Childrey Brook, the Bagpuize Brook, the Marcham Brook, the Sandford Brook, the Land Brook, the Stutfield Brook and the Letcombe Brook. In their upper reaches many of these tributaries have been managed for agricultural purposes and are little more than field drains in narrow entrenched channels, the majority of which do not flow all year round. The Letcombe Brook however remains a pristine chalk stream in its upper lengths.

Figure 1



Thames (Eynsham to Benson) & Ock Catchment Review: Key Features

- CMP Boundary
- Sub - Catchment Boundary
- Urban Areas
- Main River
- River Thames
- Lock
- Motorway
- 'A' Road
- Railway
- Principal Station

Scale:-

10km









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Figure 2

Thames (Eynsham to Benson) & Ock
Catchment Review:
Solid Geology

-  CMP Boundary
-  River Thames
-  Main River
-  Middle Chalk
-  Lower Chalk
-  Upper Greensand
-  Gault
-  Lower Greensand
-  Portland Beds
-  Kimmeridge Clay
-  Corallian
-  Oxford Clay
-  Combrash
-  Forest Marble

Scale:-

10km



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- 2.6 Many of the smaller watercourses in this catchment have in the past few years suffered from low summer base flows and drought conditions.
- 2.7 The Oxford Canal runs through part of the study area. The canal was constructed in the eighteenth century to form a link between the Coventry Canal and the River Thames and to provide a means of transporting coal. Jurisdiction over water quality, recreation and fisheries is shared between NRA Thames Region and the British Waterways, with navigation and engineering on the canal being the sole responsibility of British Waterways. (The route of the old Wiltshire and Berkshire Canal also runs through the catchment area.)
- 2.8 Figures 3a - 3c show hydrographs for the River Thames at Eynsham and Days Lock and for the River Ock at Abingdon respectively. The hydrographs for the River Thames show flow increases between Eynsham and Days weir, but the flow pattern is constant. Tributaries of the Thames along this reach include the Evenlode and Cherwell as well as the Ock. The Ock hydrograph shows the flashy nature of the watercourse with 1991 and 1992 being particularly dry years.

WATER RESOURCES

- 2.9 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 ground water recharge.
- 2.10 The Ock catchment has an average annual rainfall of 643mm (taken from 1941 to 1970 records). The average effective rainfall is 183mm.
- 2.11 Water resources data is collected by the NRA from flow gauging stations, ground water monitoring boreholes, current meter gauges and rain gauges throughout the catchment. A need has been identified for additional rain gauges, particularly in the Ock catchment.
- 2.12 Thames Water Utilities Limited (TWUL) are the sole water and sewerage undertaker operating within the catchment area. Their major ground and surface water abstractions, ie greater than 1 ML/day, are detailed in Table 2.1.
- 2.13 There are currently 171 abstraction licences in force within the study area. Figure 4 shows the location of the major abstraction points and flow gauging stations within the study area.

Figure 3a

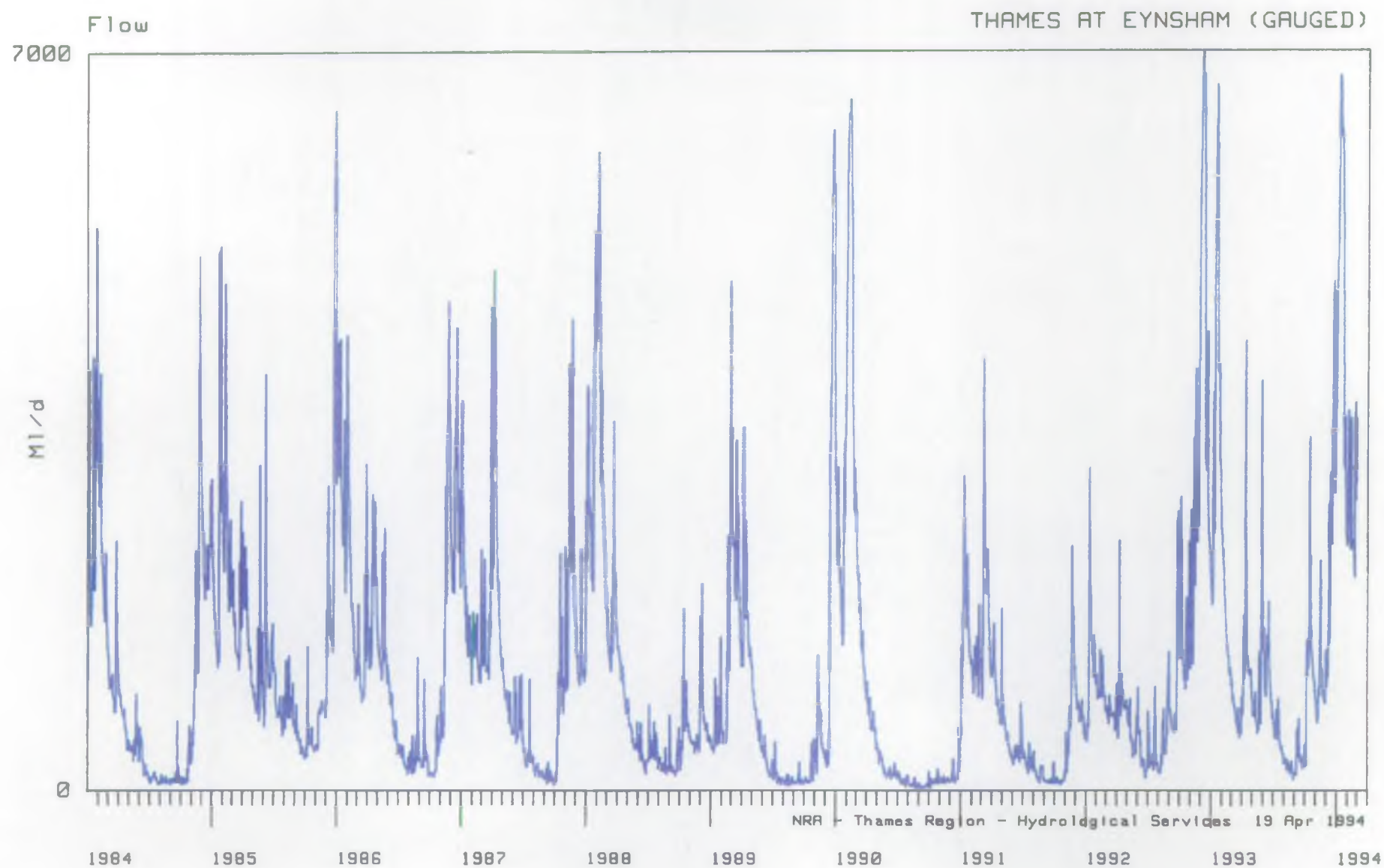


Figure 3b

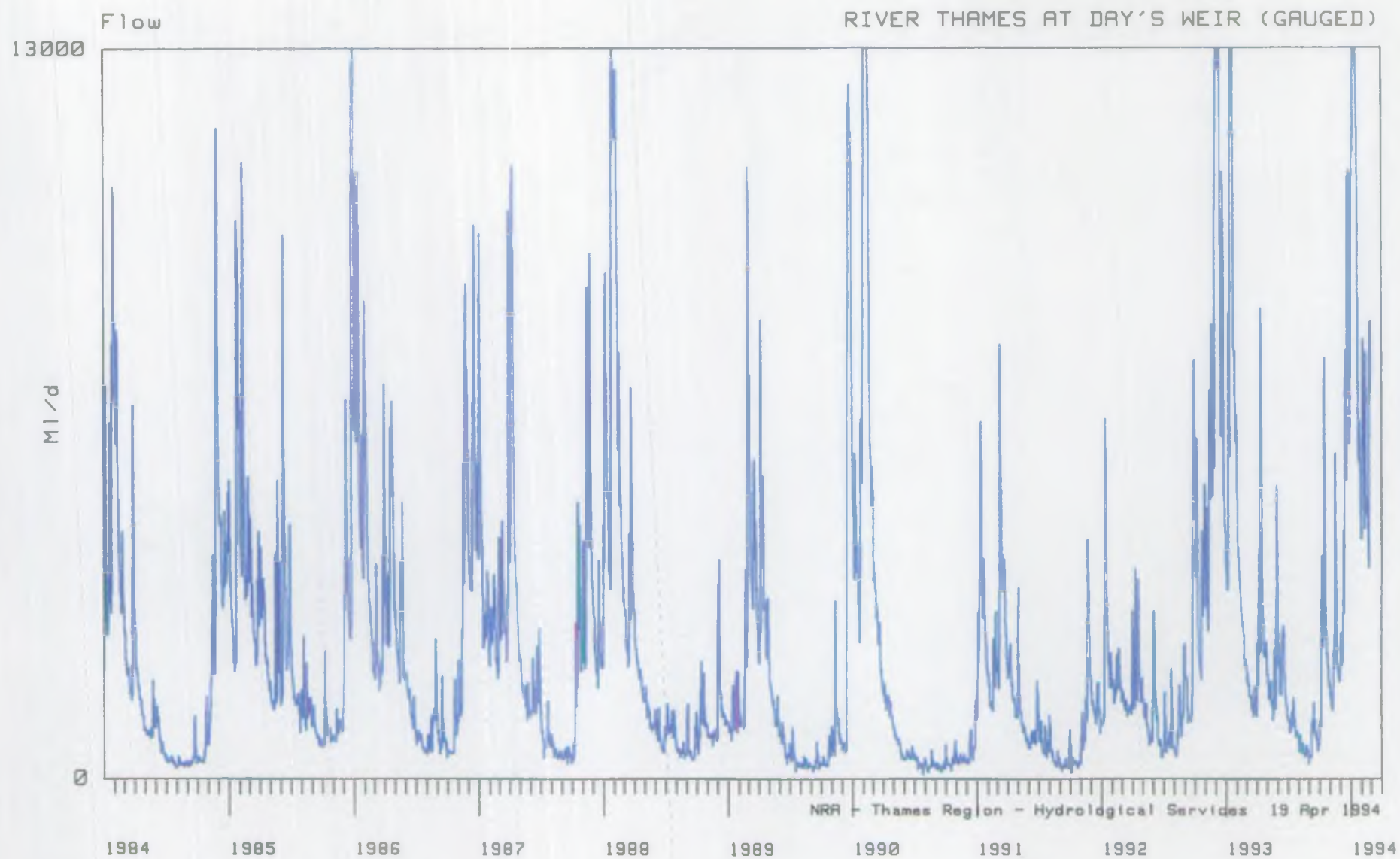


Figure 3c

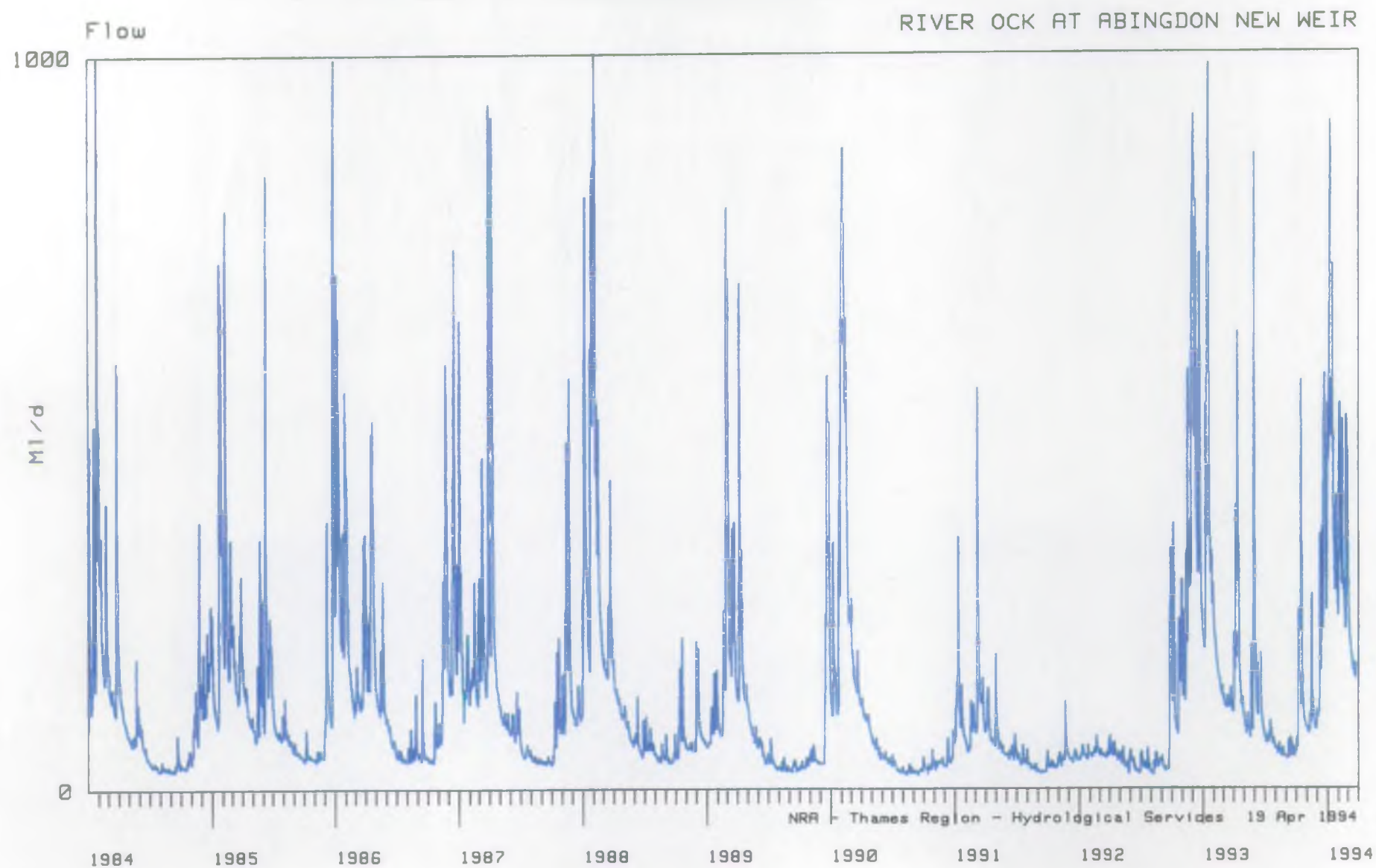


Table 2.1 - Details of Licensed Ground/Surface Water Abstractions of Greater than 1Ml/day

