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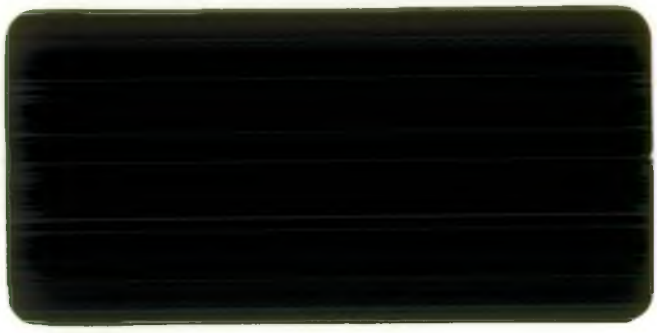
Land Use Consultants



LOWER COLNE
CATCHMENT MANAGEMENT PLAN
FOR
FLOOD DEFENCE AND THE ENVIRONMENT

THIRD DRAFT

Prepared by

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Thames Region

with the assistance of

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LOWER COLNE CATCHMENT MANAGEMENT PLAN
EXECUTIVE SUMMARY

Aim of the Catchment Management Plan

Under the 1989 Water Act the NRA is required to conserve and enhance the water environment. Such an important role requires a multi-disciplinary approach; catchment management planning seeks to provide a multi-disciplinary strategy for each catchment. The Catchment Management Plan is based on a thorough review of current activities and future trends and is drawn up within the framework of overall NRA and NRA TR policies.

Catchment Characteristics

The Lower Colne Catchment defines the north-western edge of Greater London. It covers 430km^2, with 203km of main river. It passes from the suburban edge of London to the heart of the Chilterns Area of Outstanding Natural Beauty and has an estimated population of 600,000.

This is a catchment of contrasts. The main north-south, largely gravel-based Colne Valley has been greatly altered by gravel extraction and has a legacy of mature wet gravel pits and poorly restored landfill sites. It is characterised by pre and inter-war ribbon development, downgraded agriculture, typical urban fringe pressures and the intrusion of the M25, M4 and M40 motorways and Heathrow which lies immediately to the east. In turn, these excellent communication links and proximity to London encourage land speculation for major commercial developments, despite the catchment's Green Belt status and designation of the Colne Valley as a Regional Park. By comparison, the chalk tributaries of the Chilterns retain their agricultural base and have an air of rural tranquillity.

Key Catchment Issues

Over the last few years the catchment has been subject to many studies, including the major Lower Colne Flood Alleviation Study now in the process of implementation. The key issues, therefore, are primarily concerned with the refinement of existing controls rather than the introduction of entirely new arrangements. The most important key issues are:

<u>Flood Defence</u>

- the continuing need to refine and improve the Lower Colne Flood Alleviation Scheme;
- loss of flood attenuation with continuing erosion of the Colne floodplain through land doming and new infrastructure and commercial developments;
- uncontrolled river flooding from the Pinn;
- localised flooding relating to the inadequate operation of the low level drainage system and groundwater characteristics of the Colne;
- lack of a definitive post-scheme floodplain map which can be used by local authorities in framing floodplain protection policies.

<u>The Environment</u>

- the need to conserve the many remaining important riverine habitats and landscapes which provide continuity in an area increasingly subject to change;
- the need to enhance downgraded areas of river corridor;
- the threats and opportunities posed by major new developments which could further undermine the environmental quality of the river corridors but equally provide the opportunity to take forward major environmental enhancements.

Other

- loss of wildlife value, fisheries and amenity on the Misbourne with low flows resulting from over abstraction of the chalk aquifer.

Strategy for the Catchment

The strategy for the catchment combines resolution of outstanding flooding problems with the retention and enhancement of river quality as a whole. A central part of this strategy is to ensure that the river corridors of this catchment are identified in statutory development plans as special areas to which specific policies apply.

Implementation of this strategy cannot rest entirely with the NRA. Whilst resolution of outstanding river flooding problems is the direct responsibility of NRA, conservation and enhancement of the river corridors as a whole requires a partnership with the constituent local authorities and conservation interests of the catchment. Within this forum a preferred river corridors conservation and enhancement plan can then be identified.

In pursuance of this plan the NRA TR has a vital role to play:

- carrying out localised river-related enhancements;

- providing advice on the acceptability or otherwise of landfill proposals;

- in concert with the local authorities, seeking the appropriate advancement of identified major river corridor improvements through a pro-active involvement in major development and infrastructure proposals.

The Action Needed

This Catchment Management Plan outlines how individual NRA functions can contribute to the overall catchment strategy. Key actions are:

- **Flood Defence:** resolution of outstanding problems on the Lower Colne Flood Alleviation Scheme combined with a feasibility study for the River Pinn; a review of the low level drainage system and groundwater characteristics; preparation of a definitive post-scheme floodplain map for the Colne; a co-ordinated review of landfill proposals; and setting up of experimental trials on river maintenance.

- **Fisheries:** a new fish survey programme; identification of a key fish migratory route; and identification of river maintenance requirements.

- **Recreation, Landscape and Conservation:** preparation of a conservation and enhancement plan for each of the river corridors of the catchment backed by outstanding baseline survey work and identification of recreation opportunities.

  Forward Planning: continuing close liaison with the constituent local authorities of the Catchment especially where new developments are concerned. This should be combined with preparation of model policies and recognition in statutory development plans of the river corridors as special areas to which specific policies apply.

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1.0 INTRODUCTION

1.0 INTRODUCTION

1.1 OVERVIEW

1.1.1 The National Rivers Authority (NRA) was established by the 1989 Water Act. The statutory responsibilities with which it was vested require it to assume inter alia the fundamental role of conserving and enhancing the water environment. The development of truly multidisciplinary catchment management planning is seen by the NRA as one of a number of important tools in fulfilling this obligation.

1.1.2 The NRA's responsibilities in England and Wales cover water resources, pollution control, flood defence, fisheries, recreation, conservation and navigation. Integration of all these interests is at the heart of effective catchment management plans (CMP). In the NRA Thames Region (NRA TR) flood defence and land drainage interests have become the driving force of the present round of catchment management planning. The Lower Colne Catchment Management Plan reflects this. Other interests, particularly those of water resources and water quality, are inevitably touched upon in the development of the plan as a fuller understanding of the catchment and its issues is pursued but the level of detail and extent of coverage is consequently less.

1.1.3 The NRA recognises that the relevance of its policies at the catchment level is assured only if it takes into account the wider constraints and opportunities of the catchment. The NRA TR recognises too that its role properly goes beyond the traditional provision and maintenance of works and infrastructure. It now actively seeks opportunities for environmental enhancement and has a statutory remit to have regard to conservation and amenity issues in all aspects of its day-to-day work. The geographical limits of the NRA's concerns have widened accordingly: it considers river corridors, not just watercourses; and it views water environment issues in a multi-disciplinary, catchment wide context.

1.1.4 A major impact on the Lower Colne system undoubtedly comes from the Upper Colne Catchment, and an important future requirement must be the assessment of the most significant areas involved e.g. the River Gade, the River Ver, the Radlett Brook and Mimshall Brook.

1.1.5 The successful implementation of the catchment management plan will depend on maintaining the interest not only of the different groups within NRA TR but also of the numerous external bodies concerned with the management of the catchment. A fully comprehensive and robust CMP is the key to this.

1.2 SUMMARY OF APPROACH

Methodology and Report Structure

1.2.1 The methodology and report structure for the CMP are based on NRA guidelines for catchment planning, issued in 1990 by its National Catchment Management Planning Group. These guidelines propose a framework encompassing the sequential phases of:

- evaluation;
- forward planning;
- implementation; and
- monitoring.

1.2.2 The approach outlined for the Lower Colne CMP adopts this same sequence. It comprises the five stages of:

- assessment of the natural resource base of the catchment (Section 2.0);
- identification of the current and future uses of land and water (Section 3.0);
- review of the NRA policy context: setting out NRA and NRA TR objectives, targets and policies relating these to the catchment (Section 4.0);
- definition and analysis of the key catchment issues (Section 5.0);
- presentation of an integrated, overall catchment strategy including both policy objectives and associated actions (Section 5.0).

The Foundation of the CMP

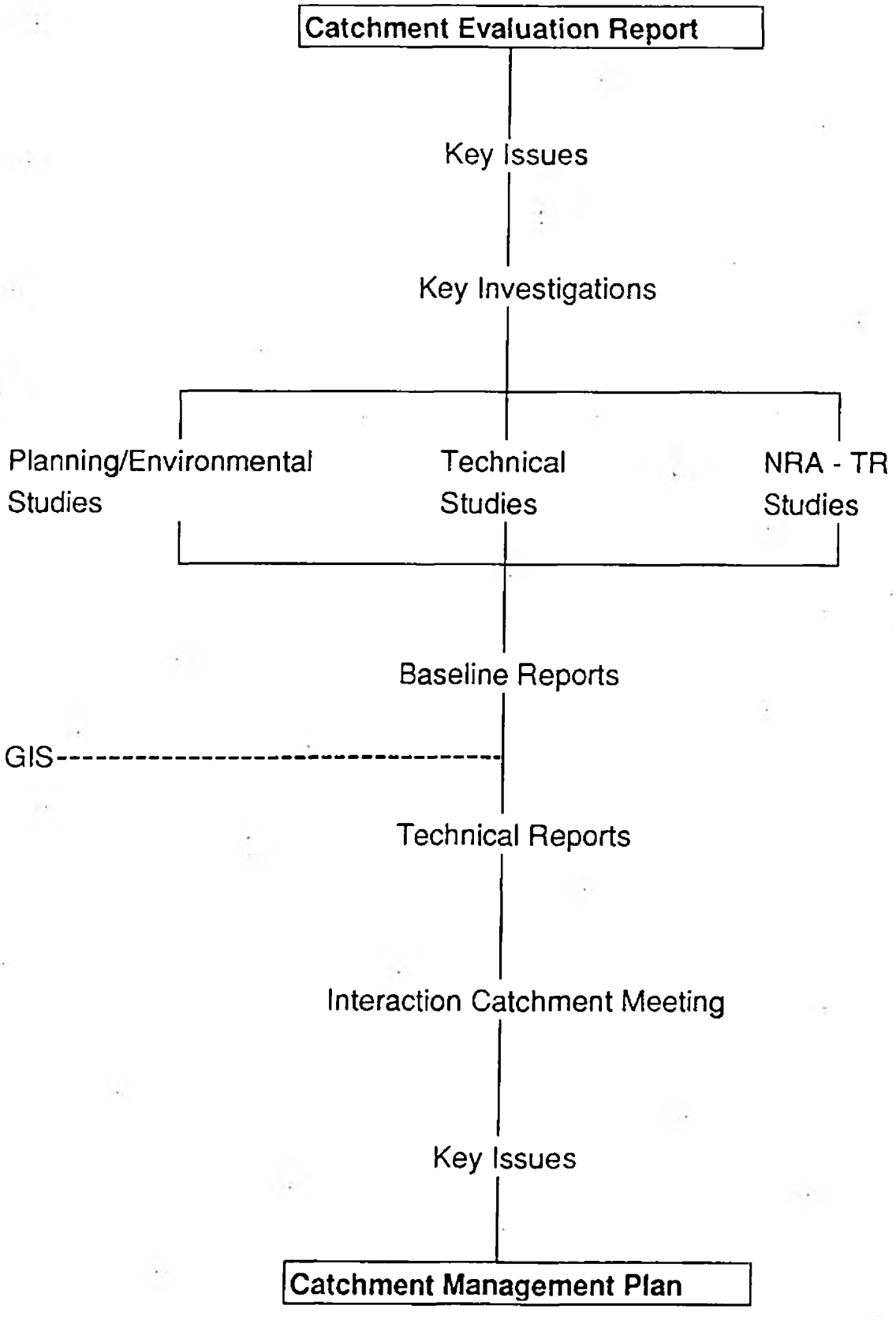
1.2.3 There were two preparatory levels of study underlying the CMP: Baseline Surveys and Technical Reports. The Baseline Surveys were carried out to provide a comprehensive database covering both engineering and planning/environmental aspects. The brief for these was structured to reflect the interests and needs not only of NRA, but also to some extent of the local authorities and other bodies recognised as having a managing role or interest in the catchment. The comprehensive database created is carried on the NRA's own geographical information system (GIS).

1.2.4 A comprehensive identification and evaluation of issues was made in the subsequent Technical Reports. Catchment specific issues had first been identified in the Evaluation Report (NRA TR, 1989). These were verified and updated and the link between issues was fully explored. Further predictions were made of how the issues might change as the use of the resource base in the catchment changed. The interface between the resource base and NRA functions was assessed to identify constraints and opportunities.

1.2.5 The Lower Colne CMP now pulls all the strands together to provide a viable and practical strategy geared to the specific issues of the catchment. The format of the CMP is designed to afford a ready grasp of the key elements of the catchment and of NRA functions. It is a decision maker's document. Actions to implement the plan are linked to each of the NRA core functions, and opportunities for joint action with external bodies are highlighted.

Figure: 1.1

FOUNDATION OF THE CATCHMENT PLAN



1.3 INTRODUCTION TO THE LOWER COLNE CATCHMENT

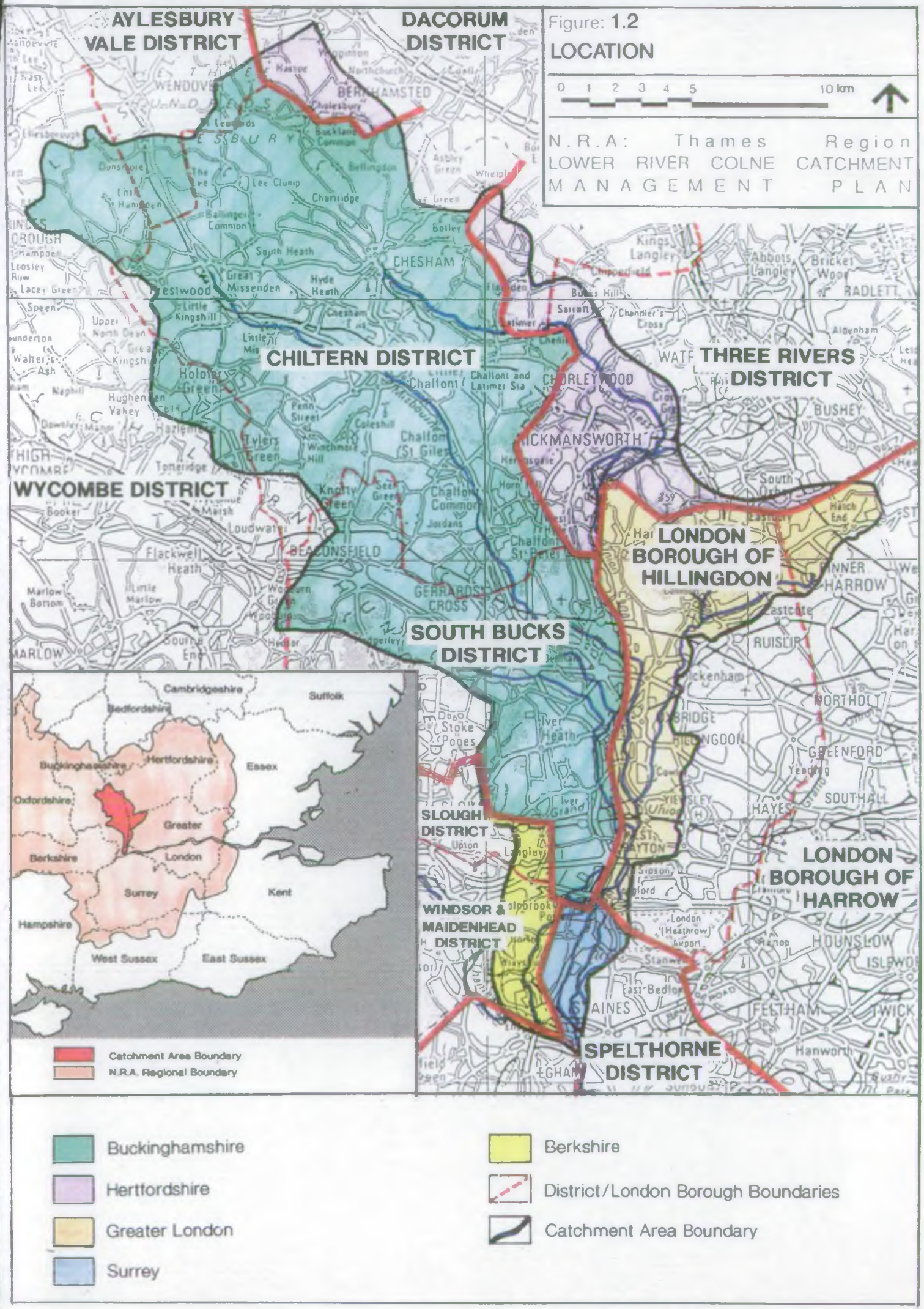
1.3.1 The Lower Colne Catchment defines the north-western edge of Greater London. It extends from the Thames at Staines in the south, to the Chiltern watershed near Wendover in the north. Thus it passes from the suburban edge of London to the heart of the Chilterns AONB. It includes (North to South) the London suburbs of Pinner, Ruislip, Uxbridge, West Drayton and Harmondsworth, and the separate towns of Northwood, Rickmansworth, Amesham and Chesham, as well as many historic villages along the valley floors, such as Iver, Denham, Colnbrook and the Chalfonts. In total, it has an estimated population of 600,000.

1.3.2 Around two-thirds of the catchment lies in Buckinghamshire, but with small areas within Hertfordshire, Berkshire and Surrey. The eastern edge of the catchment lies within the London Boroughs of Hillingdon and Harrow.

1.3.3 The catchment covers an area of some 430 km^2 with 203km of main river. Within the Colne Valley there is a complex series of broadly parallel and interconnecting southward flowing water-courses, including, the River Colne, the Frays and Grand Union Canal in the vicinity of Uxbridge and further south, the Wraysbury, Poyle Channel and Colne Brook. In the northern half of the catchment there are four main tributaries. Draining south-eastwards off the Chilterns into the Colne are the Rivers Chess, Misbourne and Alderbourne whilst draining south-westward into the Frays from Harrow and Hillingdon is the River Pim.

1.3.4 As will be seen in the following sections, this is a highly diverse and often attractive catchment suffering from a range of pressures of which gravel extraction, infrastructure and commercial development are the most acute. The challenge is to conserve those natural resources which remain and to maximise opportunities for revitalising and recreating those natural features which are threatened or have been lost.

Key Catchment Facts		
Total area of catchment	:	430 km^2
Total length of main river	:	203 km
Total population	:	600,000
Main Planning Designations	:	Green Belt, Colne Valley Park, Chilterns AONB
No. of SSSI's in the river valleys	:	7
No. of Conservation Areas in the river valleys	:	33
Average annual rainfall	:	675 mm


AYLESBURY VALE DISTRICT
DACORUM DISTRICT
CHILTERN DISTRICT
WYCOMBE DISTRICT
SOUTH BUCKS DISTRICT
THREE RIVERS DISTRICT
LONDON BOROUGH OF HILLINGDON
LONDON BOROUGH OF HARROW
SLOUGH DISTRICT
WINDSOR & MAIDENHEAD DISTRICT
SPELTHORNE DISTRICT
Figure: 1.2
LOCATION
0 1 2 3 4 5 10 km
N.R.A: Thames Region
LOWER RIVER COLNE CATCHMENT MANAGEMENT PLAN
Cambridgeshire
Suffolk
Bedfordshire
Buckinghamshire
Hertfordshire
Essex
Oxfordshire
Greater London
Berkshire
Surrey
Kent
Hampshire
West Sussex
East Sussex
Catchment Area Boundary
N.R.A. Regional Boundary
Buckinghamshire
Hertfordshire
Greater London
Surrey
Berkshire
District/London Borough Boundaries
Catchment Area Boundary

Principal Rivers of the Catchment

Watercourses of the Lower Colne Valley	Tributaries
River Colne	River Chess
Frays River	Misbourne
Grand Union Canal	Alderbourne
Poyle Channel	River Pinn
Wraysbury River	
Colne Brook	

Local Authority areas included within the Catchment

Buckingham County Council

- Chiltern District Council
- South Bucks District Council

Berkshire County Council

- Royal Borough of Windsor and Maidenhead
- Slough Borough Council

Hertfordshire County Council

- Three Rivers District Council
- Dacorum Borough Council

Surrey County Council

- Spelthorne Borough Council

London Boroughs

- London Borough of Harrow
- London Borough of Hillingdon

2.0 CATCHMENT DESCRIPTION

2.0 CATCHMENT DESCRIPTION

2.1 INTRODUCTION

2.1.1 This section seeks to describe the natural resources of the catchment and it covers the following topics:

- topography
- solid geology
- drift geology
- geomorphology
- climate
- surface water drainage
- ground water drainage
- water quality
- fisheries
- ecology
- landscape.

2.1.2 A clear understanding of these natural resources is the first step in explaining the current characterisitics of the water environment.

2.1.3 Within the Colne Catchment today, there is a distinct difference between the predominantly rural character of the chalk tributaries (Misbourne and Chess) and the urban-influenced Colne Valley which has been greatly altered over the last 50 years by extensive gravel extraction and subsequent landfilling.

2.2 TOPOGRAPHY

2.2.1 The topography of the catchment, which reflects the underlying geology, is fairly gentle as it largely constitutes the dip slope of the Chilterns falling to the confluence of the Thames and Colne floodplains. Contours increase from around 20m OAD, at the southern end of the Lower Colne floodplain, to around 200m in the north west at the crest of the Chiltern escarpment. Cut into this relatively gentle slope are the distinctive valleys of the Colne tributaries and the valley of the Colne itself which becomes evident upstream of Uxbridge.

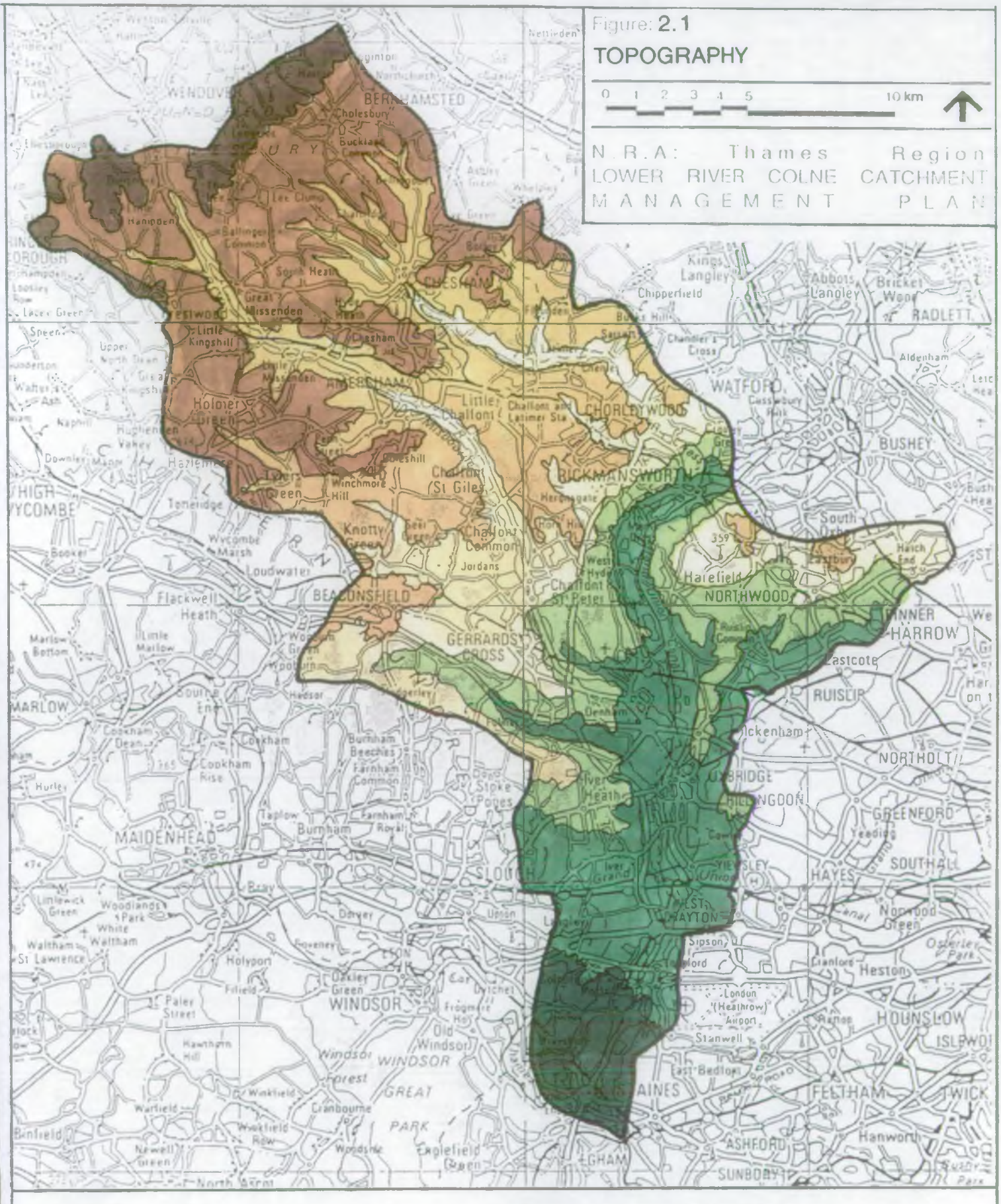


Figure: 2.1
TOPOGRAPHY
0 1 2 3 4 5 10 km
N.R.A: Thames Region
LOWER RIVER COLNE CATCHMENT
MANAGEMENT PLAN
0 – 20m
20 – 50m
50 – 70m
70 – 100m
100 – 150m
150 – 200m
200 – 250m

2.3 SOLID GEOLOGY

2.3.1 Geologically, the catchment divides into two main zones: the older cretaceous chalks of the Chilterns which dip gently south-east, and the younger Eocene solid formations of London Clay and the Reading Beds which overlie the chalk in the southern and eastern half of the catchment.

The Chalk — Cretaceous

2.3.2 The chalk is subdivided in order of increasing age, into the Upper, Middle and Lower Chalk. The Upper Chalk occurs at the surface in the northern part of the catchment while the Middle Chalk only occurs in the upper reaches of the Chess and Misbourne where exposed through river erosion; the Lower Chalk is not exposed in the catchment.

The Reading Beds — Eocene

2.3.3 The Reading Beds are generally considered to be of deltaic origin and are an extremely variable sequence of sands and clays 10-20m thick. These materials are dense and very stiff except where exposed to weathering processes.

London Clay — Eocene

2.3.4 The majority of the London Clay consists of a highly plastic clay although the upper and lower parts are extremely sandy. The London Clay weathers to a firm brown clay, becoming stiff and grey with depth.

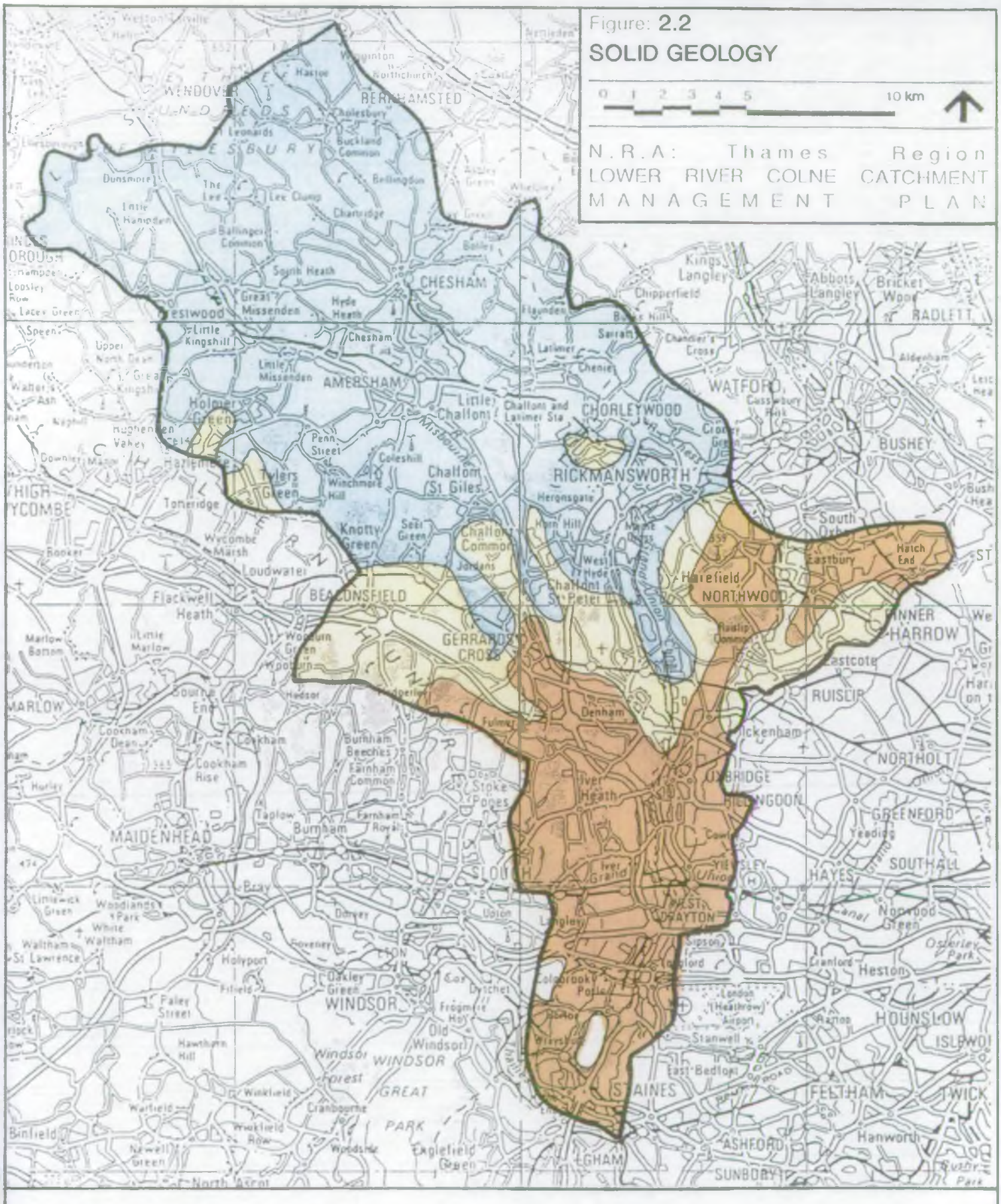


Figure: 2.2
SOLID GEOLOGY
0 1 2 3 4 5 10 km
N.R.A: Thames Region
LOWER RIVER COLNE CATCHMENT
MANAGEMENT PLAN
Chalk
Reading Beds
London Clay

2.4 DRIFT GEOLOGY

2.4.1 Over the solid geology are extensive superficial layers of younger river and glacial deposits in the order of 2-5m thick. These include:

- glacial or fluvio-glacial deposits including 'clay with flints' and pebbly clay and sand found predominantly on higher ground and associated with the Ice Age and its aftermath;
- terrace gravels deposited above the present river floodplains by palaeo-rivers associated with past higher sea levels;
- floodplain gravels associated with the existing larger rivers, especially the Colne and the Thames;
- alluvium, peat and brickearths generally lying adjacent and below existing water courses.