Fig. 4 Key	Location	Volume (Ml/day)	Use	Source	Grid Ref
G1	Manor Road	3.1	Public Water Supply	Chalk	SU 396868
G2	Childrey Warren	4.6	Public Water Supply	Chalk	SU 365848
G3	Snelling ford	1.5	Gravel Washing	Upper Jurassic	SU 328937
G4	Wallingford	2.2	Public Water Supply	Chalk	SU 602895
G5	Hendred	1.7	Public Water Supply	Chalk	SU 450878
G6	Sutton Courtney	2.2	Gravel Washing/Industrial process	Gravel	SU 512937
S1	Wolvercote	4.4	Cooling/Industrial Process	River	SP 487098
S2	Walton	3.1	Cooling	River	SP 503072
S3	Culham	4.6	Public Water Supply	River	SU 531972
S4	Swinford	45.6	Public Water Supply	River	SP 443085
S5	Sutton Courtney	5.9	Industrial Process	River	SU 506945
S6	Didcot	143.6	CEGB Depot (Didcot)	River	SU 516946
S7	Clearwater	8.1	Fish Farm	River	SU 454893

- 2.14 NRA (Thames) have produced a ground water vulnerability map for the region and are in the process of defining ground water protection zones.

WATER QUALITY

- 2.15 The NRA uses a range of chemical and biological techniques to assess water quality. Until recently the quality of individual lengths of rivers have been reported according to a classification system derived by the former National Water Council (NWC). This system classed watercourses in England and Wales on the basis of their concentrations of BOD, DO and ammonia. Due to problems with the application of the NWC scheme it has been replaced by the General Quality Assessment (GQA) which consists of a number of separate water quality assessments (chemical, biological, aesthetic and nutrient status). The first of these assessments to be developed is the chemical component. Table 2.2 shows the NWC classifications for the years 1990-1992 for the study area, along with the new chemical GQAs. The GQAs are also shown in Figure 5.
- 2.16 Since the late 1970s targets for improving and maintaining water quality have been set via 'statutory' (see 2.17) and non-statutory water quality targets; the 'statutory' water quality targets are those specified in EC Directives. The non-statutory water quality objectives were known as river quality objectives (RQOs) and derived from the NWC classification.

Figure 4

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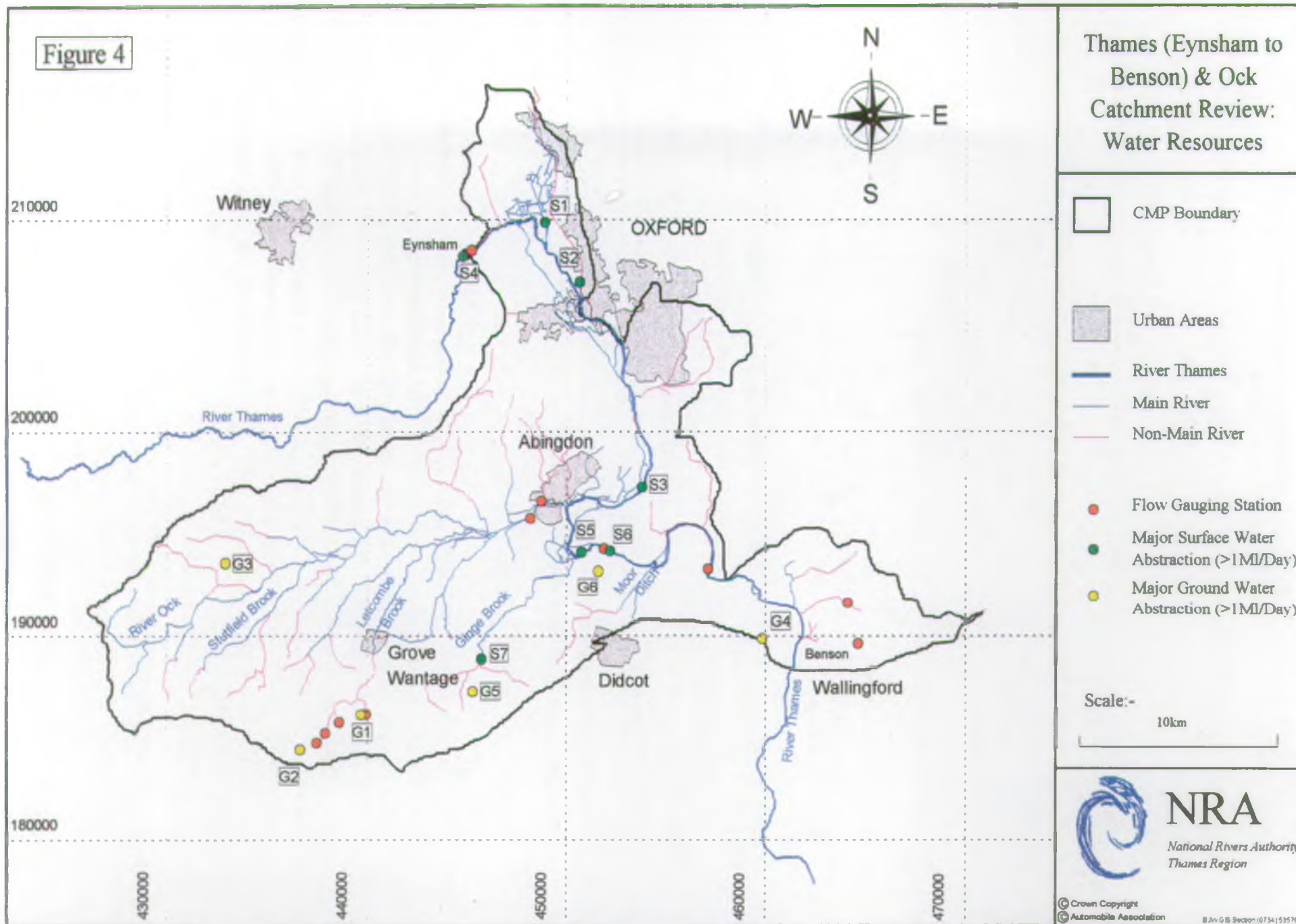


Figure 5

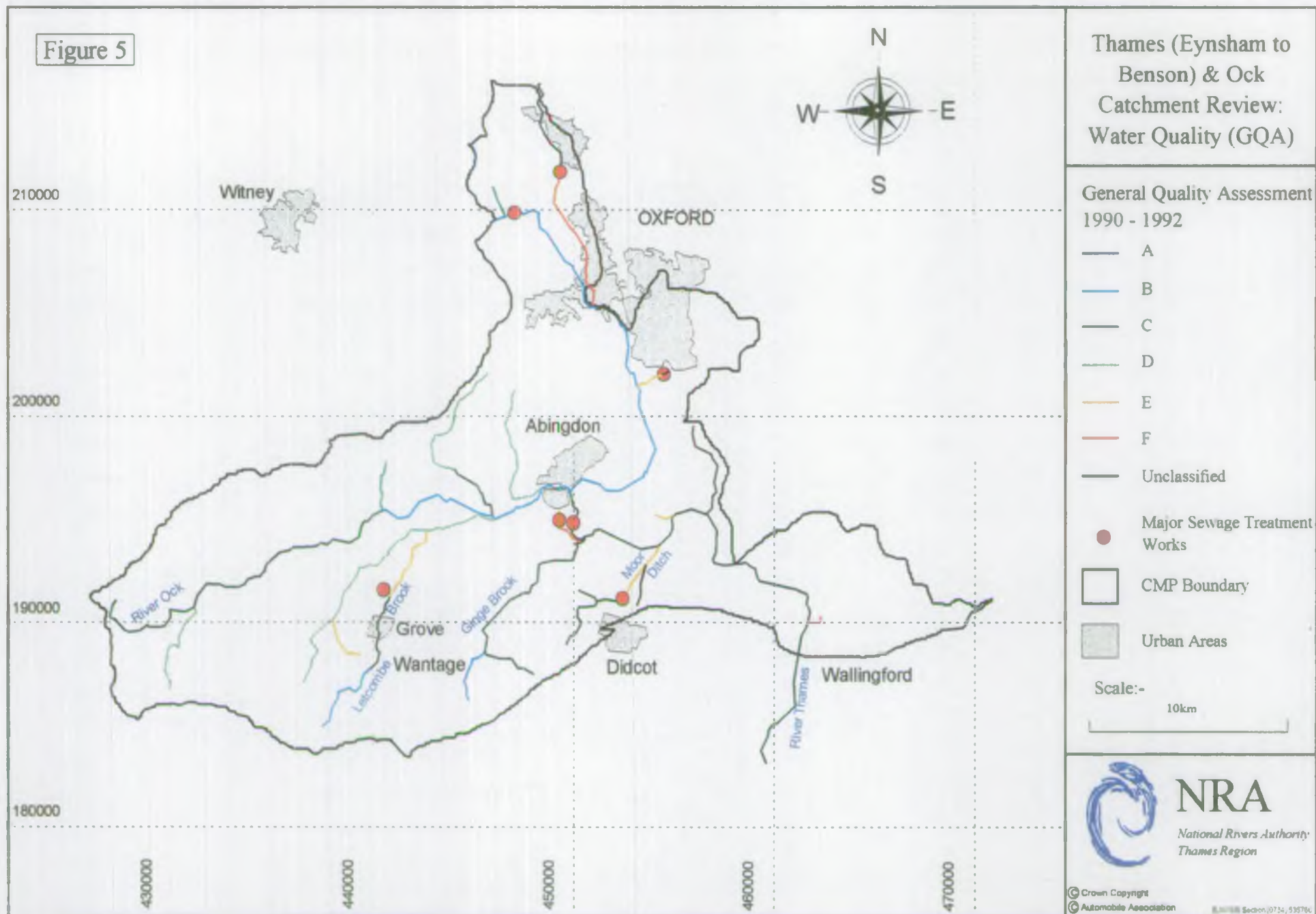


Table 2.2 - RQOs, NWC Classification, RE Objectives and GQAs for the Study Area

River	Stretch	km	RQO	NWC 1990	NWC 1991	NWC 1992	NWC 1993	RE OBJ.	GQA 1990- 1992
Ock Catchment									
Ock	Longcot to Stanford in the Vale STW	12.5	1A	1A	1B	1B	1B	1	C
Ock	Stanford in the Vale STW to Bagpuize Brook	8.0	1A	1A	1B	1B	1A	1	C
Ock	Bagpuize Brook to Thames	13.9	1B	1B	1B	1B	1B	2	B
Sandford Brook	Sandleigh to Ock	6.4	3	1B	1B	2A	2A	5	D
Childrey Brook	Source to Ock	15.7	2B	1B	2A	1B	1B	4	D
Letcombe Brook	Source to A417	4.6	2B	1A	1A	1B	1A	4	B
Letcombe Brook	A417 to Wantage STW	4.7	2B	1A	1B	1B	1B	4	C
Letcombe Brook	Wantage STW to Childrey Brook	4.3	2B	2A	2A	2A	1B	4	E
Woodhill Brook	Stockham Bridge to Childrey Brook	2.5	1B	3	2A	1B	3	2	E
Marcham Brook	Rockley Heath to Frilford Stream	8.4	2B	2A	2A	2B	2A	4	D
Marcham Brook	Frilford Stream to Ock	3.6	2B	2A	1B	1A	1B	4	C
Bagpuize Brook	Kingston Bagpuize STW to Ock	2.5	2B	2A	2A	2A	2B	4	D
Uffington Brook	Woolstone Wells to Ock	5.3	1B	1A	3	1A	2A	2	D
Thames Catchment									
Thames	Evenlode to Castle Mill Stream	9.3	1B	1A	1A	1A	1A	2	B
Thames	Castle Mill Stream to Cherwell	1.4	1B	1A	1A	1A	1A	2	B
Thames	Cherwell to Sandford Lock	4.4	2A	1B	1A	1A	1A	3	B
Thames	Sandford Lock to Ock	8.5	2A	1A	1A	1A	2A	3	B
Thames	Ock to Thame	15.2	1B	1B	1A	1B	1B	2	C