2.4.2 It is the extensive superficial river and terrace gravels which have given rise to the prominence of gravel extraction in the Colne Valley.

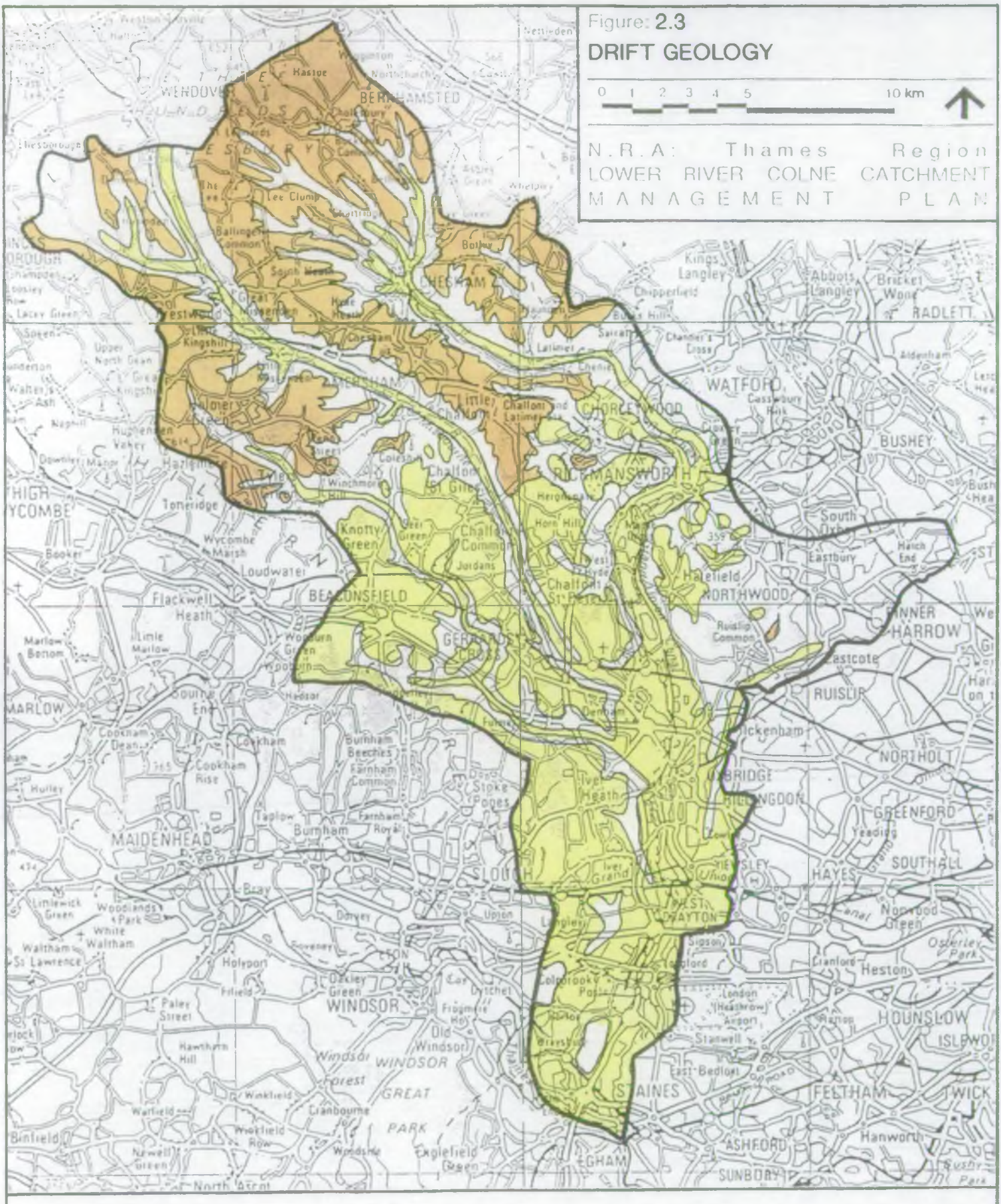


Figure: 2.3
DRIFT GEOLOGY
0 1 2 3 4 5 10 km
N.R.A: Thames Region
LOWER RIVER COLNE CATCHMENT
MANAGEMENT PLAN
Clay
Gravel/Alluvium

2.5 GEOMORPHOLOGY

2.5.1 As a result of the geological variations across the catchment, the rivers are of three main types: the gravel channels of the Colne and its southern distributaries; the chalk streams of the Misbourne and Chess; and the clay-based River Pinn.

2.5.2 Throughout, although the rivers have a generally natural character with a mature ecology they have been substantially altered by man for milling (with many mill leats and empoundments) and navigation associated with the Grand Union Canal. In consequence few rivers within the Lower Colne Catchment retain their natural sinuosity.

Gravel Rivers

2.5.3 A survey of the **Colne Brook** as a representative of the **gravel rivers** shows that its upper and lower reaches are hydrologically controlled by weirs and mills and the majority of its length has been straightened and sometimes over-widened as part of past mill empoundments. In its middle length it has also been realigned to make way for the M25. Therefore, not only has its natural sinuosity been lost but low velocities encourage siltation. The survey indicates that no entirely natural reaches remain although 5 reaches have moderate sensitivity to change as they exhibit some remnant natural bed or bank characteristics or have partially recovered from previous channel management.

Chalk Rivers

2.5.4 A survey of the **Chess** as a representative of the **chalk rivers** shows that it likewise has been extensively altered historically to power mills. In consequence out of a total of 48 reaches only 4 have some natural sinuosity remaining, 3 are regaining natural morphological characteristics, and a further 5 have attained an equilibrium in their straightened state, with a stable segregated gravel bed. These 12 reaches are considered to be moderately sensitive to change.

Clay Rivers

2.5.5 The **Pinn** as the only **clay river** in the catchment is substantially a suburban river. The majority of its length has been straightened and resectioned this century as part of urban expansion. Therefore the geomorphological valve of the Pinn and its tributaries is low except for the woodland section of the Woodriding Stream.

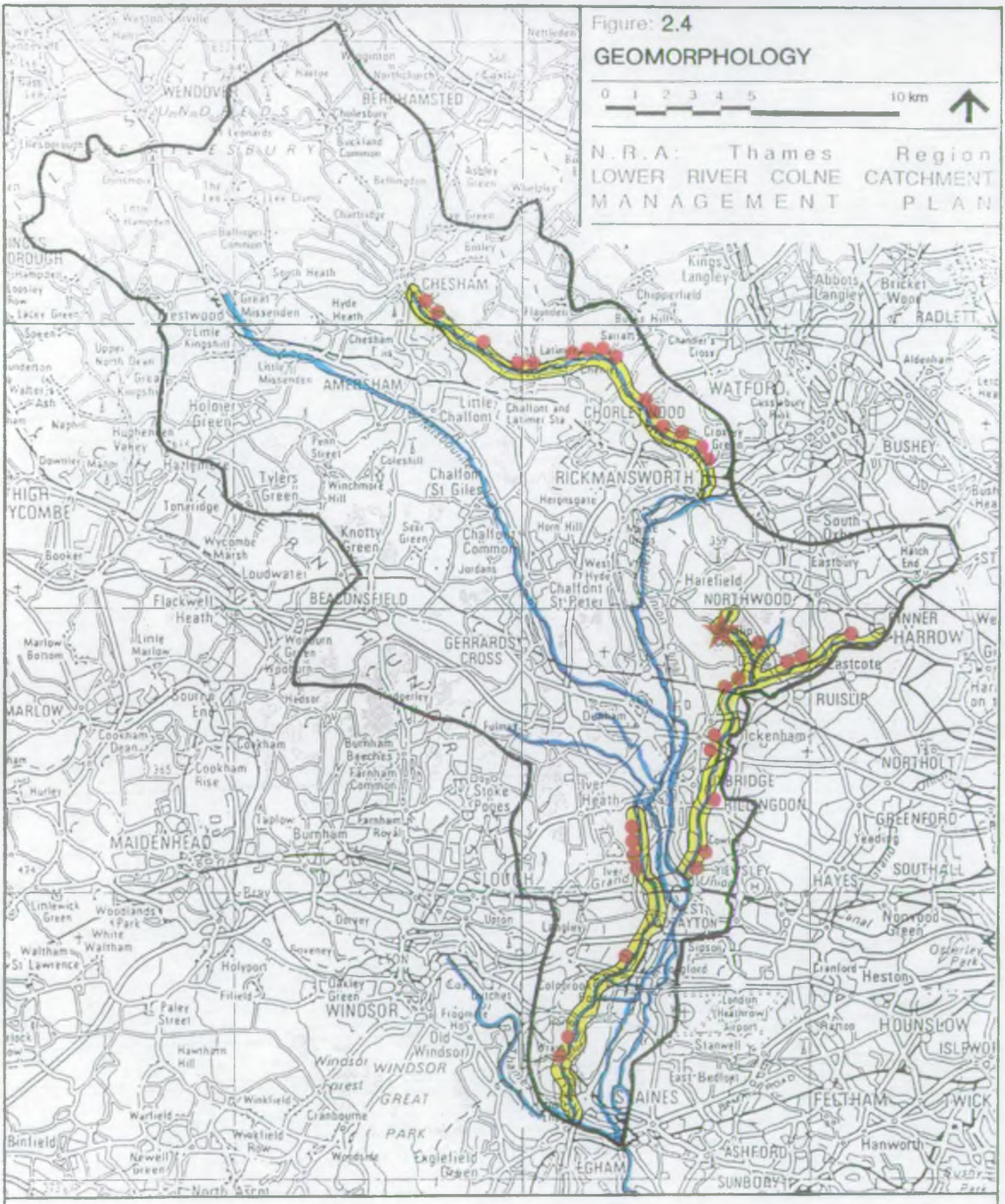


Figure: 2.4
GEOMORPHOLOGY
0 1 2 3 4 5 10 km
N.R.A: Thames Region
LOWER RIVER COLNE CATCHMENT
MANAGEMENT PLAN
CHESHAM
AMERSHAM
WATFORD
RICKMANSWORTH
BUSHEY
BEACONSFIELD
GERRARDS CROSS
NORTHWOOD
HARROW
RUISLIP
NORTHOLT
GREENFORD
SOUTHALL
HAYES
HEATHROW
HOUNSLOW
FELTHAM
TWICKENHAM
MAIDENHEAD
SLOUGH
WINDSOR
WINDSOR GREAT PARK
EGHAM
ASHFORD
Surveyed Watercourse
Moderately Sensitive Reach
Highly Sensitive Reach

2.6 CLIMATE

2.6.1 The climate of the catchment is generally typical of this part of South East England. The average rainfall ranges from 650mm in the southern part of the catchment to 750mm in the northern part while the mean for the whole Lower Colne Catchment is 675mm. The seasonal rainfall variation is characterised by long storms of low intensity during the winter and early spring, and short high intensity thunder storms in the summer. In recent years these summer thunder storms appear to have been increasing in frequency over the catchments serving Greater London and the surrounding area. This phenomenon is currently being considered as part of wider investigations by the Institute of Hydrology.

2.6.2 It is becoming increasingly accepted that global warming is occurring. The climatic changes anticipated may include drier summers and wetter winters with greater wind speeds (as experienced since October 1987).


750mm
750mm
750mm
750mm
700mm
700mm
650mm
650mm
650mm
650mm
Figure: 2.5
RAINFALL
0 1 2 3 4 5 10 km
N.R.A: Thames Region
LOWER RIVER COLNE CATCHMENT
MANAGEMENT PLAN
AMERSHAM
CHESHAM
RICKMANSWORTH
BEACONSFIELD
GERRARDS CROSS
MAIDENHEAD
WINDSOR
SLOUGH
HARROW
NORTHWOOD
RUISLIP
NORTHOLT
GREENFORD
SOUTHALL
HAYES
HOUNSLOW
FELTHAM
ASHFORD
SUNBURY
BUSHEY
RADLETT
MARLOW
HIGH WYCOMBE
Isohyet (Source: Meteorological Office, Bracknell)

2.7 SURFACE WATER DRAINAGE

The Chalk: Natural Surface Water Flows

2.7.1 On the chalk of the Chilterns, the predominantly rural land-use and porous nature of the bed-rock results in most rain water percolating directly into the underlying aquifer. This lack of surface water run-off results in few clearly defined water courses other than the ground-water fed rivers of the Chess and Misbourne.

The Reading Beds and London Clays: Natural Surface Water Flows

2.7.2 By comparison, the extensive surface water run-off associated with areas underlain by the less permeable Reading Beds and London Clays (found in the central and southern parts of the catchment) has resulted in the well-defined southward flowing rivers of the River Colne corridor. This river system is highly complex with interconnections between the various channels and, as already noted, is controlled by a series of sluices and weirs operated by the NRA TR, British Waterways, local authorities and private mill-owners. Where the rivers are artificially perched through empoundment above surrounding levels, a man-made low level drainage system operates to drain the local catchment. This discharges either to the tail of the main river control structures or directly to the Thames.

Urban Water Run-off

2.7.3 In urban areas the methods of coping with surface water run-off vary according to the underlying geology. Where chalk or gravel drift geology underlies the built-up areas, drainage is usually by soakaway combined with drainage into the arterial water course network e.g. Amersham, Chesham, the Chalfonts, Rickmansworth, Gerrards Cross and in the south, Slough East, Poyle, Iver and Colnbrook. Conversely, where only impermeable materials underlie the built-up areas, all drainage is to the arterial watercourse network as in Northwood and Ruislip. In Uxbridge and West Drayton it is assumed that the drift geology is not suitable for soakaways and therefore again all surface water drainage is to the arterial network.

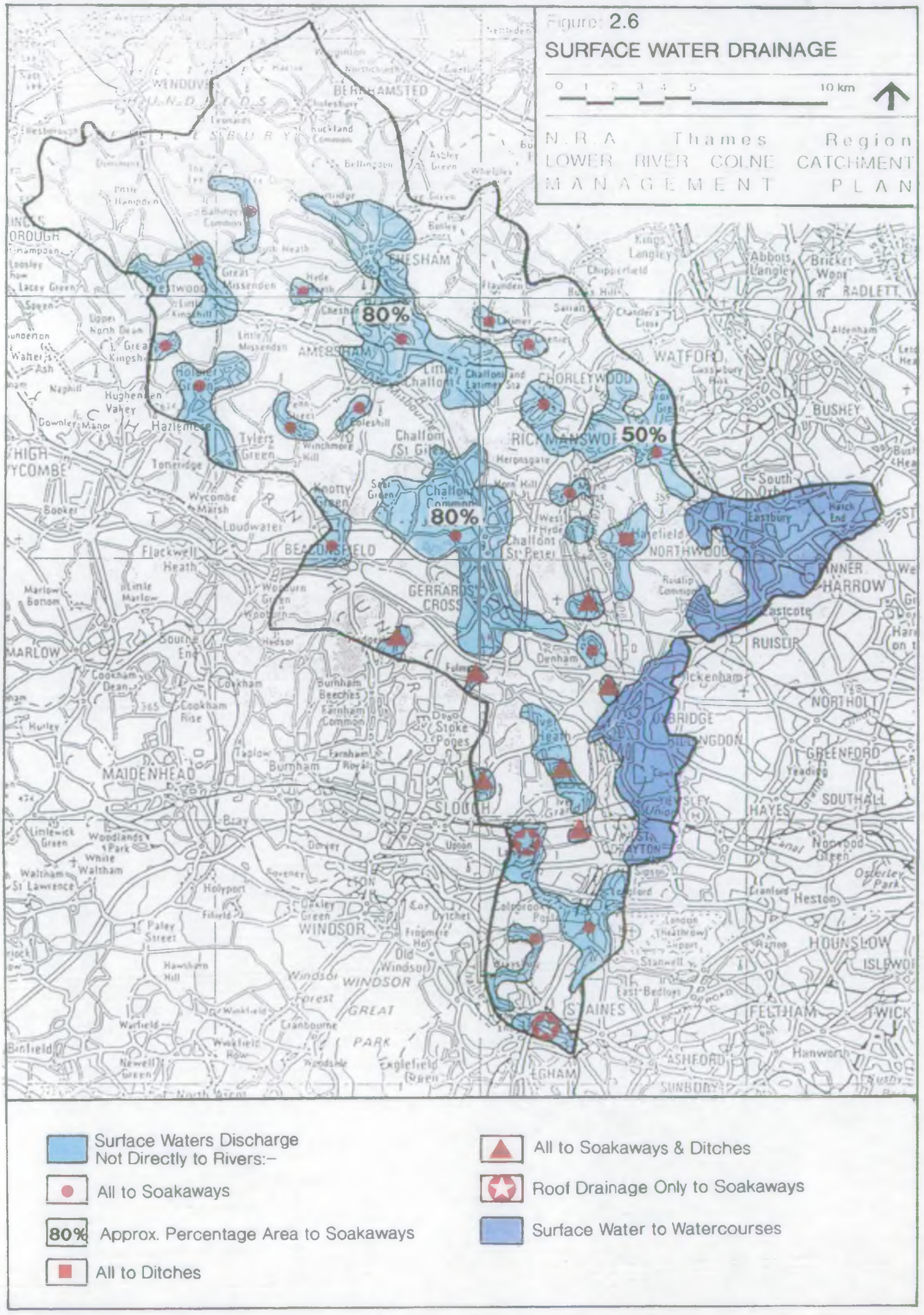


Figure 2.6
SURFACE WATER DRAINAGE
0 1 2 3 4 5 10 km
N.R.A. Thames Region
LOWER RIVER COLNE CATCHMENT
MANAGEMENT PLAN
80%
80%
50%
Surface Waters Discharge Not Directly to Rivers:–
All to Soakaways
80% Approx. Percentage Area to Soakaways
All to Ditches
All to Soakaways & Ditches
Roof Drainage Only to Soakaways
Surface Water to Watercourses

2.8 GROUNDWATER DRAINAGE

2.8.1 The groundwater bearing strata (aquifers) of the catchment consist of the deep permeable chalk in the northern part of the catchment and the shallow permeable gravel drift deposits underlain by impermeable clay in the southern part of the catchment.

The Chalk

2.8.2 Groundwater levels in the chalk are sensitive to both annual and seasonal variations in recharge by rainfall, and to the rate of abstraction for public water supply. In the catchment of the River Misbourne the total abstraction is approximately 50% of the average annual recharge. This abstraction, in combination with drier summers, has resulted in the perennial head of the Misbourne moving downstream by 4-5km over recent years and in long reaches of the river seasonally drying out, as well as reduced flows in those reaches which remain wet.

The Gravels

2.8.3 Groundwater levels in the shallow gravel aquifer are sensitive to individual rainfall events, resulting in water logging, infiltration of foul sewers and inefficient operation of soakaways during wet weather. These problems of waterlogging are exacerbated in natural floodplain areas (especially where the main watercourses are artificially impounded) by seepage of river flood waters due to the hydraulic gradient between the channel and the surrounding ground. During periods of high flows in the rivers, this can result in adjacent soakaways acting as wicks, with water rising to the surface via the soakaways and causing localised flooding.

2.8.4 The use of soakaways in the shallow gravel drift material of the southern part of the catchment increases the groundwater level. Currently this is considered to have less adverse impact on drainage than the alternative of direct drainage to watercourses (which could already be in flood) with the effect of increasing flood flows and flood risk to property.

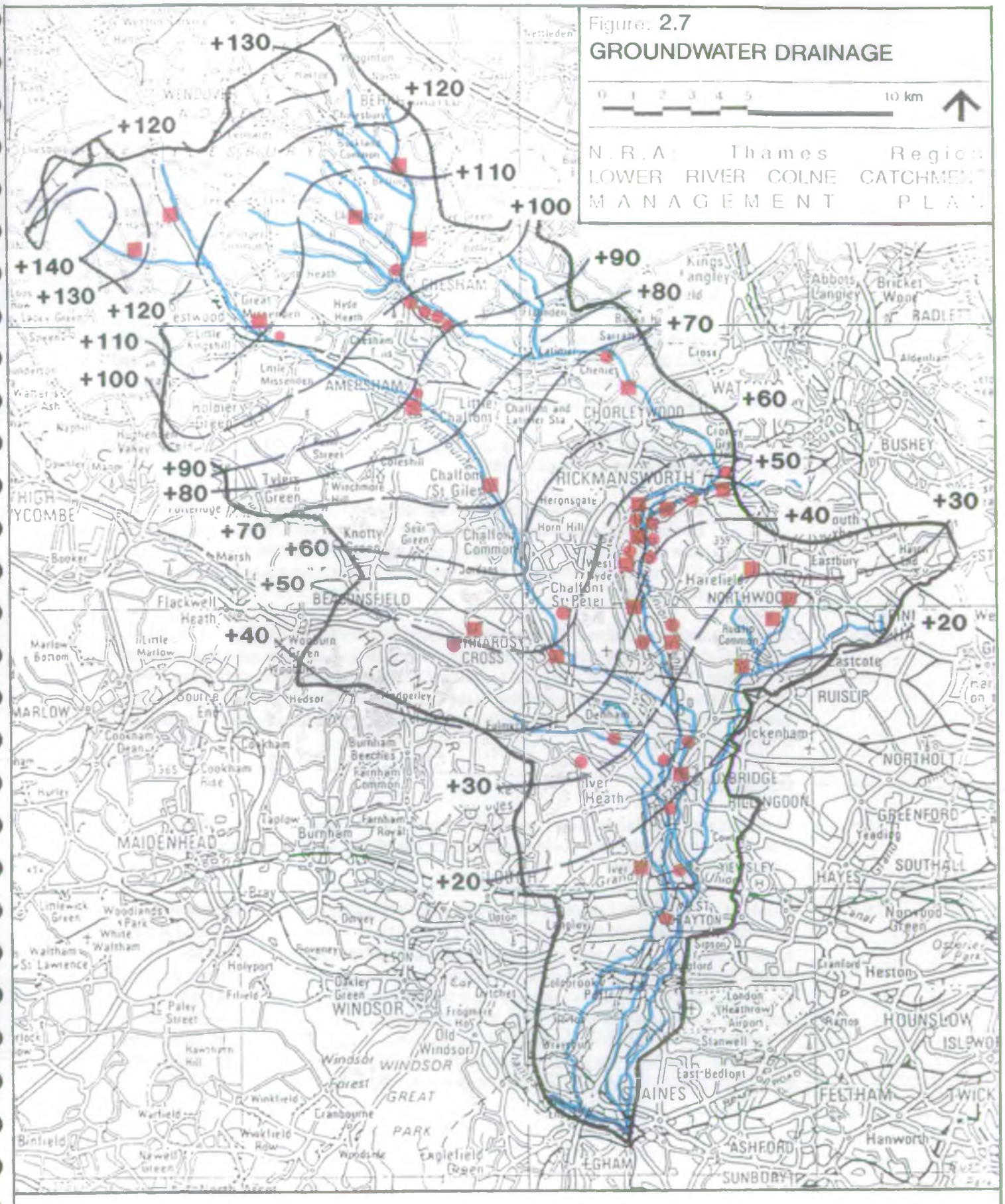


Figure 2.7
GROUNDWATER DRAINAGE
0 1 2 3 4 5 10 km
N.R.A. Thames Region
LOWER RIVER COLNE CATCHMENT
MANAGEMENT PLAN
+130
+120
+120
+110
+100
+140
+130
+120
+110
+100
+90
+80
+70
+60
+50
+40
+30
+20
+90
+80
+70
+60
+50
+40
+30
+20
+30
+20
AMERSHAM
CHESHAM
CHORLEYWOOD
RICKMANSWORTH
BUSHEY
NORTHWOOD
BEACONSFIELD
FLACKWELL HEATH
MARLOW
MAIDENHEAD
WINDSOR
WINDSOR GREAT PARK
RUISLIP
NORTHOLT
GREENFORD
SOUTHALL
HAYES
HOUNSLOW
FELTHAM
ASHFORD
SUNBURY
EGHAM
STAINES
Public Supply Pumping Station
Well or Bore
Groundwater Level in the Chalk
(1976 m A.O.D.)

2.9 WATER QUALITY

River Water Quality

2.9.1 Within the catchment there are relatively few consented trade effluent discharge points, other than those on the Grand Union Canal which include cooling waters and fish farm effluents.

2.9.2 The main sources of effluent discharge to the rivers, therefore, are the sewage treatment works (STWs). The key characteristics of these sewage treatment works (STWs) are:

- river water quality in the Colne system is influenced by STWs located both within and outside the catchment. In particular the Colne is influenced by STWs located at Berkhamstead and Watford (Blackbirds) lying in the Upper Colne Catchment, as well as by Maple Lodge, Iver Heath and other STWs located within the catchment;

- a total of 17 STWs treat the foul water from urban areas within the catchment, 3 of these lie outside the catchment;

- the export of foul water out of the catchment or to different valleys within the catchment can exacerbate the problems of low flows already described i.e. in the case of the Misbourne the majority of its foul water is transferred to Maple Cross STW where the effluent is discharged to the River Colne rather than returned to the Misbourne.

2.9.3 Insufficient data is available on the operation of individual sewage treatment works to draw firm conclusions on water quality, but there is a discernible drop in water quality downstream of Chesham STW which has prevented use of the Chess as a salmon nursery site since 1988. Fisheries surveys have also indicated that in the Colne, downstream of Denham, and the Colne Brook, levels of total ammonia are sometimes above those stipulated in the EEC directive for freshwater fisheries.

Groundwater Quality

2.9.4 At present very little information is available on groundwater quality in the catchment. Potential sources of pollution could be agricultural run-off and more particularly leachate arising from landfill sites.

2.9.5 Problems of landfill leachate particularly relate to sites filled prior to the 1974 Control of Pollution Act, when standards were very much less stringent. These are concentrated at the southern end of the Colne Valley and may be adversely affected groundwater quality. At present the consequences may not be too serious, in that no water companies extract from the gravel (except at one emergency location) and no particular river pollution is apparent. However, leachate leaking from landfill above the chalk aquifer ie. sites north of the M40 would be highly undesirable. To date there has been relatively little landfill in this area other than a major 80ha GLC site at Park Lodge Farm, Harefield (1950-1979), another on the east bank of Broadwater of a similar age, and current proposals to backfill Broadwater itself.

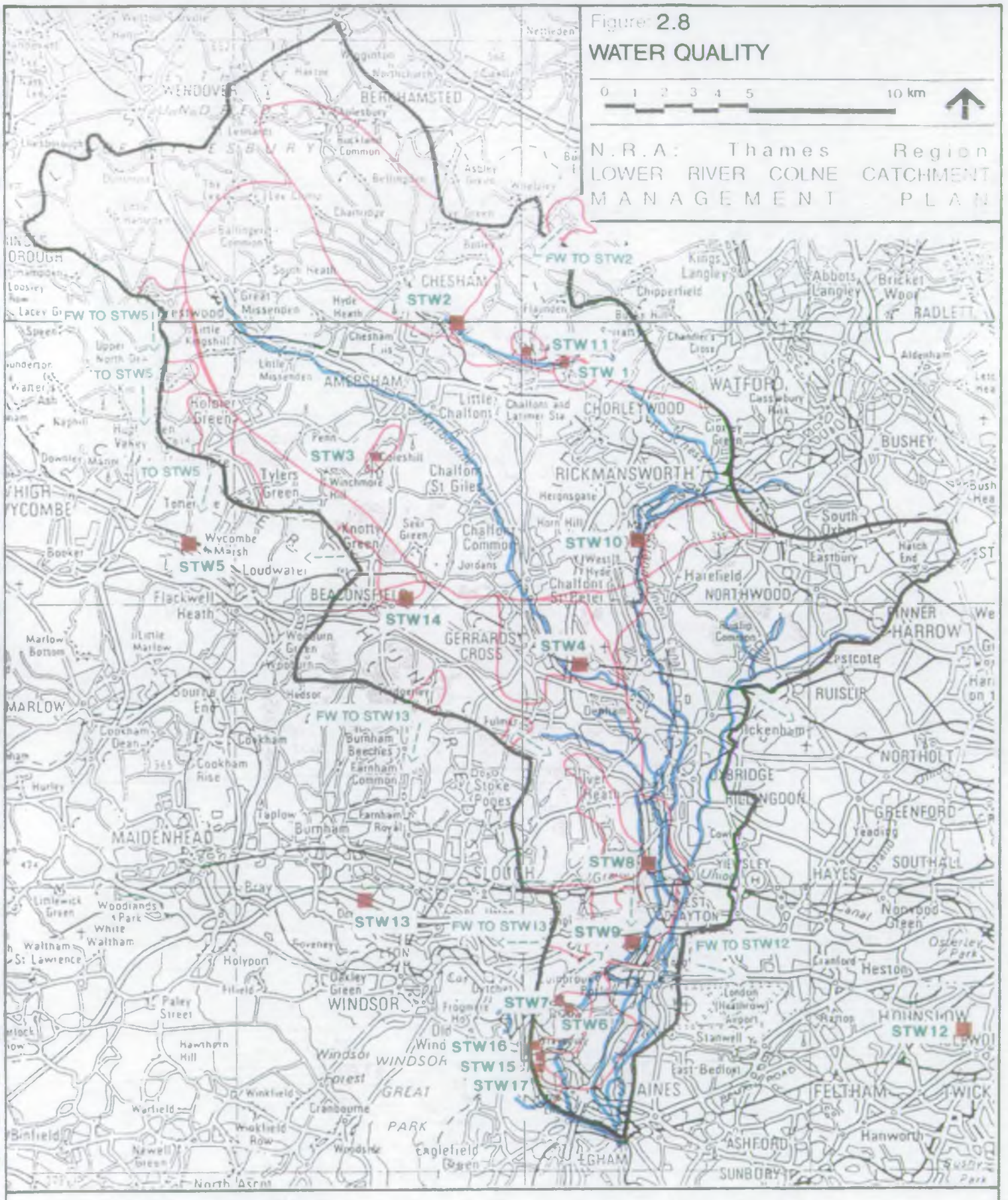


Figure 2.8
WATER QUALITY
0 1 2 3 4 5 10 km
N.R.A: Thames Region
LOWER RIVER COLNE CATCHMENT MANAGEMENT PLAN
FW TO STW2
FW TO STW5
TO STW5
TO STW5
STW2
STW11
STW1
STW3
STW5
STW10
STW14
STW4
FW TO STW13
STW13
FW TO STW13
STW8
STW9
FW TO STW12
STW7
STW6
STW16
STW15
STW17
STW12
CHESHAM
AMERSHAM
WATFORD
CHORLEYWOOD
RICKMANSWORTH
BUSHEY
NORTHWOOD
HARROW
RUISLIP
NORTHOLT
GREENFORD
SOUTHALL
HAYES
HEATHROW
HESTON
FELTHAM
ASHFORD
SUNBURY
STAINES
WINDSOR
MAIDENHEAD
MARLOW
BEACONSFIELD
GERRARDS CROSS
HIGH WYCOMBE
Wycombe Marsh
Loudwater
FOUL WATER DRAINAGE
Catchment of Sewage Treatment Works
Major Sewage Treatment Works (population equivalent > 1000)
Minor Sewage Treatment Works (population equivalent <1000)
Foul Water Treated Elsewhere Within or Outside the Lower River Colne Catchment

2.10 FISHERIES

2.10.1 Overall, the Lower Colne Catchment supports in its lakes, rivers and canals, one of the richest and most varied coarse fisheries in the Thames Region[1]. The Lower Colne rivers also form part of a salmonid migration route connecting the important spawning grounds of the Chess and Misbourne to the sea.