Table 2.2 (Continued) - RQOs, NWC Classification, RE Objectives and GQAs for the Study Area

River	Stretch	km	RQO	NWC 1990	NWC 1991	NWC 1992	NWC 1993	RE OBJ.	GQA 1990- 1992
Thames	Thame to Goring STW	14.2	1B	1B	1A	1A	1B	2	C
Oxford Canal	Shipton Weir to Kidlington STW	5.9	2A	1B	1A	1B	1B	3	C
Oxford Canal	Kidlington STW to Castle Mill Stream	6.8	2A	3	2A	2A	2A	3	F
Balterner Brook	Cassington to Thames	1.6	2B	1B	1B	1B	1B	4	D
Northfield Brook	Northfield Brook (W) to Oxford STW	0.3	3	1B	1B	1B	1B	5	C
Northfield Brook	Oxford STW to Thames	1.5	3	3	2B	2B	3	5	E
Bradfor's Brook	Mill Brook to Thames	2.1	1B	1A	1B	1B	1A	2	C
Howbery Ditch	Benson STW to Thames	0.9	3	2B	3	3	2A	5	F
Burcot Brook	Marsh Baldon to Thames	5.4	2B	1B	1A	1B	1B	4	C
Clifton Hampden Ditch	Clifton Hampden to Thames	0.9	2B	3	2A	2A	2A	4	E
Harwell Stream	Blenheim Hill to Moor Ditch	3.3	X	1B	2A	2A	2A	7	C
Moor Ditch	Milton to Didcot STW	6.0	3	1B	1B	1B	1B	5	C
Moor Ditch	Didcot STW to Thames	3.2	3	2A	3	3	3	5	E
Ginge Brook	West Ginge to Lydebank Brook	3.2	1A	1B	1A	1A	1A	1	B
Ginge Brook	Lydebank Brook to Odhay Hill Ditch	9.6	1B	2A	2A	1A	1A	2	C
Ginge Brook	Odhay Hill Ditch to Thames	0.1	2B	3	2B	2A	2A	4	E
Odhay Hill Ditch	Stonehill House to Ginge Brook	1.6	3	3	<DATA	3	3	5	F
Lydebank Brook	AERE Harwell to Ginge Brook	3.0	2B	1B	1B	1B	1B	4	C

Notes

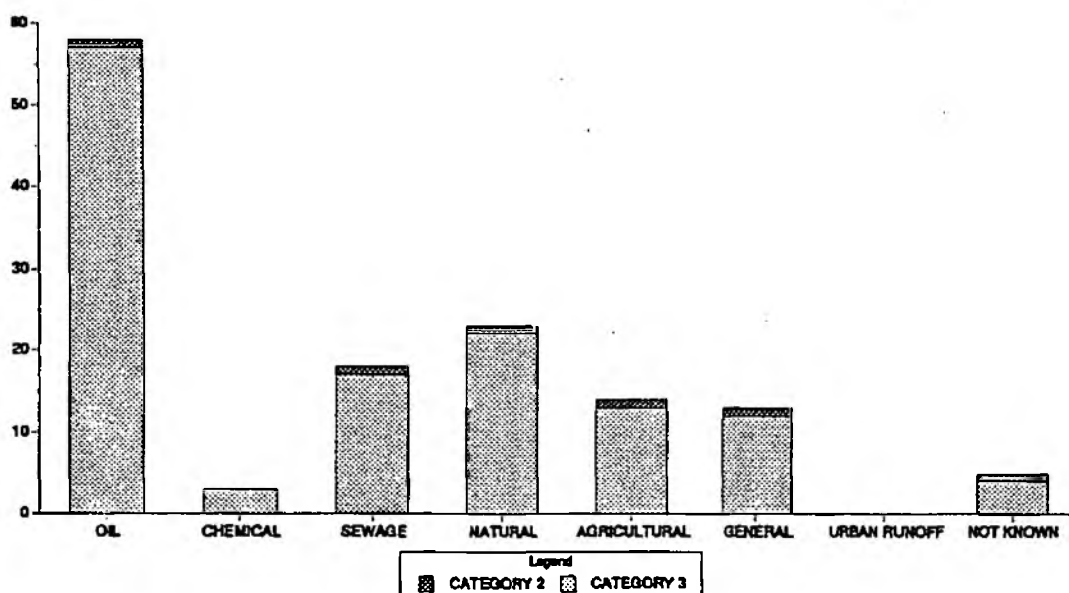
- 1) The FE OBJ data is based on a translation of RQOs.
- 2) Shading indicate failures of the RQO or RE objectives
- 3) <DATA indicates insufficient data is available to classify the reach
- 4) X indicates watercourse classed as insignificant
- 5) RQO: River Quality Objective
- 6) NWC: National Water Council Classification
- 7) RE: River Ecosystem
- 8) GQA: General Quality Assessment

- 2.17 The Water Resources Act 1991 allowed the government to set 'Statutory Water Quality Objectives' (SWQO). These are to replace the RQOs. Five uses have been proposed for rivers (River Ecosystem, Special Ecosystem, Abstraction for Potable Supply, Industrial or Agricultural Abstraction and Water Sport Activity) and to date regulations have been produced for the River Ecosystems (RE) use. Five classes have been established within this use and chemical standards have been derived for each. These are objectives only and do not reflect actual water quality.
- 2.18 The government has recently approved £522.3 million to be spent to improve water quality in England and Wales. The £41M allocated to Thames Region will be used to upgrade a number of sewage treatment works including Oxford and Benson.

POLLUTION CONTROL

- 2.19 During 1993, 155 pollution incidents were reported. None of these were classed as major incidents. Of these, 147 were classed as significant and 8 as minor incidents. Of all these incidents, 119 were substantiated as being actual cases of pollution. A breakdown of the different types of pollution is shown in Figure 6.

Figure 6 - Reported Pollution Incidents 1993



2.20 The distributaries of the River Thames and Cherwell in Oxford have been the subject of public concern and complaint. The NRA respond to all reported pollution incidents and take appropriate action. However little or no water quality information exists to confirm or deny any chronic pollution problems in these watercourses. Therefore an initial one year sampling programme has been instigated to investigate water quality in these watercourses. The data will be constantly reviewed and assessed at the end of the one year period. The one year sampling programme will be extended should it be deemed necessary.

2.21 Since 1989 twelve prosecutions and/or warnings have been issued to polluters within the study area.

CONSENTED DISCHARGES

2.22 There are 123 consented discharges in the study area. Table 2.3 shows a breakdown of the types of consent and percentage compliance with consent conditions for the year 1993. In addition three of the PLC STWs have consents to discharge stormwater. These are not shown in Table 2.3.

Table 2.3 - Consented Discharges and Percentage Compliance

Category	Total No. Consents	Number Not Sampled	Number Compliant	Compliance (%)
PLC STWs	30	1	28	97
Private STWs	52	11	27	66
Trade Effluents	25	3	17	77
Cooling Waters	4	0	3	75
Fish Farms	1	0	0	0
Agricultural	1	0	0	100
Mineral Works	7	0	5	71

2.23 Table 2.4 identifies the volumes and consent conditions for the 9 largest dischargers in the study area. The sites were selected using the criteria of a consented discharge greater than 10,000m³/day and in all but one case they are sewage treatment works owned by Thames Water Utilities. The exception is Radley Ash Disposal Lagoons, which discharge trade effluent from Didcot Power Station, to the Pumney Farm Ditch.

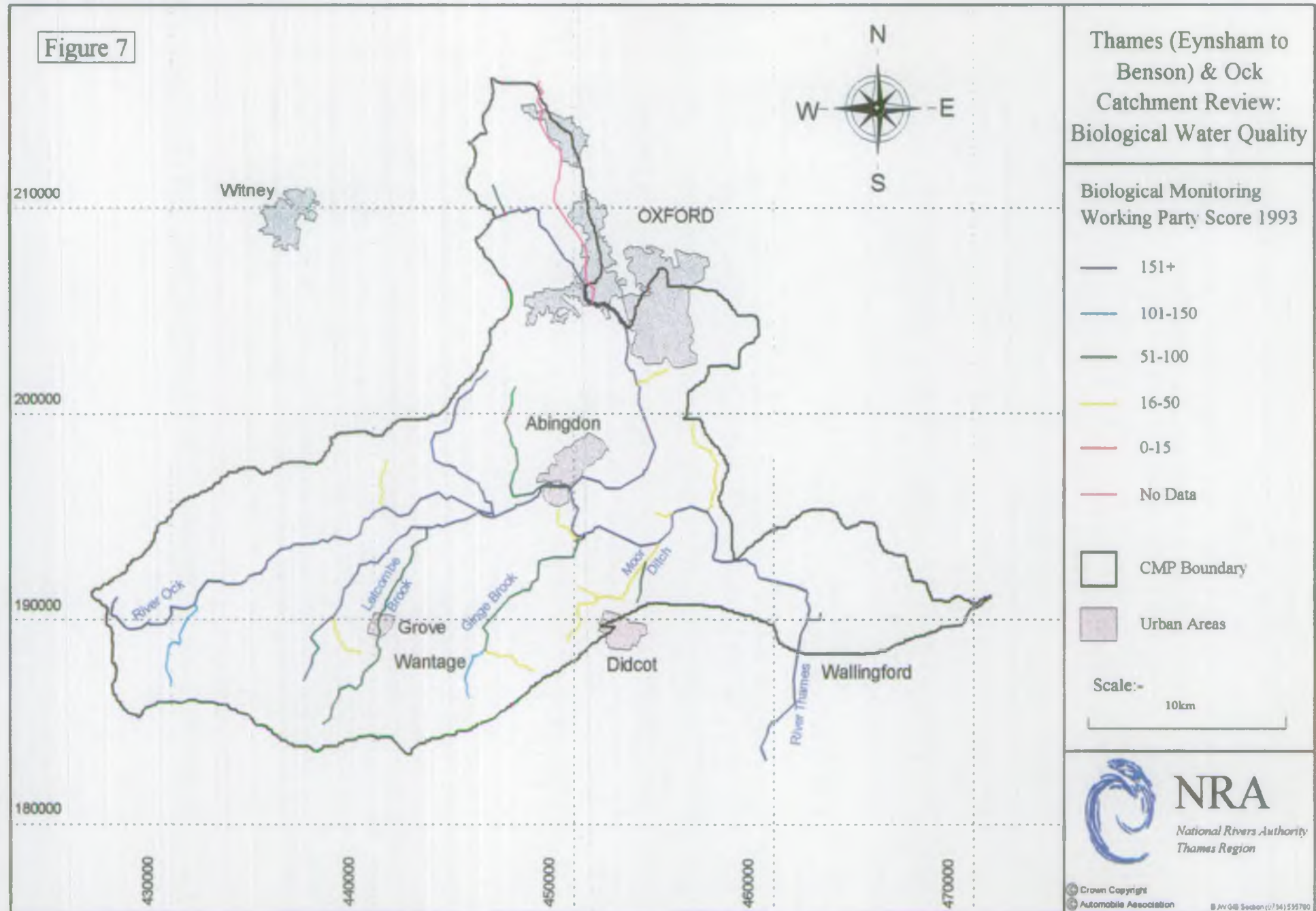
Table 2.4 - Discharge Consents of Greater than 10,000m³/day

WORKS	Volume m ³ /day	Location	Consent Conditions (mg/l)		
			Susp'd Solids	BOD	NH ₃ -N
Abingdon STW Lagoon Overflow	30,000	Odhay Hill Ditch	30	20	20
Abingdon STW Microstrainers	30,000	Odhay Hill Ditch	30	20	20
Abingdon STW	10,500	River Thames	45	20	15
Oxford STW	90,000	Northfield Brook	90	75	20
Cassington (new) STW	12,000	River Thames	40	20	7
Didcot STW	15,000	Moor Ditch	60	90	35
Kidlington (new) STW	12,600	Oxford Canal or Kingsbridge Brook	40	35	20
Wantage STW	18,750	Letcombe Brook	40	30	5
Radley Ash Disposal Lagoons	17,000	Pumney Farm Ditch	30	10	*

* additional conditions on temperature, pH, and heavy metal content.

- 2.24 The NRA also carries out biological monitoring to provide additional water quality information. The Biological Monitoring Working Party (BMWP) score system, established in 1980 is a nationally accepted means of assessing water quality. The technique assigns scores to different invertebrate taxa, based on their sensitivity to pollution. The final BMWP score is calculated by summing the scores for each taxa present in the sample. As a rough guide, a BMWP score of 100+ will indicate relatively good water quality, whilst scores approaching 0 indicate poor or unacceptable water quality. Figure 7 shows the biological water quality of the study area for 1993.
- 2.25 In addition bacteriological monitoring is being carried out at selected sampling sites. A rolling sampling programme is in operation with the aim of covering the whole catchment. An ongoing algal monitoring programme is also being carried out, instigated as part of the South West Oxfordshire Reservoir Proposal (SWORP) studies. The River Thames is sampled at five sites between Oxford and Wallingford at least at monthly intervals. Monitoring is ongoing, despite postponement of the scheme.

Figure 7



- 2.26 Following a survey carried out in 1992, native crayfish (*Austropotomobius pallipes*) were recorded at two sites on the River Ock. However subsequent surveys carried out in 1993 failed to locate any crayfish along the Ock.

FLOOD DEFENCE

- 2.27 During the early 1960s major improvement works were carried out on the Ock for agricultural purposes. The works, largely involving dredging, aimed to contain a 1 in 10 year flood event within the channel. In the mid 1970s to early 1980s flood alleviation works were carried out to protect urban property adjacent to the River Ock in Abingdon. The scheme was designed to give flood relief for up to a 1 in 25 year flood.
- 2.28 Six amber flood warnings have been issued on the River Thames and two on the River Ock since 1989, indicating potential flooding to agricultural land, parkland, isolated properties and some roads. Three red warnings were issued over the same period (one for the Ock and two for the Thames), indicating possible flooding of residential and commercial properties. However, any actual flooding has been of countryside or generally cultivated areas, with only isolated properties being affected. No severe events have been recorded.
- 2.29 The CASCADE flood warning system, successfully implemented in the NRA (TR) North East area is currently being extended to the rest of the region. The system combines and processes data from rain gauges, flow gauging stations, rainfall data from the London Weather Radar and rainfall forecasts from the Meteorological Office to predict flows on the Thames tributaries up to twelve hours in advance. As part of this project additional telemetry stations are being installed on the Ock to monitor water levels.
- 2.30 DoE Circular 30/92 - Development and Flood Risk prescribes that the NRA must provide data on flood risk to local authorities. To be in a position to do that, the NRA have looked to S105 of the Water Resources Act 1991 (Part IV Flood Defence) which empowers the NRA to carry out surveys in relation to its various functions. Thames Region depends heavily on historical data eg the 1947 flood. There is, therefore, a need to produce 'synthetic' flood maps whereby flood envelopes ie 100 year return period are defined from computer models after a period of extensive data collection ie. aerial photogrammetry/survey work. The NRA has prioritised its catchments for work (in line with CMPs and local development pressure) and the River Thames (Eynsham - Benson), Ginge brook and River Ock are deemed priority 3 catchments ie of relatively low priority.

FISHERIES

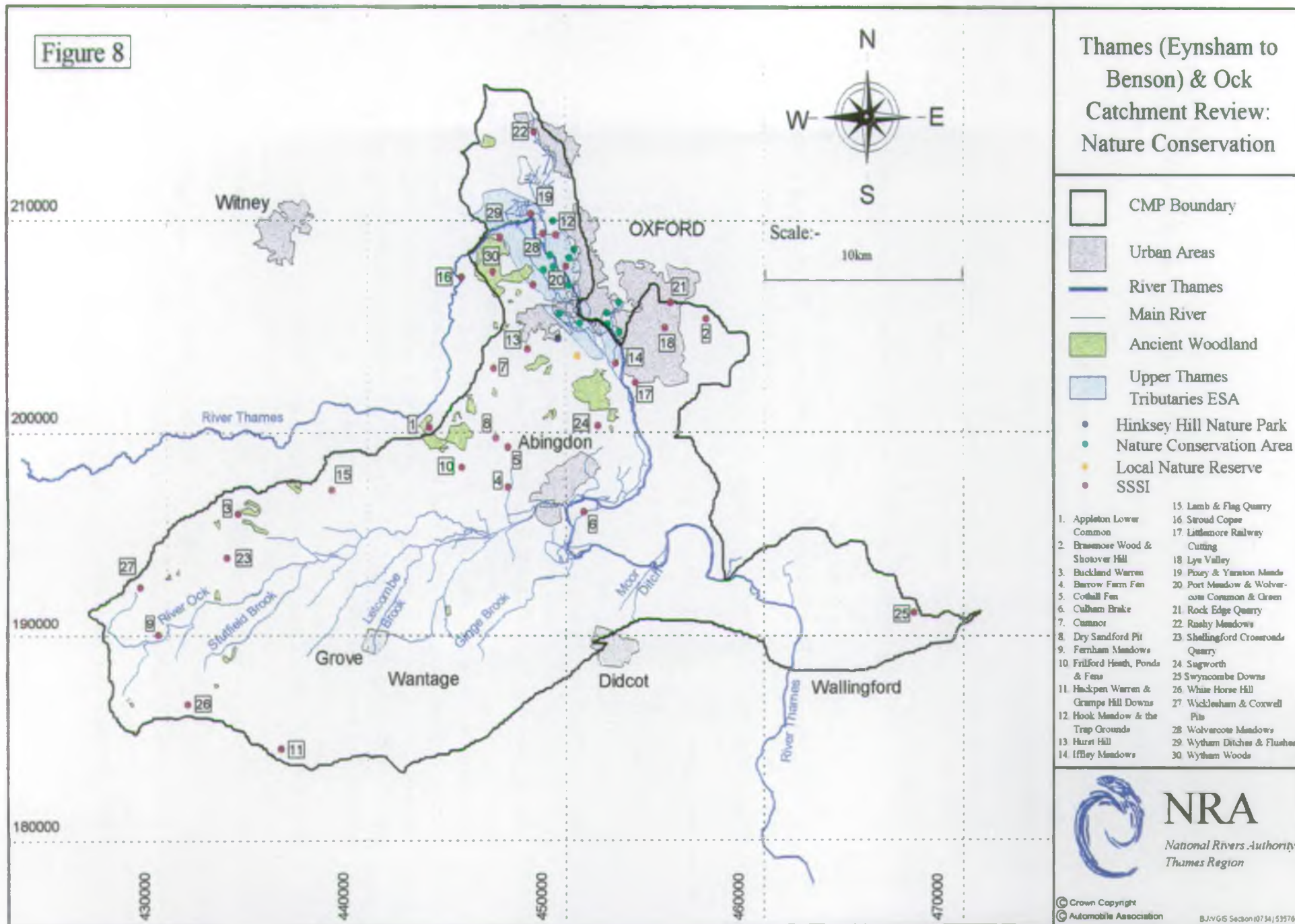
- 2.31 The EC Directive 78/659/EEC instructs member states to designate river and canal reaches capable of supporting salmonid or cyprinid fisheries. These watercourses are required to comply with stipulated water quality parameters in order to protect fish life.

- 2.32 The whole of the section of the River Thames within the catchment review study area is designated as an EC cyprinid fishery. At present little is known about the fishery of the River Thames as no comprehensive fisheries surveys have been carried out to date, due to the technical difficulties associated with surveying large rivers. However new hydroacoustic and electro-fishing surveying techniques have been developed as part of the NRA's investigations of future Water Resources proposals and sections of the River Thames are due to be re-surveyed during Summer 1994.
- 2.33 The River Ock is also designated as an EC cyprinid fishery from Lyford Bridge to its confluence with the River Thames, whilst the tributaries of the River Ock are undesignated. The predominant fish species found in the Ock catchment are chub, dace, pike, roach and gudgeon. Perch are also abundant in some areas, but appear to be confined to the lower reaches. Trout and tench are present in small numbers. A survey carried out on the Ock and its tributaries in 1992 revealed all age classes are present for the major fish species identified above, however, the quality of the fishery is limited in certain reaches, especially on the Ock itself due to poor water quality and degraded habitat, resulting from historical mismanagement.
- 2.34 None of the reaches failed the Fisheries Directive standard in the years 1990-1993.

CONSERVATION

- 2.35 There are twenty nine SSSIs in the study area (detailed in Figure 8), including a number of unimproved herb-rich meadows in the Thames floodplain around the City of Oxford, such as Pixey and Yarnton Meads, Port Meadow and Iffley Meadow. These neutral grasslands are of very high nature conservation value. Another notable SSSI in the Oxford area is Lye Valley which is one of the best recorded calcareous valley fens in southern England. In addition, the Thames itself supports a variety of typical aquatic and semi-aquatic flora and fauna, and although the Ock also supports a reasonable range of species, much of the river and riparian habitat has been degraded and there is a great deal of scope for channel and riparian habitat enhancement.
- 2.36 In March 1994, the Upper Thames Tributaries were designated by MAFF as an Environmentally Sensitive Area (ESA). The designation encroaches onto the northern part of the study area and is also illustrated in Figure 8.
- 2.37 Figure 8 also shows Ancient woodland, a proposed Local Nature Reserve at Chilswell Valley and other Nature Conservation Sites extracted from local plan documents. There are large tracts of Ancient woodland in the study area including Bagley Wood, Tubney Wood and Wytham Wood, the latter lying adjacent to the River Thames between Eynsham and Oxford.

Figure 8



LANDSCAPE

- 2.38 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 Thames Environment Design Handbook (1992) is the reference document produced to ensure that the existing landscape values of Thames-side structures are taken into account by the NRA when undertaking repairs or replacement.

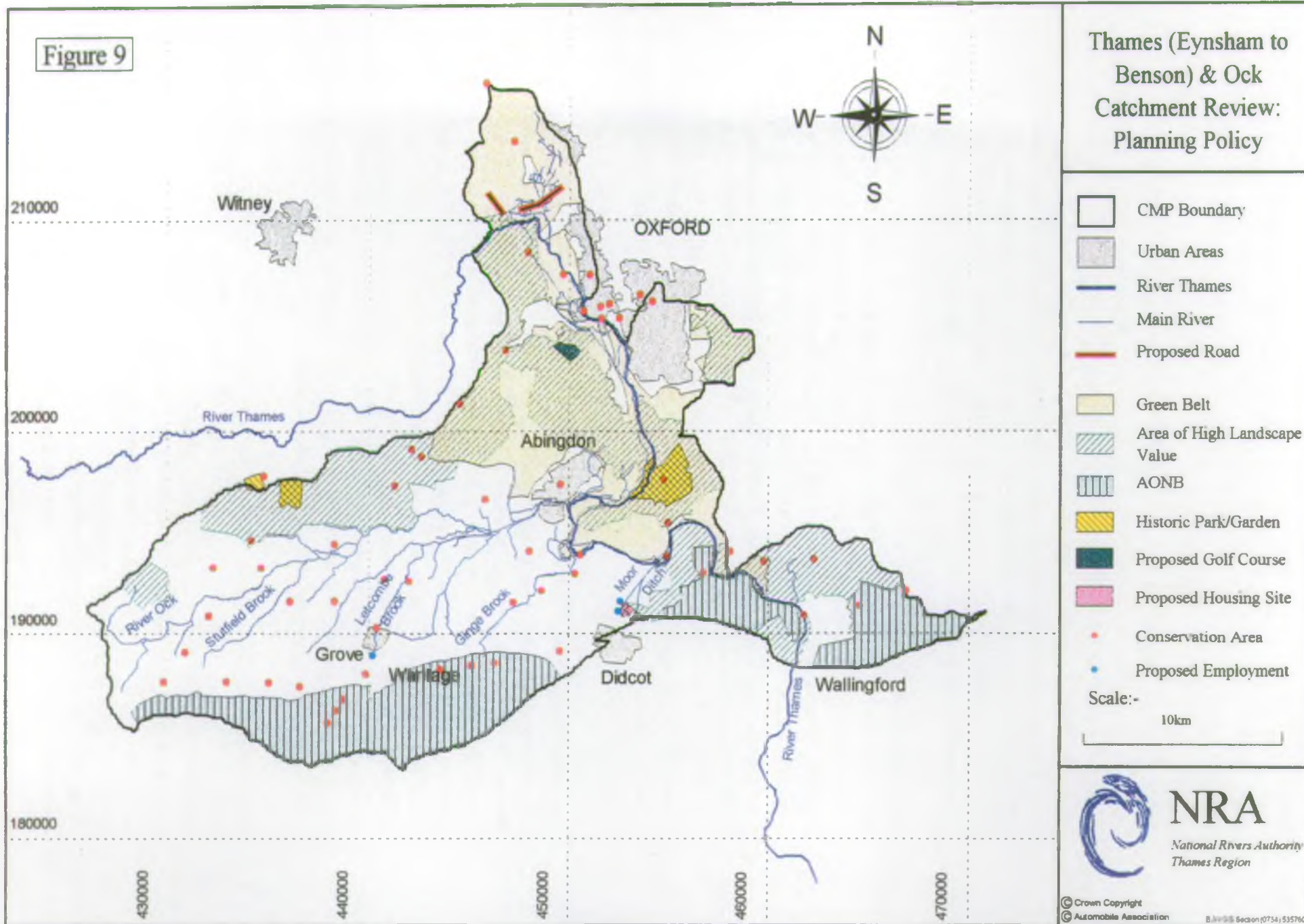
Landscape Character

- 2.39 The study area lies within the broad valley zone of the Oxford Clay Vale. The landscape is characterised by areas of open pasture and flood meadow and contrasting built-up frontages, some of historic and architectural importance. There is a series of unique lock and weir systems along the Thames, which collectively represent a significant piece of river heritage especially upstream of Oxford. Through the urban areas of Oxford and Abingdon, established walks link bridge, lock and historic sites of interest. West of Oxford, the Ock meanders through the open semi-natural landscapes of the Vale of White Horse, before joining the Thames at Abingdon. Downstream of Abingdon, the Thames flows through an "open arable" landscape, with extensive views to the distant Chiltern and Sinodun Hill tops.