2.10.2 Surveys indicate that:

- The Colne Brook, Wraysbury and Frays (surveyed in 1986) have a very good mixed coarse fishery with chub, dace and roach, being the dominant species. The target biomass of $20g/m^2$ was met at all designated sites except for the Wraysbury River.

- The Chess (surveyed in 1987) was used as a salmon nursery site between 1979 and 1988 but this was subsequently stopped because of decreasing water quality. One third of the designated sites met the target biomass of $15g/m^2$.

- The Misbourne (surveyed in 1989) has been regularly restocked in its lower reaches with brown and sea trout by the NRA. Both designated sites failed to meet the biomass target of $15g/m^2$.

- The Grand Union Canal (surveyed in 1987) has stable self-supporting communities of mixed coarse fish, reported to be typical of canals. Biomass results were 7 to $9g/m^2$.

2.10.3 Currently the movement of fish is hindered by a large number of impassable river structures, although new fish passes are now being provided as part of other river works.

Footnote:

1. The salmonid family includes salmon (which migrate), rainbow trout, brown trout (some of which migrate as sea trout), and grayling. All other fish are referred to as coarse. Among the coarse fish an important group is the cyprinid (carp) family; these include roach, rudd, bream, tench, barbel and others. Other coarse fish are eel (which migrate), perch and pike.


Figure: 2.9
FISHERIES
0 1 2 3 4 5 10 km
N.R.A: Thames Region
LOWER RIVER COLNE CATCHMENT
MANAGEMENT PLAN
SCOTTSBRIDGE MILL
CHESS WEIR
TROY WEIR
SHIRE DITCH OFFTAKE
ALLIED MILLS WEIR
HUNTSMOOR WEIR
WEST DRAYTON MILL E
TANHOUSE FARM WEIR
POYLE WEIR
HORTON MILL E
WRAYSBURY MILL
HYTHE END WEIR
STANWELL UPPER MILL
SILVERBECK WEIR
POUND MILL SLUICES
STAINES LINO MILL
E.E.C. Designated Waters for Cyprinid Fisheries
E.E.C. Designated Waters for Salmonid Fisheries
E Eel Trap Refurbished
E Eel Trap to be Refurbished
Fish Pass Constructed in 1989 or 1990
Fish Pass Designated for Future Construction
Need for Fish Pass Identified

2.11 ECOLOGY

2.11.1 The ecological interest of the catchment's river valleys is rich and primarily relates to:

- terrestrial habitats (predominantly but not exclusively wet flood meadows);
- the wet gravel pits of the valley floor;
- the ecology of the river channels themselves.

Although not all habitats are of the highest quality, few lowland river complexes can be said to show such a concentration and diversity of interest.

Terrestrial habitats

2.11.2 The terrestrial habitats of the Colne Valley floor are of two main types: secondary habitats resulting from past disturbance (mainly but not exclusively related to gravel extraction); and much older habitats including marsh, fen and most importantly alluvial grazing meadows, including Frays Meadows and Staines Moor, SSSI's, which are of the greatest importance as nationally scarce habitats. These are complemented by smaller areas of original floodplain pasture lying directly adjacent to the Colne Valley rivers, such as Jobs Dairy Meadows near Horton, meadows in the vicinity of Trout Lane and Little Britain, and Croxley Heath SSSI east of Rickmansworth.

2.11.3 On the Chess there are important alluvial meadows in the area of Sarrat Bottom including, Frogmore Meadows SSSI. However, the Misbourne generally lacks the characteristic water meadows of a chalk stream as, even historically, its middle reaches had a naturally sealed clay bed which lay perched above a much lower water table.

Wet Gravel Pits

2.11.4 The two main complexes of mature wet gravel pits in the Colne Valley of value to wildfowl are between Rickmansworth and the M40, centred on Stockers Lake and Broadwater SSSI's in the north, and just north of Wraysbury in the south. These are of national if not international importance for wildfowl. Broadwater (70 ha) has recently been judged by the Wildfowl and Wetland Trust as the premier gravel pit for wildfowl in Britain while the Wraysbury gravel pit is nationally important for wintering Tufted Duck and is a major site for Smew, Golden-eye, Pochard, Goosander and Great Crested Grebe.

The River Channels

2.11.5 The braided river channels of the Colne Valley have a rich marginal flora, comparable to the very best in Britain. This is concentrated in areas with shallow or low lying banks and is especially rich where associated with large areas of marshland/unimproved pasture. In contrast, the Colne system has a rather poor aquatic flora. Whilst retained heads above mills have advantaged 'edge' species requiring a permanently high water table, the resultant creation of a relatively uniform aquatic habitat has not benefited plant diversity.

2.11.6 The lower reaches of the Chess have wetlands, including reed swamp and old cress beds, while the greatest interest of the Misbourne chalk stream relates to spring-fed flushes and cress beds, as at Little Missenden, and to sections where the river has been dammed to form formal lakes as at Shardaloes, near Amersham.

2.11.7 In the case of the Pinn the river has limited ecological interest because of its urban setting although the corridor is of local importance for wildlife.

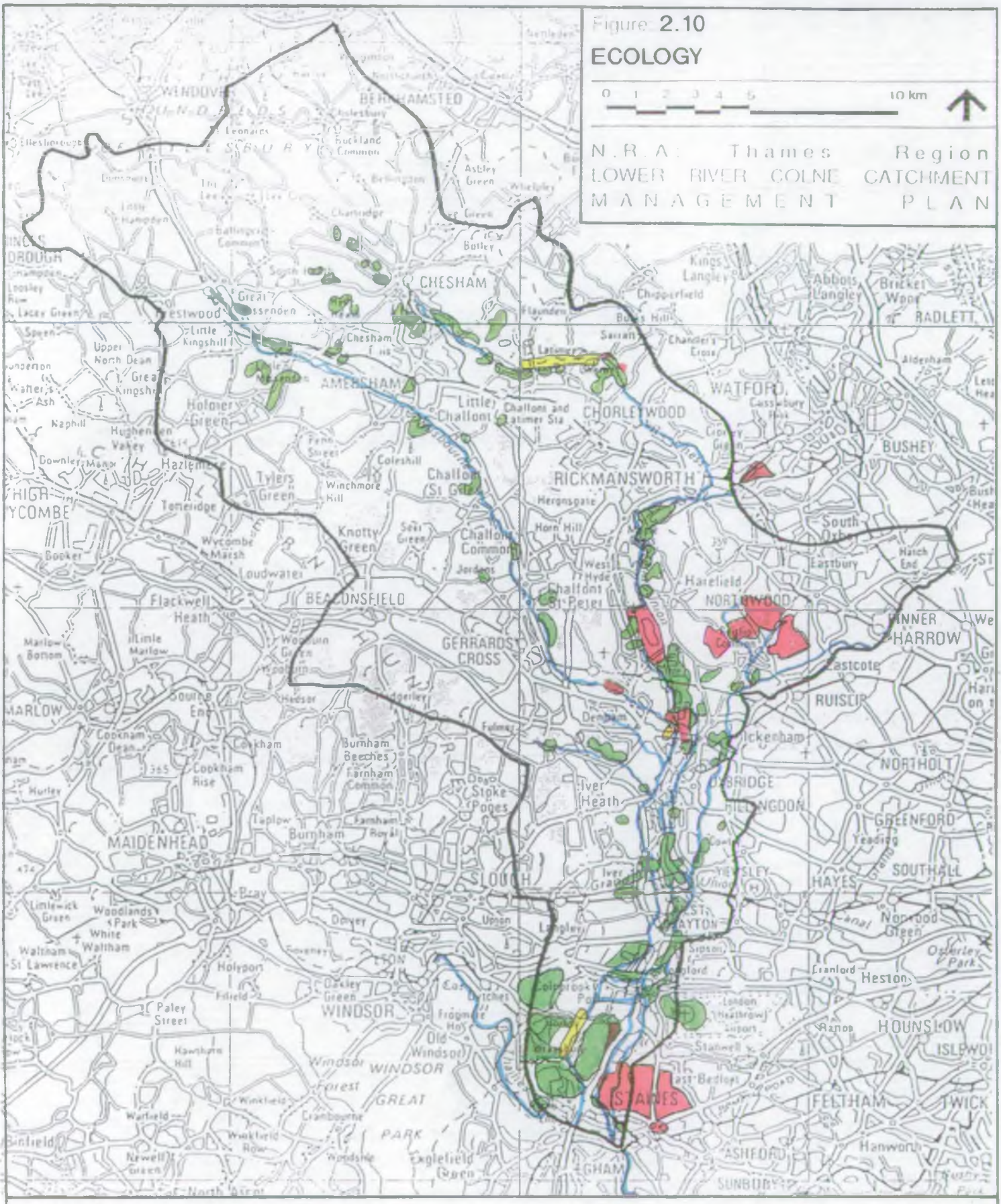


Figure 2.10
ECOLOGY
0 1 2 3 4 5 10 km
N.R.A. Thames Region
LOWER RIVER COLNE CATCHMENT
MANAGEMENT PLAN
CHESHAM
AMERSHAM
CHORLEYWOOD
RICKMANSWORTH
WATFORD
BUSHEY
RADLETT
BERKHAMSTED
BEACONSFIELD
GERRARDS CROSS
HIGH WYCOMBE
MARLOW
MAIDENHEAD
WINDSOR
SLOUGH
NORTHWOOD
HARROW
RUISLIP
UXBRIDGE
NORTHOLT
GREENFORD
SOUTHALL
HAYES
HOUNSLOW
HESTON
FELTHAM
TWICKENHAM
ISLEWORTH
STAINES
ASHFORD
GREAT PARK
WINDSOR Forest
Site of Special Scientific Interest
Site of Ecological Interest
Linear Site of Ecological Interest

2.12 LANDSCAPE

2.12.1 Within the catchment there is a clear distinction between the landscape of the narrow, well-defined, chalk valleys of the Misbourne and Chess and the less clearly defined north-south valley of the Colne and its associated rivers.

The Chalk

2.12.2 The valleys of the Chess and Misbourne are characterised by an agricultural landscape, typically consisting of pasture across the valley floor (although in a number of instances this has given way to arable production), arable on the lower slopes, with the upper slopes crowned with copses and woodlands. This mature agricultural scene is complemented by well defined historic towns and villages of high visual quality which straddle the valley floors and by the rivers themselves which, in certain key sections, retain the shallow-edged, meandering course, marked with scattered willow pollards, so typical of traditional chalk rivers.

The Gravels

2.12.3 By contrast, the Colne valley floor is largely a product of modern land-use pressures characteristic of so much of London's urban fringe, with fragmented agricultural holdings, active mineral workings, downgraded and poorly reclaimed pasture, scrub, horse grazing, intrusive urban development, inter-war suburban sprawl, non-conforming uses and, at the southern end of the valley, the massive embankments of water supply reservoirs. Retained within these mixed land uses, however, are remnants of a past agrarian landscape and distinctive landscaped estates as evident in the ancient meadows of Staines Moor and Frays Farm and in the parklands and estate plantings around Denham Court, Delaford Manor, Hunstmoor Park and Sutton Park. These marks of maturity are further enhanced by the older villages of the valley floor such as Denham, Iver and Colnbrook.

2.12.4 Most importantly, a cohesion is provided to these disparate landscape features by the water environment consisting of the rivers themselves, which retain a largely natural character, and the mature tree-fringed gravel pits to be found in a chain between Rickmansworth and the M40, in the area of Little Britain to the east of Uxbridge, and around Wraysbury at the southern end of the Colne Valley.

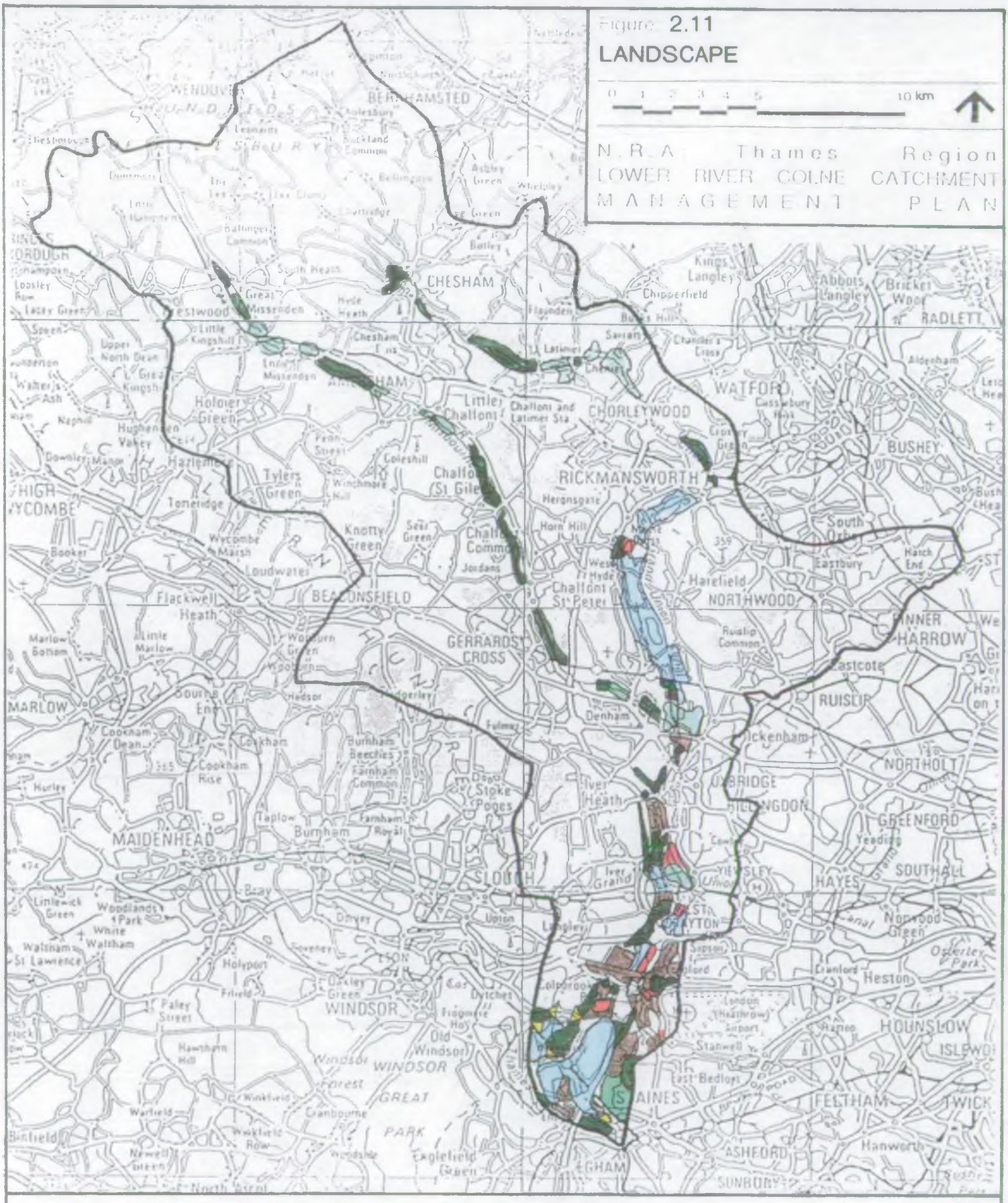


Figure 2.11
LANDSCAPE
0 1 2 3 4 5 10 km
N.R.A. Thames Region
LOWER RIVER COLNE CATCHMENT
MANAGEMENT PLAN
CHESHAM
BERKHAMSTED
CHORLEYWOOD
RICKMANSWORTH
WATFORD
BUSHEY
BEACONSFIELD
GERRARDS CROSS
MARLOW
MAIDENHEAD
SLOUGH
WINDSOR
NORTHWOOD
HARROW
RUISLIP
UXBRIDGE
HAYES
SOUTHALL
GREENFORD
HOUNSLOW
FELTHAM
TWICKENHAM
Open Water & Associated Landscape
Traditional Agricultural Landscape.
Original Flood Meadows.
Downgraded Agriculture
Dereliction.
Active Mineral Workings

3.0 CURRENT AND FUTURE USES OF THE CATCHMENT

3.0 CURRENT AND FUTURE USES OF THE CATCHMENT

3.1 INTRODUCTION

3.1.1 This section looks at the changing land use pressures facing the catchment and considers what effects these are having on the water environment. The land uses which are described are as follows:

- residential development
- industrial/commercial development
- communications
- minerals/waste disposal
- agriculture
- recreation and amenity
- navigation
- heritage/archaeology
- flood defence
- river geomorphology
- water resources
- water quality
- fisheries
- ecology
- landscape.