Landscape Designations

- 2.40 The study area contains two designated Areas of Outstanding Natural Beauty - the North Wessex Downs AONB and the Chilterns AONB. Designation of AONB reflects the national significance of the landscape character. These are shown on Figure 9. Together, they form a considerable part of the catchment in the Wantage and Wallingford areas. The boundary between the two is marked by the River Thames, where it carves through the chalk escarpment to form the Goring gap. Although both areas are chalk upland, their characters differ. The North Wessex Downs AONB includes both open uplands and lower land between Didcot and Wallingford, extending up to the Thames, while the Chilterns AONB is generally of a more enclosed and wooded nature.
- 2.41 Extensive areas of the remainder of the study area are designated as Areas of Great Landscape Value or Areas of High Landscape Value (see 2.59). These are also shown on Figure 9. With the exception of the built-up area of Oxford, the River Thames lies wholly within such areas. Although AGLVs are not of national importance, they generally have an unspoilt nature and landscape quality. Within the valley of the River Ock and its tributaries, most of the landscape is not subject to any particular landscape policy designation. The main exception is between Garford and Lyford, where the River Ock adjoins the boundary of an Area of High Landscape Value.

Figure 9



RECREATION

Recreation within the Study Area

- 2.42 Recreation activities within the catchment are heavily concentrated on the Thames in the urban areas of Oxford and Abingdon. There is less recreational activity on the Ock due largely to its rural setting and greater distance from urban areas. However, angling is very popular and there is at least one angling club, Sutton Courtney and Anchor AC in the Ock catchment. Recreation activities are shown on Figure 10.

Water Based Recreation

- 2.43 Rowing is the principal water based activity which takes place within the catchment. There are about eight rowing clubs based on the Thames; three in Abingdon and five in Oxford. Within Oxford, there are approximately 3,000 active rowers, and most of the rowing takes place between Godstow and Abingdon. Sailing is also popular on the Thames, and there are three sailing clubs based at Abingdon, Medley and Oxford University. Boating takes place along the whole length of the Thames within the catchment, although height restrictions imposed by Osney Bridge limit the size of craft upstream of Oxford. Passenger services operate on the Thames between Oxford and Abingdon, and punting takes place in the Oxford area, particularly during summer months. There is also a riverside centre at Donnington Bridge which specialises in watersports training. Until recently, swimming took place at official bathing stations at Godstow, Longbridge and upstream of Osney Bridge. Although these sites have now closed, and the NRA seeks to discourage swimming (primarily due to risk of drowning), it still takes place at various points along the river where there is good public access.

Land Based Recreation

- 2.44 Land based recreation is heavily concentrated on publicly accessible land close to the urban areas of Oxford and Abingdon. These include areas of common land and public open space at Port Meadow, Binsey/Pixey Mead, Christ Church Meadows, Clifton Hampden and Iffley Meadows in Oxford. The area near to Days Lock on the Northmoor Trust Estate, and the tow path along the Thames are also heavily used for informal countryside recreation. Table 2.5 below shows the daily number of pedestrians visitors in the vicinity of Abingdon Lock, based on the results of a NRA survey.

Figure 10

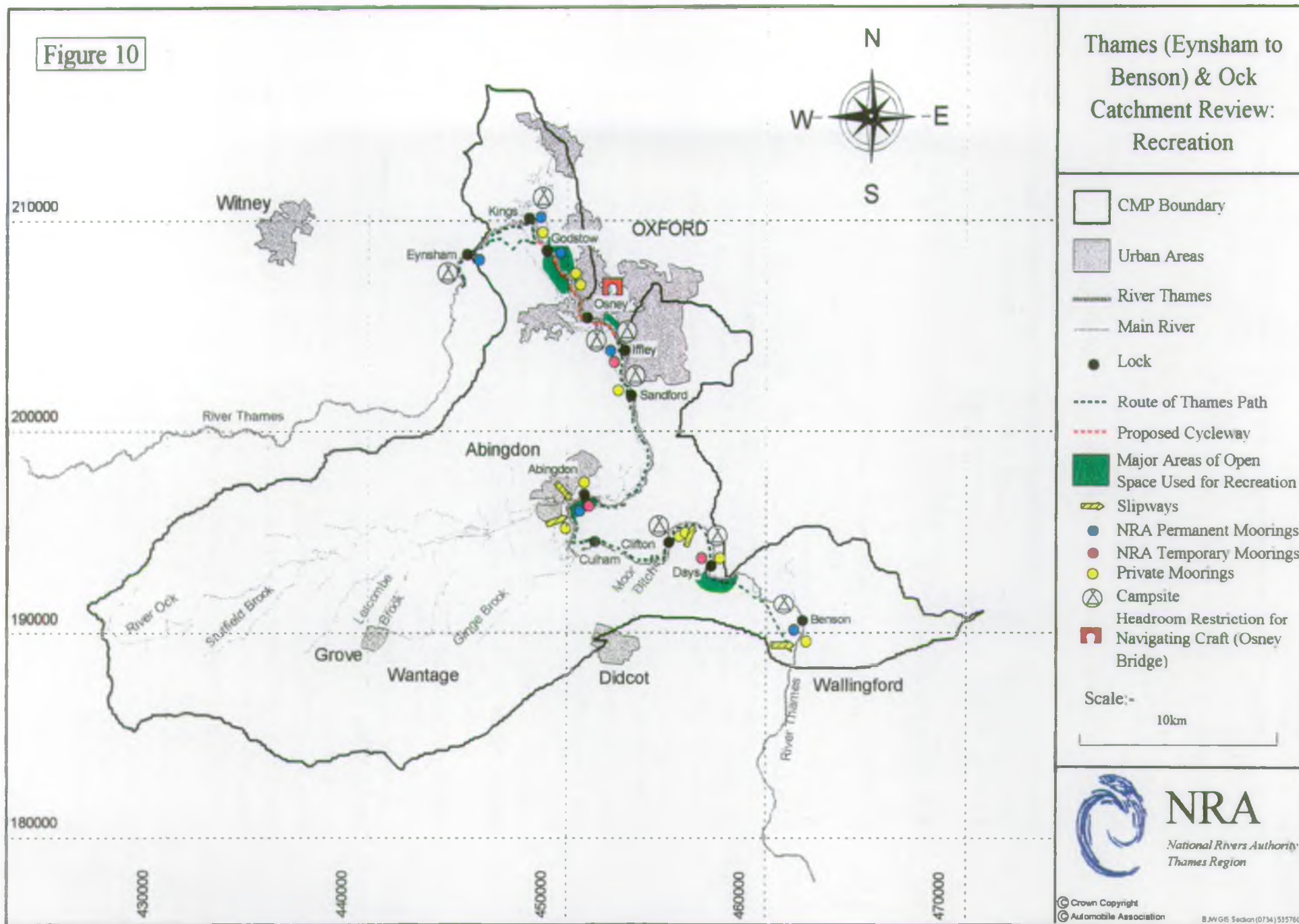


Table 2.5 - Pedestrian Counts: Abingdon

Day/Time	Number of Visitors
July weekday	619
August weekday	1,597
August Saturday	1,475
August Sunday	3,788
August bank holiday	11,962*

* Raft race also took place in Abingdon on survey day

- 2.45 Table 2.6 below shows the number of walkers using the towpath adjacent to the River Thames at Kennington. This information was obtained from pedestrian counters installed on the route during the summer of 1993.

Table 2.6 - Pedestrian Counts: Thames Towpath at Kennington

Survey Period	Total Pedestrians	Daily Average
8/6/93 - 18/6/93	2, 058	206
18/6/93 - 8/7/93	7, 782	389
8/7/93 - 27/7/93	4, 606	242
27/7/93 - 17/8/93	5, 634	268
17/8/93 - 14/9/93	5, 926	214
14/9/93 - 1/10/93	1, 468	86
1/10/93 - 1/11/93	2, 418	78
1/11/93 - 1/12/93	2, 766	90
1/12/93 - 4/1/94	1, 796	54
4/1/94 - 1/2/94	5, 050	188
1/2/94 - 1/3/94	2, 900	104

Source: NRA

- 2.46 Angling takes place mainly between Oxford and Godstow on the River Thames. Busy areas tend to be at weirs and other sites where the river banks are publicly accessible. However at all locations anglers have informal access arrangements with landowners. There are over 20 clubs based within the catchment. The NRA also permits a limited amount of camping at eight lock sites along the Thames between Eynsham and Benson.

NAVIGATION

Legislative Context

- 2.47 Section 79 of the Thames Conservancy Act, 1932 allows the public the right of navigation on the Thames, including backwaters, side-channels and inlets. There is no such public right of navigation on the River Ock, which is, in any event, constrained by fluctuating flows. The 'Thames Navigation and General Byelaws, 1957', rules established to govern activity on the navigation, have been updated and a new set of byelaws will be in force from 1 November 1994. The byelaws will include a number of changes such as the enforcement of a speed limit for the first time and the definition of 'bridge jumping' as an offence.

Navigation Activity

- 2.48 Table 2.7 below shows lock traffic figures for the Thames between Eynsham and Benson in 1980 and 1993.

Table 2.7 - Thames Lock Traffic (Eynsham to Benson)

Lock	Total Number of Passages of craft through each lock	
	1980	1993
Eynsham	10,667	7,882
Kings	12,523	9,194
Godstow	13,228	8,970
Osney	24,883	10,713
Iffley	21,611	13,791
Sandford	20,574	13,553
Abingdon	20,823	14,850
Culham	22,371	14,581
Clifton	22,256	14,126
Days	25,900	17,269
Benson	25,567	16,258
TOTAL	220,403	141,187

Source: NRA

- 2.49 In the 15 years that preceded 1992 there was an overall decline in the volume of lock traffic, possibly due to the recession. This reflects the trend for the Thames as a whole. Within the catchment, fewer craft navigated the Thames upstream of Osney Bridge, due to restrictions imposed by the limited headroom. While this distribution of traffic is borne out in figures for both 1980 and 1993, there is evidence of more boats navigating upstream of Osney Bridge in the recent past, many of which are narrow boats bound for

the Oxford Canal. However, since 1992 two factors have caused a marked increase in traffic in Navigation District No. 1 of which this catchment is part. Firstly Visitors Licences were introduced and are available at key locks. Secondly, the Kennet and Avon canal reopened facilitating an increase in through traffic.

- 2.50 There are no separate figures for the number of craft registered within the catchment. For the Thames as a whole, some 11,000 powered and 6,000 non-powered craft were registered with the NRA to navigate the Thames in 1993, and a further 4,000 visiting craft were granted temporary registration.
- 2.51 There are only a limited number of slipways between Eynsham and Benson, the main points of access to the river being located at:
- Riverside Centre, Donnington Bridge;
 - Clifton Hampden, Oxford Cruisers;
 - Benson Cruiser Station;
 - Abingdon Boat Centre;
 - St. Helen's Wharf.
- 2.52 Apart from St Helen's Wharf which is public, access to the River via these slipways can only be obtained by prior arrangement with the relevant owner and at a cost, and none of the slipways are actually promoted for public use. The slipway at St. Helen's Wharf is only capable of accommodating very small craft. Launching from a trailer at St. Helen's Wharf involves temporary obstruction of the highway.
- 2.53 There are a number of permanent mooring sites along the Thames within the catchment. NRA sites include:
- Kings Lock;
 - Godstow;
 - Iffley Lock;
 - Benson Lock;
 - Eynsham Lock (summer only);
 - Abingdon Lock (summer only);
 - Days Lock (summer only).
- 2.54 Other permanent moorings, which are privately owned include:
- Bossoms Boatyard (off Port Meadow);
 - De La Mare Trust, Godstow;
 - Goodies, upstream of Rose Isle;
 - Wilsham Road, Abingdon;
 - Abingdon Marina;
 - The Lees, Clifton Hampden;
 - The caravan site, Clifton Hampden;
 - Bowditch near Days Lock;
 - Shillingford Bridge Hotel;
 - Benson Cruiser Station.

- 2.55 The NRA has provided temporary (24 hour) free moorings adjacent to the towpath below Isis Bridge, near Iffley and above Abingdon Lock. Other temporary mooring facilities are available at Eynsham, Kings, Iffley, Shillingford Corner, Sandford, Abingdon, Days and Benson Locks.

LAND USE PLANNING CONTEXT

2.56 The study area lies within the county of Oxfordshire. The relevant local planning authorities and their development plans are listed below:

- Oxfordshire County Council - Oxfordshire Structure Plan "Oxfordshire 2001," February 1992;
- Oxford City Council - Oxford Local Plan Review 1991-2001, deposit draft, June 1993;
- Cherwell District Council - Cherwell Local Plan, deposit draft, November 1992;
- Vale of White Horse District Council - Vale of White Horse Local Plan, consultation draft, November 1993;
- West Oxfordshire District Council - West Oxfordshire Local Plan, deposit draft, October 1993;
- South Oxfordshire District Council - South Oxfordshire Local Plan, December 1993.

2.57 The relevant planning policies contained in these plans which affect the study area are shown on Figure 9 and include:

Green Belt

2.58 The Green Belt policies of the Oxfordshire Structure Plan and other local plans restrict development around the built up area of Oxford. Development in the Green Belt will normally only be permitted for agriculture, forestry, recreation or other appropriate development within settlements.