3.1.2 In each case the existing situation is described, followed by an assessment of possible changes in the future, and the likely implications of these for the water environment.

3.1.3 A summary of the current situation is also provided in map form. These maps primarily relate to the river corridors rather than to the wider catchment. More detailed mapped information is available on GIS.

3.1.4 As already outlined, the catchment is an area of contrasts, passing from the outer suburbs of London, through the urban fringe shatter-zone of the Colne Valley itself, to the more tranquil rural scene of the Chilterns, with its distinct residential settlements.

3.2 LAND USE PLANNING

Development Restraint

3.2.1 The whole catchment outside existing built up areas is designated Metropolitan Green Belt. This is strongly upheld by the constituent local authorities of the area and is reaffirmed by the regional strategies of the DOE[1] and South East Regional Planning Conference (SERPLAN)[2] which seek to restrain any further development on the west side of London. These restraint policies are enhanced by inclusion of the Chilterns dip slope in the Chilterns Area of Outstanding Natural Beauty (AONB) and recognition of the Colne Valley floor, between Rickmansworth and Staines, as a Regional Park - the Colne Valley Park - where the emphasis is on landscape conservation and rehabilitation, and informal recreation.

3.2.2 The need for development restraint in the Colne Valley has also been highlighted by the Lower Colne Flood Alleviation Scheme, at present being implemented by the NRA. This scheme has been necessitated by the large number of properties within the Colne Valley which are at risk from flooding. However, the success of this scheme depends on further development within the floodplain being prevented.

Development Pressures

3.2.3 Despite the emphasis on development restraint, change associated with gravel extraction and landfill continues unabated in the Colne Valley, as does pressure for commercial development. This pressure is fuelled by the excellent transport links enjoyed by the catchment (the M40 and M4 cross the catchment and the M25 runs the length of the Colne Valley), by the proximity of London's Heathrow, and by the uncertain future surrounding many of the older mineral planning permissions.

3.2.4 The dilemma facing the local authorities of the Colne Valley is that, in the present economic climate, they lack the funds to implement the main objectives of the Colne Valley Park. Furthermore, if all original mineral extraction conditions were fulfilled (requiring filling of certain wet pits) the objectives for the Valley would be further undermined. Therefore, in seeking a constructive way forward, the local authorities necessarily enter into extensive negotiations with mineral operators and developers with the aim of framing new strategies of mutual benefit to the public and private sectors. It is these forms of negotiation which at present provide the back-bone to potential major improvements in the Colne Valley.

Footnote:

1. Planning Guidance Note No. 9. Regional Guidance for the South East, DOE (1989)

2. Shaping the South East, SERPLAN (1990)

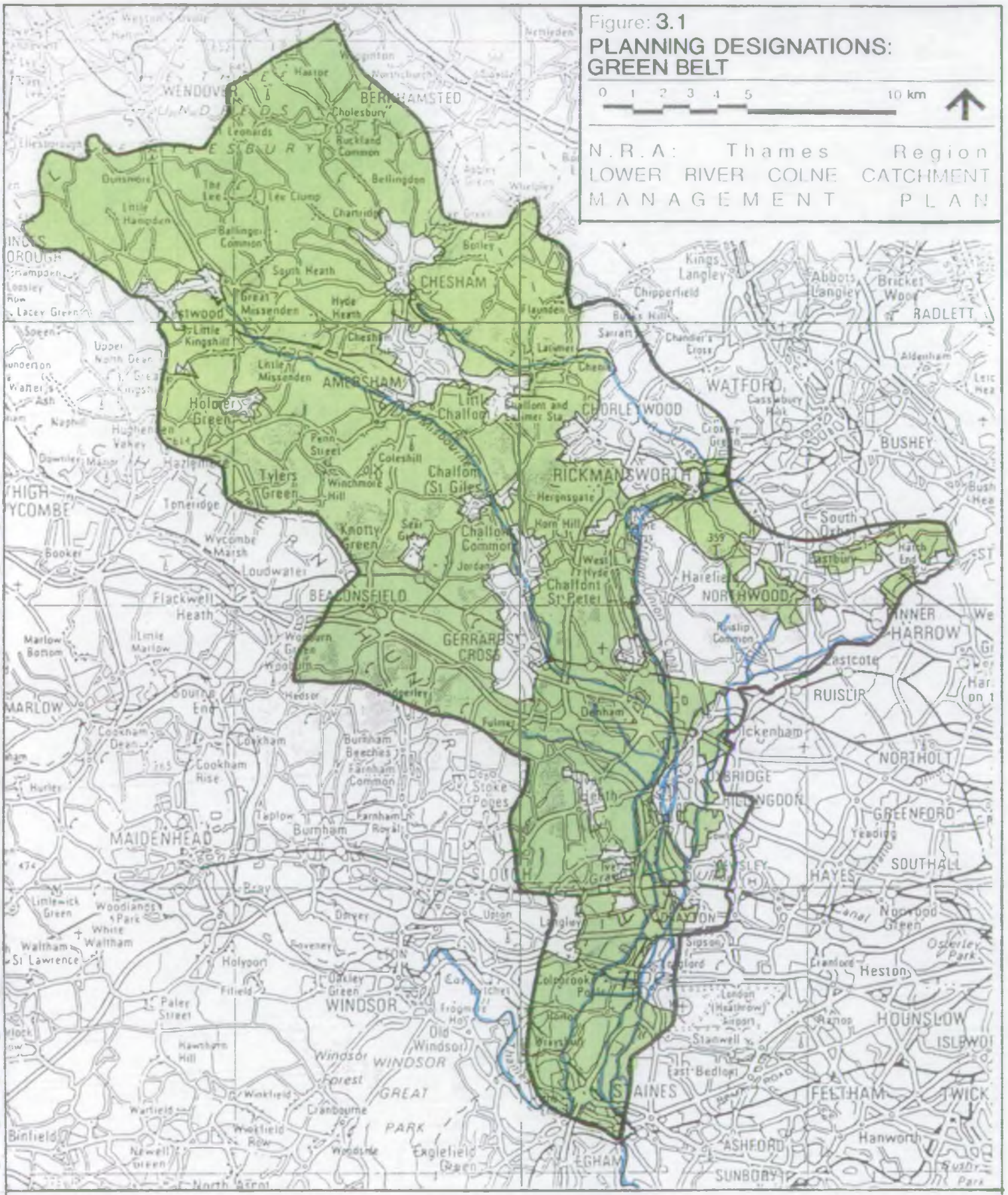


Figure: 3.1
PLANNING DESIGNATIONS:
GREEN BELT
0 1 2 3 4 5 10 km
N.R.A: Thames Region
LOWER RIVER COLNE CATCHMENT
MANAGEMENT PLAN
BERKHAMSTED
CHESHAM
AMERSHAM
RICKMANSWORTH
WATFORD
BEACONSFIELD
GERRARDS CROSS
MAIDENHEAD
WINDSOR
SLOUGH
HARROW
RUISLIP
NORTHWOOD
UXBRIDGE
HAYES
SOUTHALL
HOUNSLOW
FELTHAM
STAINES
ASHFORD
SUNBURY
Green Belt

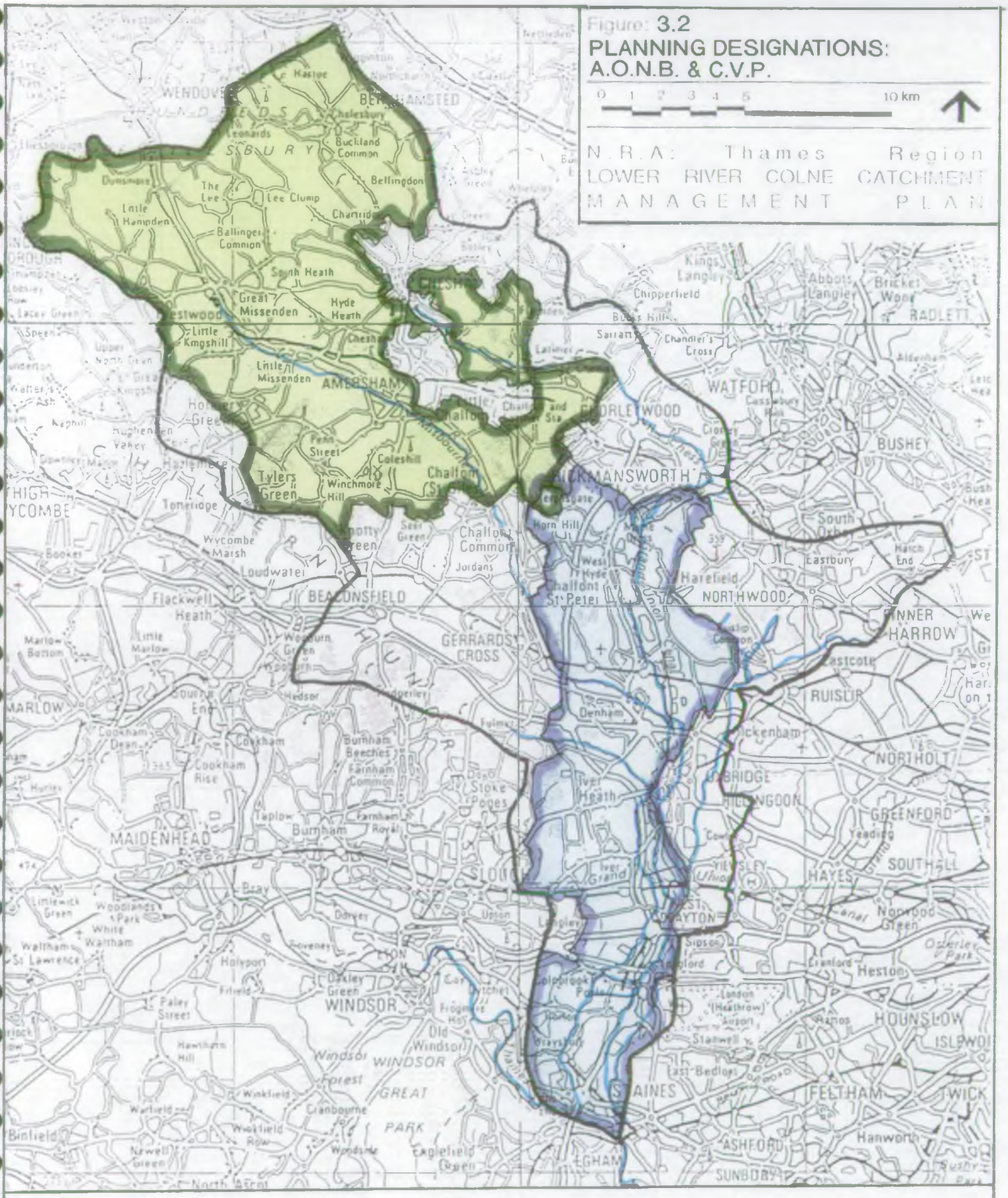


Figure: 3.2
PLANNING DESIGNATIONS:
A.O.N.B. & C.V.P.
0 1 2 3 4 5 10 km
N.R.A: Thames Region
LOWER RIVER COLNE CATCHMENT
MANAGEMENT PLAN
Area of Outstanding Natural Beauty (A.O.N.B.)
Colne Valley Park (C.V.P.)

3.3 RESIDENTIAL DEVELOPMENT

The Current Situation

3.3.1 Within the catchment it was the coming of the Metropolitan Line in 1904 which was to herald the real spate of urban expansion and ribbon development characteristic of the 1920's and 1930's, prior to the imposition of planning controls under the 1949 Act. The residential areas of Rickmansworth, Uxbridge, Cowley, West Drayton, Horton, Wraysbury, Poyle and Staines mainly date from this period, as do those of Chesham, Amersham and the Chalfonts. For the first time residential development made substantial inroads into the Colne floodplain.

3.3.2 Since the 1930's residential development has been fairly restricted. Nevertheless major expansion has occurred at West Drayton, Poyle, Colnbrook and Stanwell Moor as well as small scale but cumulatively significant infill throughout the catchment.

Future Situation

3.3.3 Because of the strong policies of restraint, new housing within the catchment is likely to be very restricted for the foreseeable future. Review of the local plans suggests that the main areas of new housing are likely to be limited to infill around Wraysbury, Horton, Hythe End, Iver, Denham, Chorley Wood, Rickmansworth, Amersham and Chesham and redevelopment of the Old Ford plant in Slough.

Implications for the Water Environment

3.3.4 As future housing development is likely to be very limited in extent, impacts on the water environment are likely to be relatively insignificant, so long as new housing is sited outside the floodplain and so long as it does not include excessive areas of hardstanding likely to lead to major problems of surface water run-off.

3.3.5 These developments will also need to take account of local groundwater conditions, bearing in mind the propensity of the Colne Valley gravels to waterlogging.