AONB and Area of High/Great Landscape Value

2.59 The Vale of White Horse, West and South Oxfordshire District Councils have identified areas regarded as being of high or great landscape value (see 2.40). Within these areas, the councils seek to conserve and enhance the quality of the environment and will not normally permit development which will adversely affect the landscape.

2.60 The study area also lies partly within the open uplands of the Wessex Downs AONB. Policies in the Vale of White Horse and South Oxfordshire Local Plans aim to conserve and enhance the natural beauty and special landscape quality of the AONB and adverse development will not normally be permitted.

The River Thames and its Valley

- 2.61 The South Oxfordshire Local Plan states the council's intention to maintain the character of the river, its valley and the settlement along its banks.

Historic Parks and Gardens

- 2.62 Sutton Courtenay Manor House (Grade II), Buckland House (II) and Pusey House (II) are registered by English Heritage as Parks and Gardens of Special Historic Interest. The Vale of White Horse District Council will consider the need to protect the setting of the parks or gardens when considering development proposals.

Ancient Woodland

- 2.63 Policies for the protection and enhancement of these woodlands are contained in the Vale of White Horse Local Plan. (Policy NC 2).

Conservation Areas

- 2.64 The purpose of Conservation Area designation is to secure the preservation of the character and appearance of the area. New development is carefully controlled.

Nature Conservation

- 2.65 No development which would have an adverse effect on an SSSI, LNR or other nature conservation site will be permitted by the councils.

Development Proposals

- 2.66 There are 2 major employment sites proposed within the study area, identified in the Local Plans. These are detailed on Figure 9.
- Site 1 - South Oxfordshire District Council has resolved to grant outline planning permission for the development of 7.9ha of land at Southmead, Didcot within Class B1 (business use) and Class B8 (storage and distribution);
 - Site 2 - Outline permission on this 4.8ha site also at Southmead has also been granted by the council for development within Class B1 and Class B8;
- 2.67 There is a road proposal within Cherwell District which runs to the south of Kidlington and joins the A40(T) east of Cassington.

- 2.68 The land between Hinksey and Harcourt Hills has been allocated for use as a nature park and golf course by the Vale of White Horse District Council. This is shown on Figure 9.
- 2.69 Approximately 200 acres of land at Ladygrove, north of Didcot is allocated for housing. The scheme was submitted for planning permission in July 1994. The NRA objected to the development proposal as it entailed culverting the Ladygrove Ditch. Detailed information relating to the Ladygrove development is contained in the "Planning Policy Document for the Didcot Area to 2001" by South Oxfordshire District Council.
- 2.70 National Power are proposing to construct a new power station at Didcot. The scheme has been to public enquiry and the outcome is awaited.

MINERALS

Introduction

- 2.71 The relevant minerals and waste policies for the study area are contained in the Oxfordshire Minerals and Waste Local Plan, Deposit Draft 1993 prepared by Oxfordshire County Council. The policy context for this plan is provided by the Oxfordshire Structure Plan.
- 2.72 There are 3 specific areas within the catchment where new sand and gravel workings have been accepted in principle:
- the Sutton Courtenay area;
 - the Sutton Wick area;
 - the Eynsham - Cassington - Yarnton area.

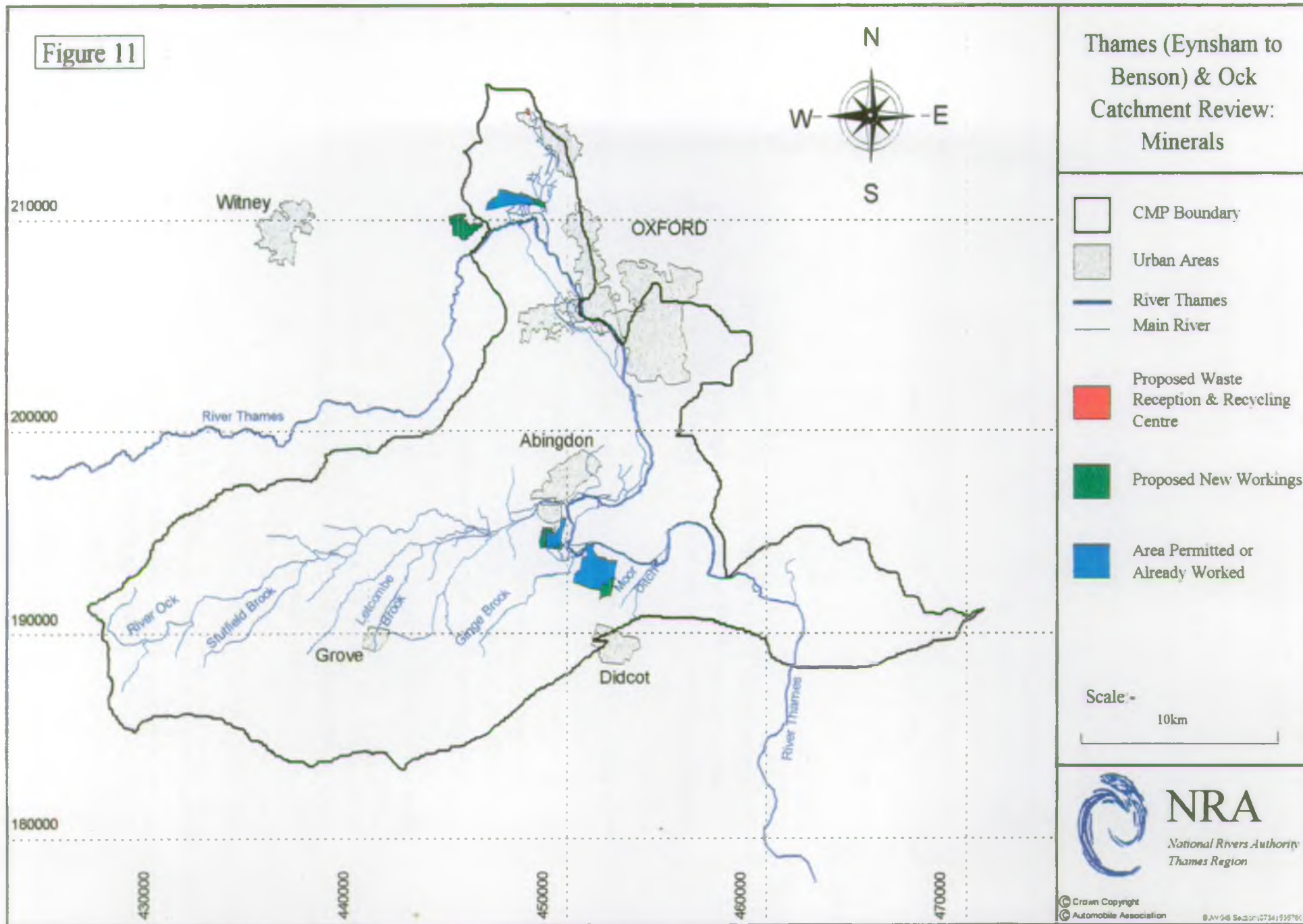
These are shown on Figure 11.

- 2.73 The exact working areas will be determined at the planning application stage and proposals will be subject to all development plan policies including the protection of SSSIs and other nature conservation sites.

The Sutton Courtenay Area

- 2.74 Extraction of sand and gravel has been taking place in this area for many years and much of the land has already been restored to agricultural use. There is now only one site remaining where the principle of working (sharp sand, gravel and clay extraction) is accepted but no planning permission has been granted.

Figure 11



The Sutton Wick Area

- 2.75 No land is currently being worked, but some land in this area adjoining the River Thames will be released for sharp sand and gravel extraction. The Local Plan states that the setting of the River Thames should be preserved and enhanced in accordance with the relevant Structure Plan policies.

The Eynsham - Cassington - Yarnton Area

- 2.76 The main area for future sharp sand and gravel working lies between Eynsham and Cassington, south of the A40. This area will not be released until 1999.

Proposed Waste Reception and Recycling Centre at Kidlington

- 2.77 Landfill is likely to remain the primary means of waste disposal in the region during the plan period. However, the County Council will encourage the future development of a waste reception and recycling centre at Langford Lane, Oxford.

3. CATCHMENT ISSUES

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

SOUTH WEST OXFORDSHIRE RESERVOIR PROPOSAL (SWORP)

- 3.2 The construction of a major new pumped storage reservoir in South West Oxfordshire has been proposed by Thames Water Utilities Ltd. The reservoir would provide an operational capacity of up to 150,000Ml. The land take involved would be large (approximately 14km²) with considerable potential impacts for water courses and the local environment. An Environmental Assessment of the scheme has been commissioned by TWUL to look at the impacts and benefits of the scheme.
- 3.3 Numerous studies have been carried out to determine the baseline environmental conditions of watercourses surrounding the proposed reservoir location. Many of these studies are ongoing. In November 1993, following a review of demand forecasts and success in leakage control, TWUL announced that further promotion of SWORP would be delayed for at least five years.
- 3.4 Principal issues of concern related to the reservoir proposal are:
- **Land Drainage:** The existing land drainage system within the proposed reservoir "footprint" is sensitive to changes in flow and any alteration of alignment of water courses may result in the exacerbation of potential flood risks;
 - **Conservation:** Any alterations of alignment of watercourses could result in habitat loss. Should the reservoir proposal go ahead, it would present opportunities for habitat creation both on and around the reservoir.
 - **Algae:** The habitats of rivers and reservoirs give rise to very different algal populations. The discharge of reservoir water may result in an increase in algal blooms. Studies of the dynamics of algae in rivers and reservoirs are being undertaken to determine whether constraints on operation will be necessary to protect the River Thames.
 - **Ground water Quality:** Ground water within the confined Corallian aquifer beneath the proposed reservoir site is known to contain variable quantities of mineral salts. Leakage of stored water from the reservoir could displace this ground water with implications for surface water quality.

- **Abstraction and Discharges from and to the River Thames:** The rate, volume and timing of any discharges and abstractions to and from the River Thames will need to be carefully controlled and monitored. An Environmentally Acceptable Flow Regime will be established to maintain an acceptable quantity of water in the river and to protect and improve the in-stream habitat and thus the ecological and fishery status of the Thames.
- 3.5 The NRA's Regional Water Resources Strategy ('Future Water Resources in the Thames Region - A strategy for sustainable management'), launched in June 1994, emphasises the importance of pursuing demand management measures within the region, but also recognises a number of options for developing new resources including the reservoir proposal and a possible Severn-Thames transfer. Each option has potential environmental impacts and benefits which require further work by the NRA and others to establish a firm position.

GROUND WATER POLLUTION

- 3.6 Pollution of a large area of ground water, down gradient of Harwell has occurred. This has potential implications for Public Water Supply at Blewbury Pumping Station.
- 3.7 There are several large landfill sites in the Ewelme area, both old, active and proposed. The historical landfill sites are not thought to be lined, although no leachates have been encountered to date. However the presence of chlorinated solvents has been identified.

RIVER LEVELS AND FLOWS

- 3.8 Following a national initiative, the Letcombe Brook was one of five rivers within Thames Region identified as suffering from "low flows". The Letcombe Brook has two branches, both spring fed via lakes along its uppermost reaches. Low ground water levels due to abstraction from a local pumping station have resulted in both arms experiencing low or no flow during summer months. The West Berkshire Ground water Scheme, which was constructed in the mid 1920s as a means of abstracting water from the surrounding aquifers and transporting it via the river system to London, includes discharge points at the head of the Brook. The system has been modified to improve control of pumping to the two lakes, and to provide monitoring of flows and water levels in the brook. Thus when lake levels fall below a certain value, pumping commences and water levels and flows within the Letcombe Brook are maintained. The scheme has been used successfully for the past two years.

HABITAT DEGRADATION

- 3.9 In the early 1980s land drainage improvement works carried out on the River Ock resulted in the considerable loss of in-stream habitat. The Ock runs over a largely clay catchment

and consequently any natural recovery is likely to be slow. An enhancement project was carried out downstream of Ock Bridge prior to 1989 and has proven to be very successful. The 1991 NRA River Ock fish survey revealed much higher fish biomasses in improved sections of the river. There remains however massive potential for habitat enhancement along much of the River Ock.

- 3.10 Gravel spawning areas on the River Thames, its side streams and its tributaries could benefit from enhancement works, as gravels on watercourses such as the Seacourt Stream, Potts Stream and Hinksey Stream have become silted.

WOLVERCOTE PIT

- 3.11 This site was bought by the NRA for the disposal of dredgings from the River Thames. It is of considerable nature conservation interest, with the open water attracting wildfowl, and the herb-rich wetland and scrub communities providing attractive habitat for breeding summer migrants. The site is also thought to be of value for invertebrate communities and is of archaeological interest. The NRA have prepared a Management Plan for the site which allows for the existing use and refers to future potential recreational uses. This may result in conflicts between recreational and conservation uses, depending on the type of recreation promoted.
- 3.12 The NRA wishes to improve access to the site through the construction of a road to the site from the A40, however the Department of Transport refuses to grant permission for this additional road. The situation was to be reviewed following the construction of the new A40 bypass, but this scheme has now been withdrawn from the roads programme. Therefore, no opportunities for improved access exist.