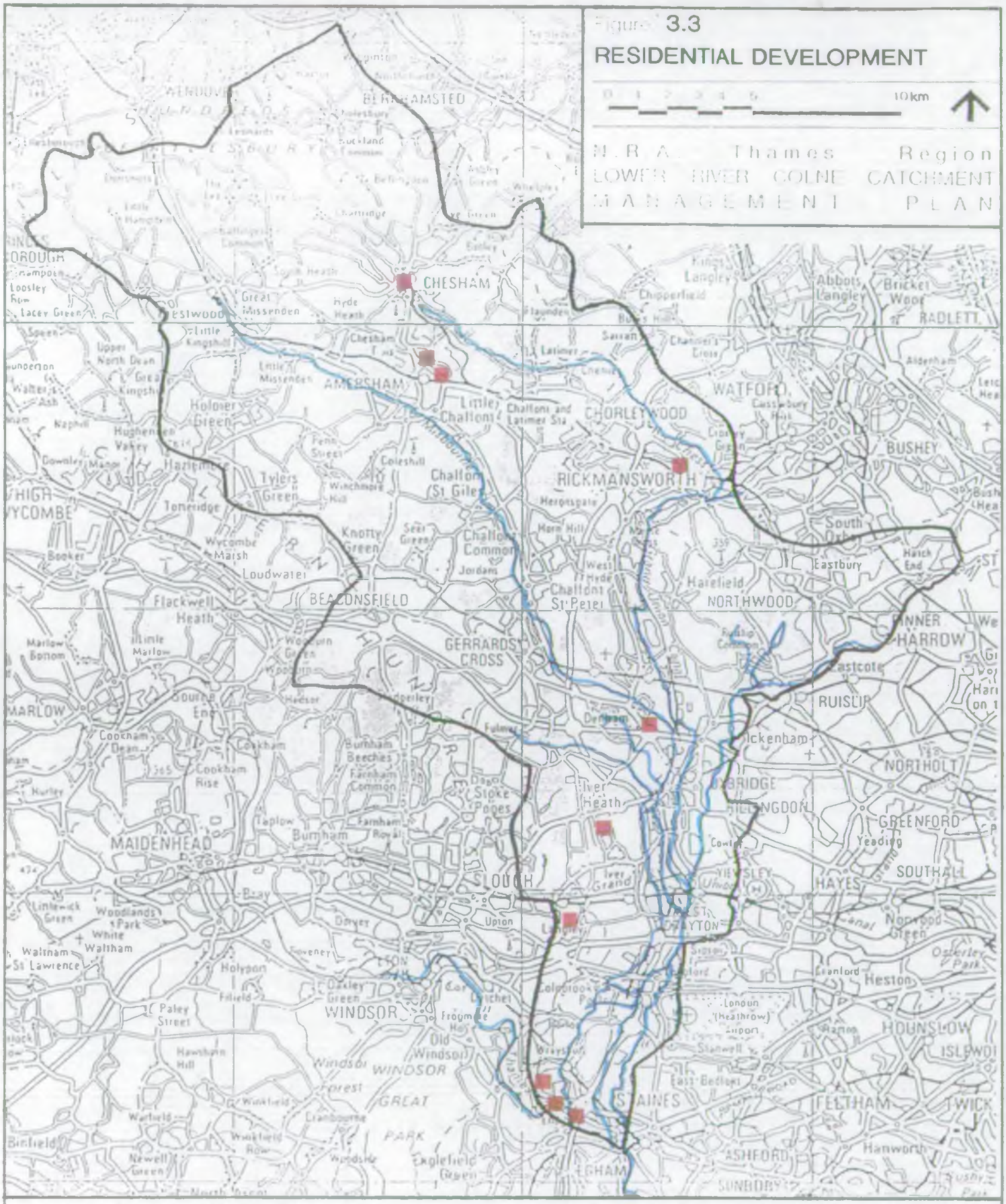


Figure 3.3
RESIDENTIAL DEVELOPMENT
0 1 2 3 4 5 10km
N.R.A. Thames Region
LOWER RIVER COLNE CATCHMENT
MANAGEMENT PLAN
CHESHAM
AMERSHAM
BERKHAMSTED
RICKMANSWORTH
WATFORD
BUSHEY
BEACONSFIELD
GERRARDS CROSS
NORTHWOOD
HARROW
RUISLIP
NORTHOLT
GREENFORD
SOUTHALL
HAYES
HEATHROW
HOUNSLOW
ISLEWORTH
TWICKENHAM
FELTHAM
STAINES
ASHFORD
SUNBURY
HIGH WYCOMBE
MARLOW
MAIDENHEAD
SLOUGH
WINDSOR
GREAT PARK
Likely Areas of Infill Housing Development

3.4 INDUSTRIAL/COMMERCIAL DEVELOPMENT

The Current Situation

3.4.1 While residential development arose primarily as a result of the railways, industrial and commercial developments have been more closely related first to water power and more recently in response to Heathrow and the excellent motorway communications. These industrial/commercial areas are primarily concentrated in and around the Colne Valley.

3.4.2 Brewing and milling, relating to water power, still operate in the Colne Valley but the major expansion has been in general and light engineering industries and medical, chemical and petroleum research laboratories, followed most recently by the electronic and computer industries and distribution industries associated with Heathrow. Particularly significant industrial developments within the Colne floodplain include Poyle Trading Estate and industrial estates along the western edge of Uxbridge, Harmondsworth and Colnbrook, while major office developments are concentrated in Uxbridge and Staines.

Future Situation

3.4.3 As in the case of residential development, Green Belt policies focus attention on redevelopment and restructuring as opposed to green field developments. Nevertheless, the very high development values in the Colne Valley, encourage exploration by developers of every avenue to gain planning permission on Green Belt land, including tying development proposals to major improvement schemes desired by the local authority and of benefit to the wider community. At present the only firm Green Belt proposal of this nature, supported by the local authority, is Prospect Park (the potential new British Airways Headquarters), lying immediately to the north-west of Heathrow. Nevertheless, other developments of this type will inevitably come forward in the future.

Implications for the Water Environment

3.4.4 Large commercial/industrial developments can have a significant impact on the water environment, not least through:

- increased surface water run-off , which can exacerbate flood flows and lead to pollution of water courses;
- adverse changes to channel geomorphology to accommodate the development;
- increased demand on water resources, leading to further drawdown of the chalk aquifer; and
- reduction in flood defence levels of service if the development is constructed in the floodplain.

3.4.5 On the other hand, if these problems can be overcome through careful planning, such developments can offer significant opportunities for the introduction of major mitigation and enhancement measures, often forming part of wider environmental objectives.

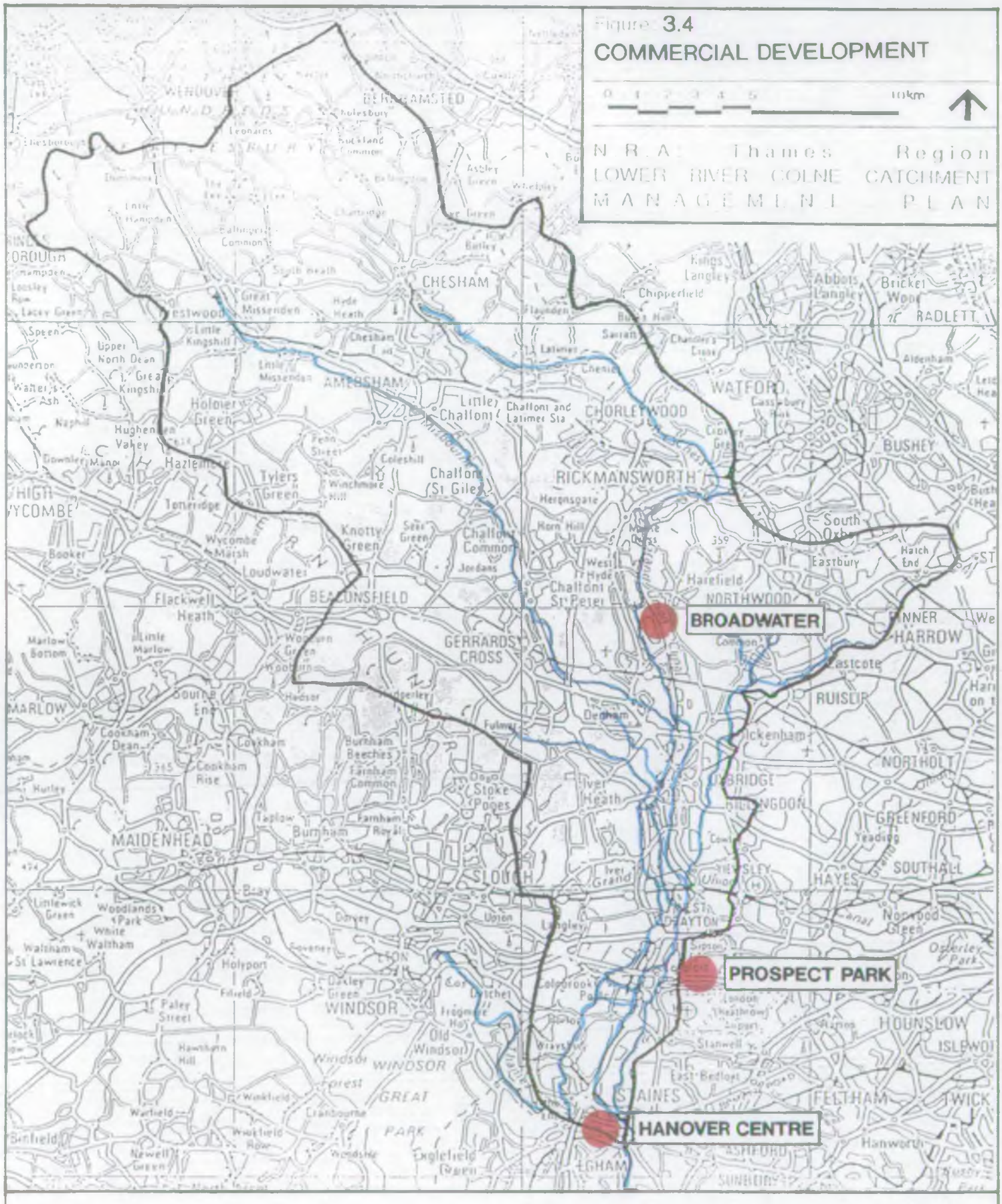


Figure 3.4
COMMERCIAL DEVELOPMENT
0 1 2 3 4 5 10km
N R A Thames Region
LOWER RIVER COLNE CATCHMENT
MANAGEMENT PLAN
BROADWATER
PROSPECT PARK
HANOVER CENTRE
CHESHAM
AMERSHAM
BEACONSFIELD
GERRARDS CROSS
MAIDENHEAD
WINDSOR
SLOUGH
RICKMANSWORTH
WATFORD
HARROW
RUISLIP
NORTHOLT
GREENFORD
SOUTHALL
HOUNSLOW
FELTHAM
TWICKENHAM
STAINES
EGHAM
MARLOW
HIGH WYCOMBE
Likely Major Commercial Developments

3.5 COMMUNICATIONS

The Current Situations

3.5.1 Successive improvements in communication links have been a major spur to development in the Colne Valley with the M4, M40 and M25 now being the dominant transport links within the catchment.

Future Situation

3.5.2 The catchment's location ensures that it will continue to be subject to great pressure for major infrastructure development. Plans for an M25 Motorway Service Station in the Colne Valley have been dropped, but there are proposals to improve the motorway network by:

- widening the M25 to dual 4 from the M4 intersection northward to well outside the catchment;
- widening the M4 to dual 4 westward from the M25 intersection.

(In both cases widening will be largely within existing highway land).

3.5.3 In addition, Heathrow Airport Ltd. (HAL), propose to construct a fifth terminal at Heathrow (T5) between the existing airport and the M25. This will require both a new terminal building and major new infrastructure, including:

- a new motorway link and associated distributor roads (Scheme 1B2) feeding into the M25 between the M4/M25 Intersection and the Poyle Intersection;
- localised improvement of roads crossing the M25;
- new grade separated collector distributor roads between the M4/M25 Intersection and Junction 4 of the M4, plus widening of the M4 from dual 3 to dual 4 between Junctions 3 and 4.

Implications for the Water Environment

3.5.4 The implications of these proposals have or are being investigated by the NRA TR in a number of separate studies. The road proposals will not take any significant land from the floodplain, as works are largely being carried out within the existing road corridor, but they will lead to increased road run-off which could affect river water quality and will increase river flood flows. The M25/T5 proposals will also require the relocation of lengths of the Wraysbury River and Bigley Ditch.

3.5.5 At the same time, Terminal 5 and its ancillary works, such as car parking, will take a small area of land from the existing floodplain which, in terms of the Lower Colne Flood Alleviation Scheme, can be compensated by the widening of Moor Bridge. Water quality in the catchment should not be affected by the new terminal as all airport surface water run-off will be carried to the Bedfont Lakes complex in the Crane catchment, where it could have considerable impact.

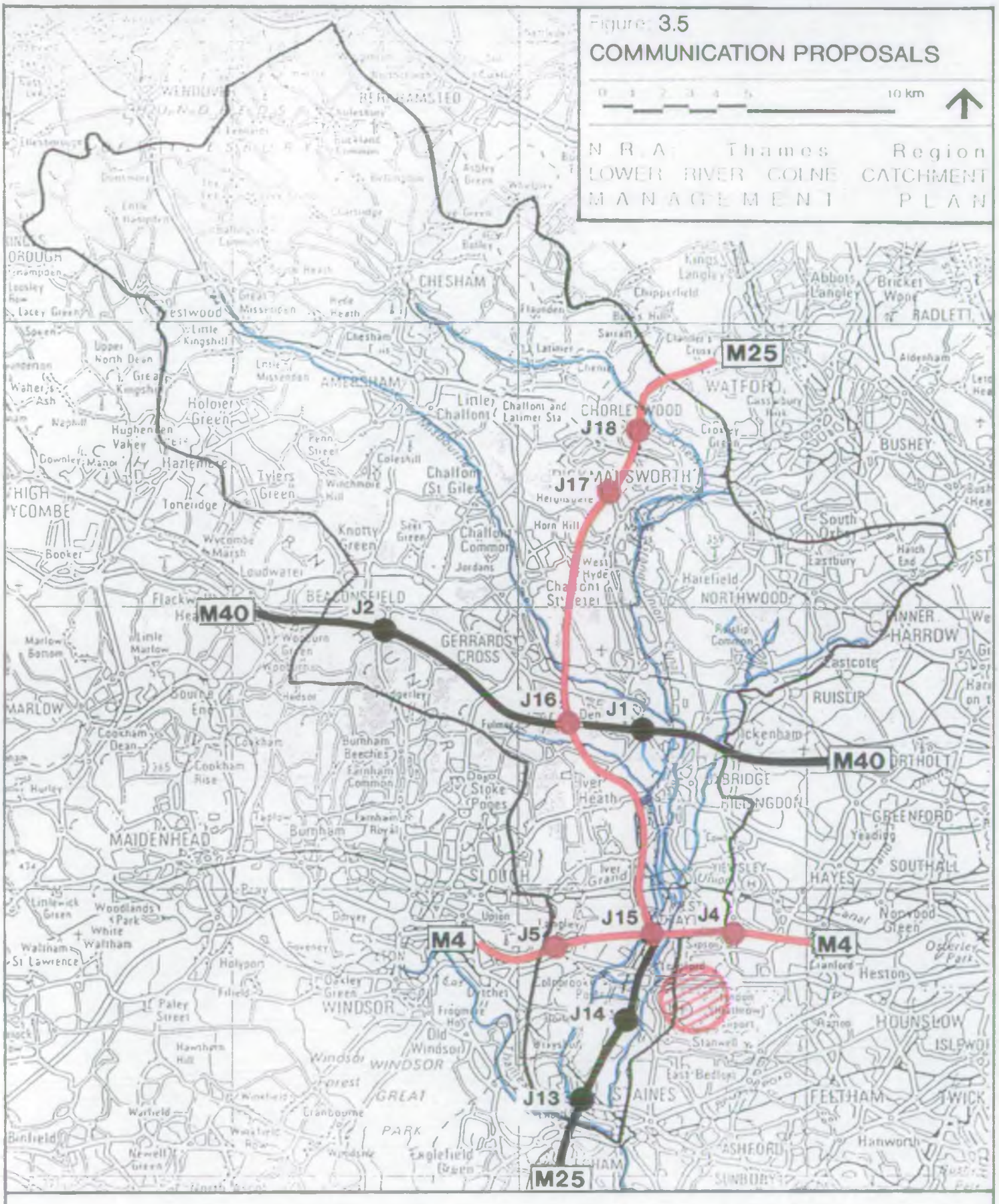


Figure 3.5
COMMUNICATION PROPOSALS
0 1 2 3 4 5 10 km
N R A Thames Region
LOWER RIVER COLNE CATCHMENT
MANAGEMENT PLAN
M25
M40
M4
J18
J17
J16
J15
J14
J13
J12
J5
J4
J2
J1
CHESHAM
AMERSHAM
WATFORD
BUSHEY
HIGH WYCOMBE
GERRARDS CROSS
MAIDENHEAD
WINDSOR
SLOUGH
HARROW
RUISLIP
NORTHWOOD
HAYES
SOUTHALL
HOUNSLOW
HEATHROW
Proposed Widening of M4 & M25 Motorways
Terminal 5, Heathrow Airport

3.6 MINERALS/WASTE DISPOSAL

The Current Situation

3.6.1 Since the 1930s gravel extraction has had a fundamental impact on the character and hydrology of the Colne Valley. The extensive mature wet gravel pits of the valley floor have become highly valuable wildlife and landscape features. The more recent areas of gravel extraction have tended to be in the south of the Valley between Yiewsley and Wraysbury. The majority of these have been used for landfill and restored to agriculture (often low grade) with doming above surrounding land. Thus mineral extraction has created some of the finest features in the Colne Valley (mature wet gravel pits) and has caused some of the worst affects of landscape degradation (poorly restored landfill sites).