EUTROPHICATION OF THE THAMES

- 3.13 It is possible that when UK legislation is issued to enact the EC Urban Waste Water Treatment Directive (91/271/EEC), the Thames from Days Lock to Teddington could be classed as eutrophic, due largely to nutrient rich discharges from sewage treatment works in the area. NRA biologists are currently undertaking work to assess trophic levels (ie food chain and energy relationships) in the River Thames.

RIVER THAMES : SEACOURT STREAM RELATIONSHIP

- 3.14 The Seacourt Stream (a distributary of the Thames) periodically suffers from fluctuations in flow. This has resulted in complaints from the general public and has implications for in-stream habitat.

3.15 Several factors have been identified as contributing to the problem including:

- a) the operation of Kings Weir : there is a need to maintain water within the main channel for navigation purposes; in addition the weir gates are not particularly sensitive and cannot be opened by degrees, resulting in large variations in flow;
- b) the abstraction regime at Farmoor whereby it was suspected that TWUL were abstracting their 24 hour abstraction entitlement overnight. This 'over-abstraction' has since ceased.

THE RIVER THAMES THROUGH OXFORD

3.16 The River Thames as it flows through Oxford splits into many distributaries all controlled by sluice gates. The operation of these gates is largely driven by flood defence and navigational requirements and may threaten valuable spawning habitat in some of the side streams. There has been a perceived deterioration, by the general public, in both the quality and quantity of water in some of these distributaries. This has implications for the ecological, fishery and amenity value of the River Thames. There seems to be some confusion as to whether some or all of the distributaries through Oxford are classified as Main River and whether the River Quality Objectives and EC Fisheries Designations for the reaches of the River Thames flowing through Oxford apply to the distributaries.

3.17 A second issue is the block release of water held back behind structures for navigational purposes, which results in increased velocities in the river and causes fry washout.

OXFORD STRUCTURES STUDY

3.18 A study has been carried out to assess the management of structures on the River Thames from Eynsham to Sandford, with the aim of minimising flooding. Improvements in the operation mechanism of some structures may also result in an improvement in water quality in some reaches. The final report, due in October 1994, will identify a strategy for the efficient management of the structures and detail any capital works required to allow improved control. The study did not address any of the flow problems on the River Thames side streams, although, in theory, the model developed for the study could be applied to this problem.

OXFORD SEWAGE TREATMENT WORKS

3.19 The water quality in the Northfield Brook is intermittently affected by discharges from Oxford Sewage Treatment Works. The treatment works' process tanks, especially, are poorly designed and the periodic pollution events often result in fish kills. The discharge consent standards for the works are relatively low and consequently samples taken at pollution incidents comply with consent conditions, despite the fact that the river is

obviously in a poor condition. The watercourse runs through a Country Park and public awareness of the problem is very high.

KIDLINGTON SEWAGE TREATMENT WORKS

- 3.20 Discharges from the works were found to be affecting the water quality of the Oxford Canal, particularly during the summer months when water levels and the dilution of the effluent were low. Following negotiations with TWUL the location of the discharge point was made optional. Thus during summer months the sewage treatment works discharges to the Kingsbridge Brook (a tributary of the Wolvercote Stream). The sewage treatment works then meets its consent conditions and water quality in the canal does not suffer.

OXFORD SEWERS

- 3.21 The sewers in the City of Oxford are very old and in poor structural condition, giving rise to problems following heavy rain. When the water table around Oxford rises the sewers become infiltrated by ground water, resulting in a back up of the sewers. In order to tackle this situation Oxford City Council have to pump water from the sewers to the river. This problem has been suggested as an issue to be included within TWUL's Asset Management Planning.

DEVELOPMENT PRESSURE

- 3.22 The study area is generally highly constrained by policies to protect areas of landscape value. Large areas to the south and west of Oxford and to the north and east of Abingdon are protected by green belt. The structure plan seeks to restrain the overall level of development although Didcot is one of the preferred locations for new development, including a housing development to the north of the town. Development pressure is likely to be concentrated in this area.
- 3.23 A number of development schemes are under way in Oxford including the redevelopment of the Rover site. Projects such as this have implications for the water environment and NRA TR has a representative on the Oxford Business Environmental Group (OBEG) to allow the NRA to have an early involvement in such schemes and to ensure pollution prevention measures are taken on board.
- 3.24 There is a large area to the north of Wantage which is relatively unconstrained from the planning policy point of view. This is, however, unlikely to come under serious pressure since much of it is high quality agricultural land. In addition the Vale of the White Horse District Council do not envisage any major development within the District up to 2001.
- 3.25 There are a number of gravel pits in the Abingdon and Dorchester area which are of nature conservation value for wildfowl. These are under pressure from development proposals for water based recreation activities.

- 3.26 In September 1993, the Secretary of State for Trade and Industry granted approval for a 1360 megawatt combined cycle gas turbine power station on land immediately to the west of the existing power station at Didcot. This has direct implications in itself for NRA but in addition land on the existing power station site may become surplus to requirements and thus available for other forms of development after 1996.

NAVIGATION ISSUES

- 3.27 The need for more off-river moorings and additional public slipways are the principal navigation issues within the catchment. There is a possible conflict between fisheries interests and the development of additional off-river moorings. The NRA are currently investigating the possibility of providing a new public slipway and associated recreational facilities near Sandford Lock. More public information is required about existing launching sites within the catchment. Safety is also a problem, particularly within the Oxford area, where activity is heavily concentrated. There are conflicts between boats, swimmers and other craft, such as canoeists. Recently, bridge jumping has been observed at Godstow Bridge, Donnington Bridge, Kennington Rail Bridge and Wallingford Bridge. There have been a few recorded accidents but no fatalities due to this and the activity is a major concern to the NRA.

LANDSCAPE ISSUES

- 3.28 One of the main issues in relation to the landscape of the catchment, is the cumulative impact of piecemeal development and other uses and activities on the overall quality of the landscape. A visual appraisal of the River Thames revealed that the inherent character of some sites along the River had been eroded due to unsympathetic infrastructure works, such as flood defence works, or measures to cope with recreational pressures and the need to increase the River's navigation capacity. Elsewhere, agricultural practices and recreational pressures have led to the loss of bank side vegetation. A second issue, is the lack of adequate baseline information on landscape quality, which is required in order to guide decision making and help identify appropriate environmental enhancement work, and hence fulfil the NRA's statutory obligations. In an attempt to ensure that the repair or replacement of river structures was undertaken in a manner sensitive to the existing landscape value, the NRA produced a 'Thames Environment Design Handbook' (1992).

RECREATION ISSUES

- 3.29 Intense recreational pressure on the Thames at Oxford and Abingdon has led to conflicts of interest between different recreational activities, and between recreation and conservation interests. In terms of water based activities, there is a conflict between rowing and sailing, punting and canoeing. Although measures have been taken to minimise conflicts, including the establishment of a River Users Group to co-ordinate events on the river, and the introduction by Oxford University of a cox training programme, the large number of craft on the water make conflict inevitable. There are

also conflicts between water based activities such as rowing and bankside recreational pursuits such as angling, as well as between different land based activities such as walking and cycling on tow paths. Both water and land based activities have led to a loss of bankside vegetation through trampling. This is of particular concern in ecologically sensitive areas such as Iffley Meadows, which is a Site of Special Scientific Interest, and is heavily used for recreational purposes.

- 3.30 Lockside and riverside facilities for visitors are also inadequate. There are insufficient toilet and refreshment facilities, and existing sites tend to be poorly maintained. Given the current level of use, and the proposed opening of the Thames Path in 1996, there is a need to upgrade and provide a wider range of facilities.

WILTSHIRE - BERKSHIRE CANAL

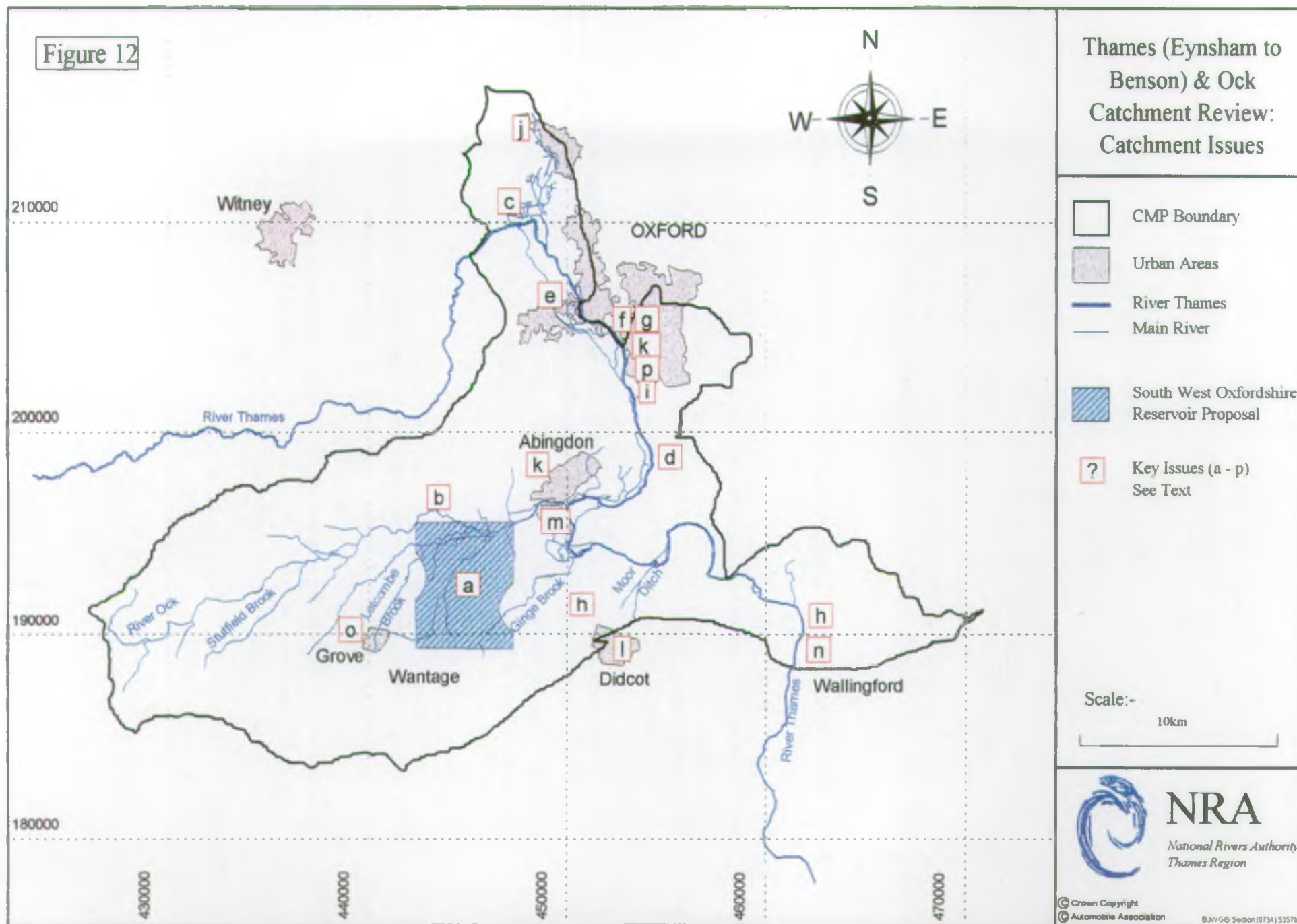
- 3.31 The derelict Wiltshire - Berkshire canal lies to the south west of Abingdon and has been identified as an important amenity area by the Wiltshire Berkshire Canal Group. Parts of the canal still hold water although its conservation value is unknown. However even in its derelict state it provides a valuable wildlife corridor. The group wish to restore the canal. One proposal put forward involves using the lower reaches of the Ock to link the canal with the River Thames. This would however be to the detriment of the existing habitat and is therefore unacceptable from a conservation point of view. In addition the canal would need to be fed with water. This demand could not be met at the expense of adjacent rivers or ground water supplies.

SUMMARY OF KEY ISSUES

- 3.32 The key issues are shown on Figure 12. These are as follows:
- a) SWORP: possible impacts and benefits due to construction and operation of a reservoir scheme at this scale and location.
 - b) Habitat degradation. The main problems arise as a result of land drainage improvement works on the River Ock. There is also however considerable potential for habitat enhancement on the Ock.
 - c) The future management of and access to Wolvercote Pit.
 - d) Eutrophication of the River Thames.
 - e) River Thames: Seacourt Stream relationship. The issue relates to fluctuations in flow and the impact on amenity and ecology.

- f) The River Thames through Oxford. The issue relates to the operation of sluice gates and the impact on habitat in some of the side streams, particularly the implications for amenity and fisheries.
- g) Oxford sewers. These are in poor condition and subject to inundation by ground water. TWUL would need to take lead in this issue.
- h) Ground water pollution. This has occurred down gradient of Harwell and has implications for public water supply. There is also concern relating to landfill sites in the Ewelme area.
- i) Oxford Sewage Treatment Works. The problem relates to water quality in the Northfield Brook as affected by discharges from the Oxford Sewage Treatment works.
- j) Kidlington Sewage Treatment Works. The issue concerns the effect of discharges on the water quality of the Oxford canal.
- k) The condition and functioning of Oxford sewers.
- l) Development Pressure. This is likely to be concentrated in the Didcot area. Concerns include the proposed new power station.
- m) Development Pressure. The gravel pits in the Abingdon and Dorchester area are under pressure for water based recreation development.
- n) Navigation. The need for more off-river moorings and additional public slipways.
- o) Established low flow alleviation scheme on the Letcombe Brook.
- p) Landscape. The cumulative impact of piecemeal development is in places adversely affecting the landscape and amenity value of the river environment.
- q) Recreation. Recreation pressures on the Thames at Oxford and Abingdon are intensive and in places conflict with conservation interests. Lockside and riverside facilities for visitors are also inadequate.

Figure 12



4. CATCHMENT ACTIONS

- 4.1 This section sets out in table form a summary of recent NRA activity (post 1989), a summary of current NRA activity (1993/94) and a summary of planned NRA activity (1994/95 and beyond).
- 4.2 Many of these actions have been initiated in response to the issues outlined in the previous sections. However to address fully all the issues identified some further action will be required. Suggested recommended actions are put forward in Section 5 of this report.

Table 4.1 - Summary of Recent NRA Activity (Post September 1989)

Project	Date Completed	Comments
Water Quality		
Macroinvertebrate survey of the distributaries of the River Thames through Oxford		Work associated with Oxford Structures Study
Algal Studies on the River Thames	1992-date	Ongoing
Macroinvertebrate Survey of the River Thames, River Ock and Ginge Brook		
River Ock Crayfish Survey	Autumn 1993	
Water Resources		
Established low flow alleviation scheme on the Letcombe Brook	1991/1992	Monitoring of both river and ground water levels is ongoing
Fisheries		
Fisheries Survey of the Ock Catchment	October 1992	
Fish Stock Assessment : Fry Survey on the River Thames from Bablock Hythe to Days Weir	June-September 1991	Commissioned by the NRA
Sutton Pools Fisheries Survey	1992	
River Thames (Oxford to Days Weir) Juvenile Fish Survey	1992	
Fisheries Survey of the Cow Common Brook	March 1993	
Conservation		
River Corridor Survey of the River Ock, River Thames (Abingdon to Benson) and the Ginge Brook	1992	
Phase 1 and Phase 2 Surveys of the River Thames Floodplain (Abingdon to Benson)	1992	
Survey of the Loddon Lily along the River Thames and its floodplain	April 1993	
Management Plan for Wolvercote Pit		Potential for conflict between recreation and conservation interests
Habitat Enhancement on Childrey and Letcombe Brook and River Ock	1992	

Table 4.1 (Continued) - Summary of Recent NRA Activity (Post September 1989)

Project	Date Completed	Comments
Geomorphology		
Bank Erosion Survey of the River Thames	1993	Data is contained in a map atlas and on a database, providing information on length, type and condition of bank protection.
Landscape		
Thames Environment Design Handbook	June 1992	A Reference manual for all concerned with the design and management of the River Thames infrastructure and heritage.
River Ock Meander Planting Project	1991	Localised environmental enhancement to restore vegetation to an area which was subjected to extensive land drainage works in the past.
Kings Lock Bank Protection Works		
Landscape Assessment of the River Thames		
Landscape Assessment of the Thames in Oxford	July 1992	Undertaken as part of review of Oxford Defence Structures
Recreation		
Promotional material for walking by the River Thames	1992	Joint NRA/Vale of White Horse District Council initiative
Navigation		
Refurbishment and repair rolling programme of all the locks in the catchment including Clifton Lock.		
Provision of electric boat charging facilities at Benson		

Table 4.2 - Summary of NRA Activity (1993/94)

Project	Action/Timescale	Comments
Water Quality		
Oxford STW	Oxford STWs' consent has been reviewed and tightened to meet EC Fish Directive obligations in the Thames. Storm tanks are to be installed to meet the UWWTD ¹	These changes have been put forward to TWUL in AMP2 ² negotiations which are still in progress.
Consent Reviews	A number of other STWs have had their consents reviewed. These include: Kidlington, Abingdon Lagoon, Abingdon Microstrainer, Didcot, Culham, Faringdon, Grayton and Benson.	These changes have been made to protect the quality of adjacent watercourses and were put forward in the AMP2 negotiations.
Kidlington STW	The NRA is monitoring the use of the two discharge points	The scheme is still in an experimental stage
Ground water Pollution	Harwell: although responsibility for the pollution which largely consists of chlorinated solvents has not been proven, Harwell are currently undertaking remedial measures; the NRA is monitoring progress. Ewelme: ground water and rivers in the area are being monitored for evidence of leachates. Studies are being carried out to identify the sources and distribution of pollution in the area.	
Identification of Ground water Protection Zones	Work is ongoing	
River Thames Algal Baseline Monitoring and study	Work is continuing	
Water Resources		
SWORP	Some baseline surveys are ongoing	Further promotion of SWORP by TWUL has been delayed for a least five years.
Low Flow alleviation scheme on the Letcombe Brook	Augmentation is carried out as required	Habitat improvements are also planned.
Fish Parasite Study	On-going intensive survey of the Letcombe Brook relating fish parasite levels to water quality	

¹UWWTD: Urban Waste Water Treatment Directive

²AMP2: Asset Management Plan 2

Table 4.2 (Continued) - Summary of NRA Activity (1993/94)

Project	Action/Timescale	Comments
Water Resources (Continued)		
Water Resources Strategy	'Future water resources in the Thames Region - A strategy for sustainable management' was published in June 1994	This acknowledges the importance of demand management and leakage control, but also addresses the development of SWORP and catchment transfers
Flood Defence		
Oxford Structures/Floodplain Study	Draft Final Report completed August 1994	It is possible that the model developed for the study could be used to address low flows on the Thames side streams through Oxford.
Recreation		
Thames Region Recreation Strategy and Recreation Data Base	NRA/Sports Council Joint Initiative High Priority	Draft to be published October 1994. Will provide supplementary planning guidance and an input to the CMP
Liaison with Thames River Users' Groups	NRA	Forum to co-ordinate use of the River
Thames Path	NRA/Countryside Commission	Joint initiative establishing the first national trail to follow a river from source to mouth. Opens 1996
Pedestrian Counts	On going	Counters currently sited at Kennington, Oxford
Navigation		
Lock refurbishment and repair	NRA	Programme of on-going maintenance and repair
Development Control		
Continued NRA involvement with OBEG.	On going.	Ensures NRA has early involvement with development schemes within the Oxford area.

Table 4.3 - Summary of Planned NRA Activity (1994/95 and Beyond)

Project	Action/Timescale	Comments
Water Quality		
Litter Picks	The Cowley Marsh Stream, Oxford has been identified in a national initiative as a priority site for litter clearance. The Wantage area also suffers from litter problems.	The NRA has no legal responsibility to remove litter unless it is causing a blockage to flow. Similarly the Local Authority has no statutory responsibility for litter collection.
Oxford Sewers	The Oxford Sewers problem has been identified as an issue in the TWUL Asset Management Plan	
Pollution Prevention	Campaigns at industrial sites in Abingdon and Didcot - continued involvement with OBEG. Farm visits in the Ock catchment.	Part of the NRA aim to develop closer links with local industry and HMIP. Aim to provide effective input into the OBEG waste minimisation initiative to safeguard the water environment.
Ground water Quality Investigation	Past and present land use over the lower Chalk and upper Greensand in Oxford, Ewelme, Oakley wood, Harwell, Benson and other sites) to evaluate its effects on ground water quality	In order to formulate policy regarding remedial actions, future land use and the protection and development of drinking water sources.
Eutrophication of the River Thames	A monitoring programme has been established to provide more data by 1997. A study will also be carried out over the next 3 years to determine whether phosphate removal at STWs will affect levels of eutrophication	
Oxford Distributaries	1994/95 May be extended	Investigation into Water Quality following public concern.
Water Resources		
Abstraction licence enforcement policy	ongoing	
Water Resources Strategy	Developing a strategy for the SWORP project and considering establishing a working party on the Severn-Thames transfer	
Fisheries		
Fisheries Survey of the River Ock	1997/98	
Fisheries Survey of the River Thames	Summer 1994	The survey will be carried out along selected reaches of the River Thames

Table 4.3 (Continued) - Summary of Planned NRA Activity (1994/95 and Beyond)

Project	Action/Timescale	Comments
Conservation		
Habitat improvement works and management input to Upper Thames ESA	Three sites highlighted; one near Eynsham and two in Oxford	
Wolvercote Pit	Access is a constraining factor in optimising the use of the site. Now that plans to develop the A40 have been refused by DTp, no improved access opportunities exist.	Potential conflicts between Recreation and Conservation interests may need to be addressed if the site is to be used by the public.
River Thames: tree and shrub planting at Little Wittenham	Winter 1994/95	
Land Drainage/Flood Defence		
Watercourse maintenance	Implementation of programme to standards commensurate with adjacent land use	
Refurbishment of all buck weirs	5 year programme	
Seacourt Stream	Further studies are being undertaken to assess the degree of flow variation in the watercourse and to identify and investigate contributing factors and possible solutions	The NRA intends to produce a Water Management Plan to optimise the distribution of water during varying flow conditions.
Flood Defence		
CASCADE Flood Warning System	Additional telemetry stations are to be installed on the River Ock	

Table 4.3 (Continued) - Summary of Planned NRA Activity (1994/95 and Beyond)

Project	Action/Timescale	Comments
Landscape		
Update and review Thames Landscape Assessment, to include River Ock	High Priority	Work likely to be commissioned to consultants
Recreation		
Replace tow path bridges 54 and 57 (Kennington Railway Bridge and Sandford Bridge)	Medium Term	
Improve public access at Sandford	Medium Term	Opportunities to involve Countryside Commission
Promote lock and weir fishing	Medium Term	Key sites at Eynsham, Sandford, Clifton and Benson
Investigate suitability of Thames Weirs for canoeing	Long term	Possibly in conjunction with capital works at weirs or installation of salmon runs
Swifts Ditch, Abingdon, lock restoration project	Long term	Restoration of first power lock and provision of interpretation facilities
Navigation		
Implementing and enforcing new navigation byelaws	Long Term	
Launch safety inspections and spot checks	Long Term	To reduce the number of serious navigation incidents such as boat fires
Provision of electric boat charging facilities at Sandford	Medium Term	Aim to provide electric charging facilities along the whole length of the Thames
Provision of new slipway at Sandford Lock	Long term	Joint recreation project to enhance Sandford Lock, including provision of picnic facilities
Planning		
Update Areas Liable to Flood Information	Medium Term	
Improve agricultural drainage at Oday Hill	Long Term	

5. CONCLUSIONS AND RECOMMENDATIONS

- 5.1 There are clearly a range of problems and issues within the study area including current and future development proposals, the potential for habitat and landscape enhancement, ground water pollution, the effect of sewage treatment works on water quality and heavy recreation pressure in the Oxford area.
- 5.2 This section summarises in Table form the Consultants' recommendations for further actions to be taken to address fully the issues identified in Section 3. These are recommended in addition to those identified in Section 4 which are either current or planned actions.

Table 5.1 - Summary of Recommendations

Project	Action	Priority
Water Quality		
Redevelopment of Industrial Sites	Monitoring and advising on potential of impacts on water quality and flows. Continue existing involvement with OBEG (Oxford Businesses Environmental Group)	-
Water Resources	There is a need for additional daily rain gauges in the Ock catchment particularly in the Vale of the White Horse.	
Conservation		
Habitat Enhancement	There is great scope for habitat enhancement along the majority of the River Ock. Suggested work includes the installation of groynes, creation of a more diverse bed morphology (pools and riffles), the reinstatement of gravels, wet land and pond creation and tree planting.	-
Geomorphology		
Geomorphology survey of the River Ock	To devise an effective habitat enhancement programme for the river through baseline data collection	Medium Priority
Land Drainage		
River Thames Through Oxford	Investigations into the distribution and quality of water through Oxford. Existing liaison between NRA and OCC should be continued. It may be possible to alter the model developed for the Oxford Structures Study to address low flows.	-
Landscape		
Promote bankside planting	Promote initiatives with local land owners. Possible use of "set-aside" farmland for woodland planting or through Countryside Stewardship Scheme grant aid for landscape enhancement of riverside	High priority

Table 5.1 (Continued) - Summary of Recommendations

Project	Action	Priority
Landscape (Continued)		
Promote diversification of tree, shrub and flora content where species have been discouraged by agricultural practices	In association with landowners as above	High priority
Restore river infrastructure using traditional materials, including Iffley Lock and Folly Bridge	In conjunction with other capital works	Long term
Recreation		
Enhance opportunities for canoeing at weir sites	NRA	In conjunction with capital works or fisheries projects
Upgrade existing visitor facilities/promote new facilities including information points and picnic sites	NRA in conjunction with other organisations, including; local authorities, Sports Council and Countryside Commission	Medium term
Investigate need for management plan for Thames in Oxford area	NRA in association with Sports Council, River Users' Groups and local clubs	Long term
To study recreational activities along the River Ock and establish a data base	NRA	Long term. To assist in the identification of problems and opportunities, and enhancement projects.
Navigation		
Investigate opportunities for additional public slipways, mooring and electric boat charging facilities	NRA	Medium term
Promotion of existing boat launch sites	NRA/relevant owner	Promote voluntary agreements with owners of slipways to allow public use

NOTES