Future Situation

3.6.2 Although a large percentage of the valley gravels have now been exploited, economic pressures necessitate the release of further land for mineral extraction and use of void space for landfill.

3.6.3 The County Minerals plans define 'preferred areas' where future mineral extraction will be favoured. They may also indicate 'prospect areas' where extraction may sometimes be permitted, and 'restricted areas', where extraction will not be allowed. Within the Colne Valley the majority of 'preferred sites' are in Buckinghamshire, including a major site in the Denham area, whilst the most important restricted areas are along the eastern edge of Slough, north of Hythe End and Staines Moor itself.

3.6.4 By comparison, the location of future landfill sites is not clear. Some minerals plans, notably Buckinghamshire's, indicate requirements for landfill, but more commonly decisions are taken on a site by site basis as new applications come forward.

3.6.5 Currently the most pressing problems associated with landfill are outstanding planning conditions which require the filling of at least 14 of the old mature wet gravel pits of the Colne Valley, including some of exceptionally high wildlife interest, such as Broadwater and the Wraysbury Pits.

Implications for the Water Environment

3.6.6 The prime problems of mineral workings relate to their subsequent use for landfill. In particular:

- past doming of landfill sites above original ground level has taken substantial areas out of the floodplain so increasing the risk of flooding. Any further loss of floodplain through doming would reduce the effectiveness of the Lower Colne Flood Alleviation Scheme.

- filling of established wet gravel pits would reduce their flood attenuation capacity, as well as leading to the loss of some nationally important habitats;

- backfilling of gravel workings with impermeable material forms a barrier to groundwater movement, resulting in increased groundwater levels on the upstream side with a mirror decrease in levels on the downstream side;

- backfilling with putrescible or hazardous wastes over permeable materials can lead to pollution of groundwater. This is a particular concern in older pits filled before the more stringent controls introduced under the Control of Pollution Act, 1974.

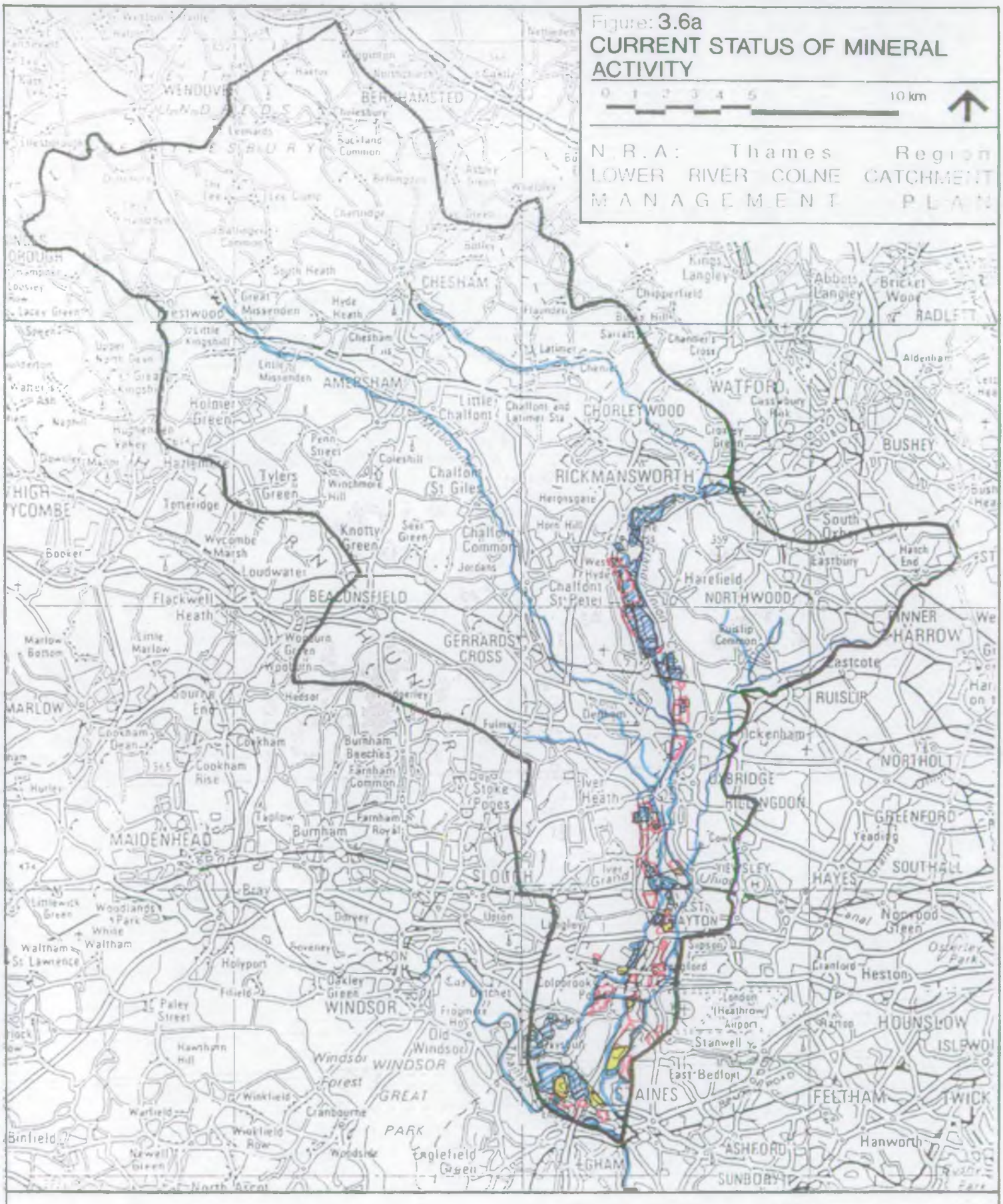


Figure: 3.6a
CURRENT STATUS OF MINERAL ACTIVITY
0 1 2 3 4 5 10 km
N.R.A: Thames Region
LOWER RIVER COLNE CATCHMENT MANAGEMENT PLAN
Worked Out Wet Pits
Recent Consents and Existing Workings
Recent Filling Where Known

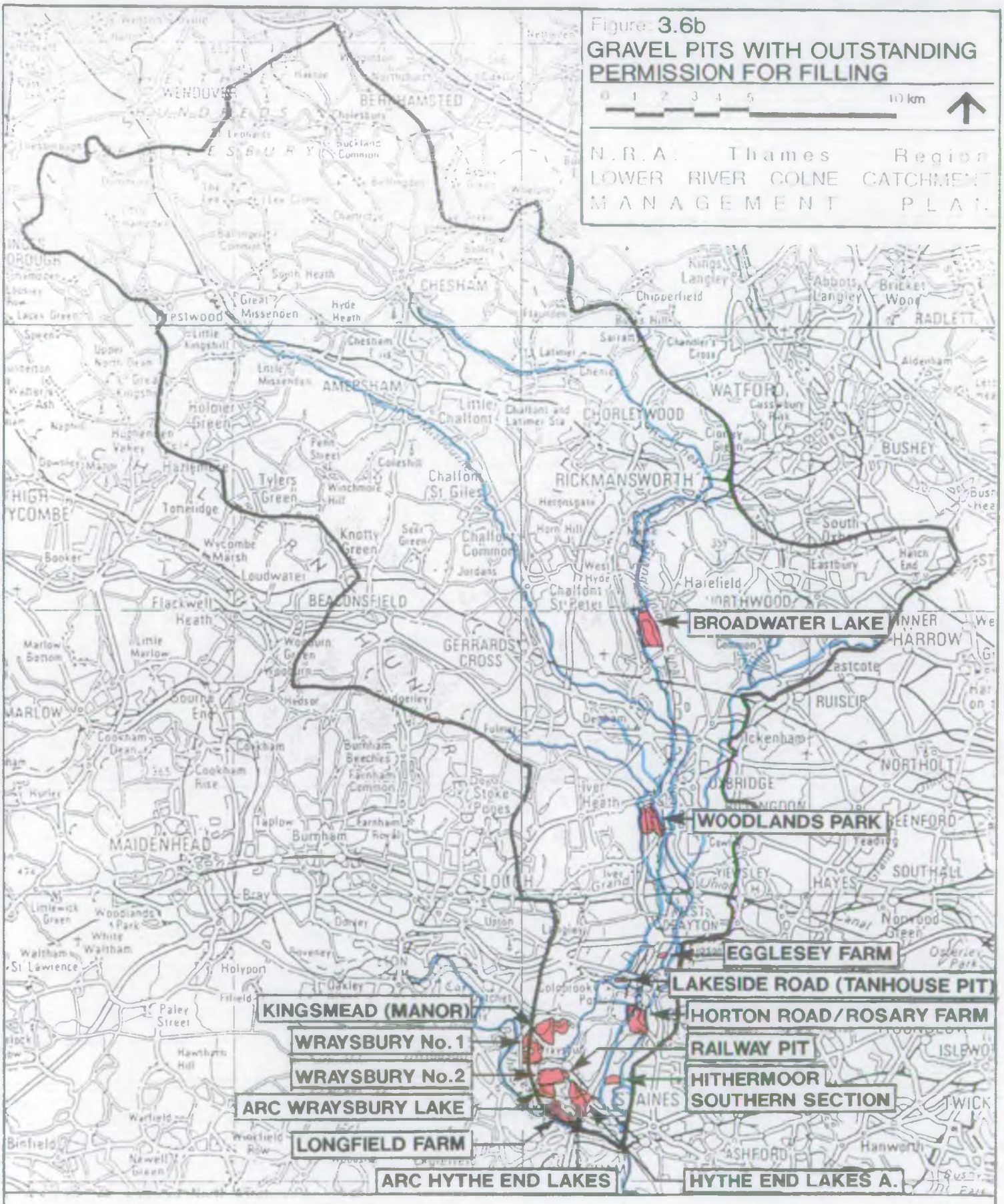
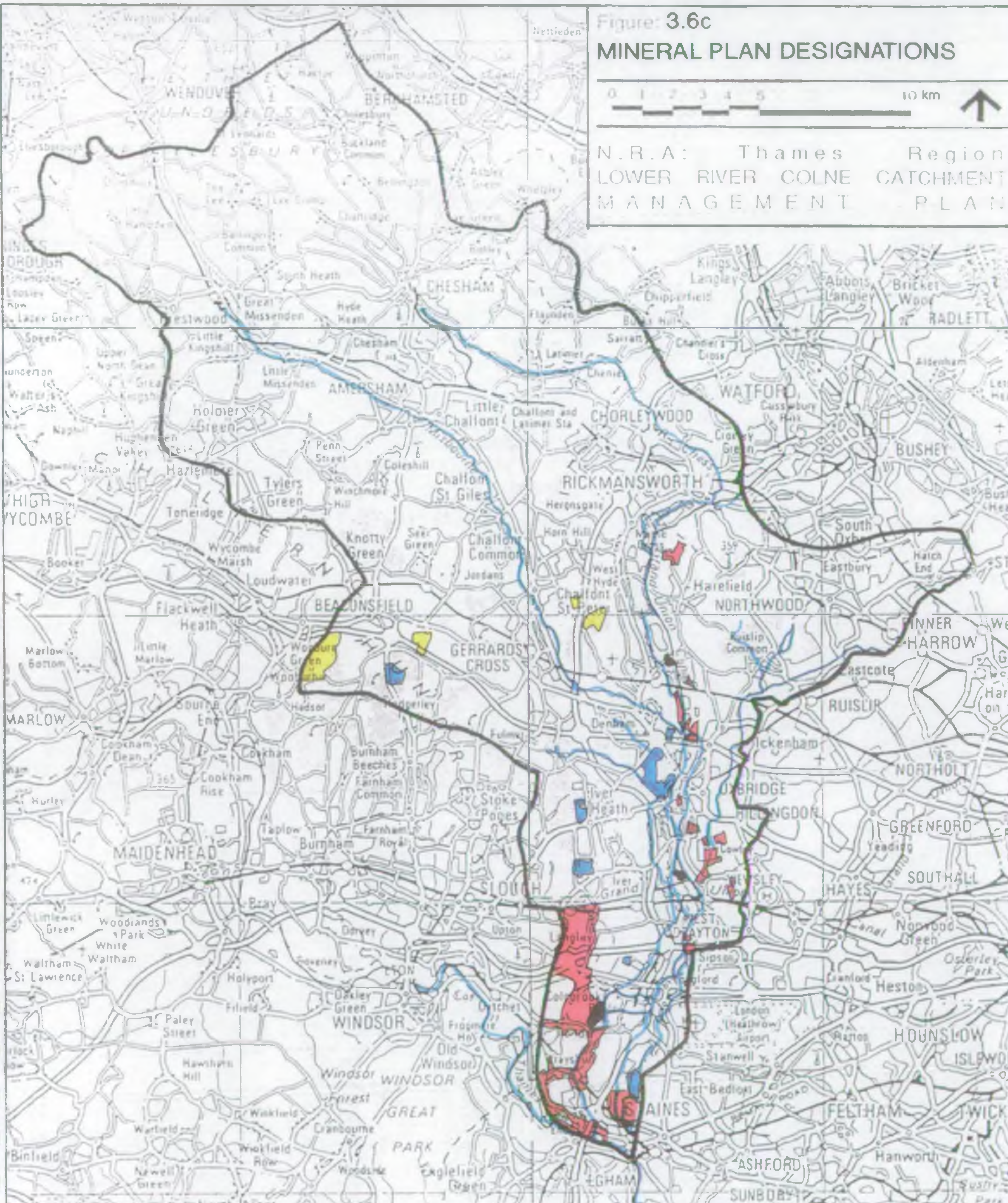


Figure 3.6b
GRAVEL PITS WITH OUTSTANDING PERMISSION FOR FILLING
0 1 2 3 4 5 10 km
N.R.A. Thames Region
LOWER RIVER COLNE CATCHMENT MANAGEMENT PLAN
BROADWATER LAKE
WOODLANDS PARK
EGGLESEY FARM
LAKESIDE ROAD (TANHOUSE PIT)
HORTON ROAD/ROSARY FARM
RAILWAY PIT
HITHERMOOR
SOUTHERN SECTION
KINGSMEAD (MANOR)
WRAYSBURY No.1
WRAYSBURY No.2
ARC WRAYSBURY LAKE
LONGFIELD FARM
ARC HYTHE END LAKES
HYTHE END LAKES A.
CHESHAM
AMERSHAM
RICKMANSWORTH
WATFORD
BEACONSFIELD
GERRARDS CROSS
MAIDENHEAD
SLOUGH
HARROW
RUISLIP
NORTHOLT
SOUTHALL
HAYES
ASHFORD
Gravel Pits with Outstanding Permission for Filling

Figure: 3.6c

MINERAL PLAN DESIGNATIONS

N.R.A: Thames Region
LOWER RIVER COLNE CATCHMENT
MANAGEMENT PLAN



Prefered Areas, Restoration Water, Inerts or Unspecified

Prefered Areas, Putrescible Waste Restoration

Prospect Areas

Areas of Restriction or Objection

3.7 AGRICULTURE

The Current Situation

3.7.1 The tributary valleys of the Misbourne and Chess are still predominantly in agricultural use (grazing and arable). Conversely few viable agricultural units remain in the Colne Valley. Here the combined effects of urbanisation and fragmentation associated with gravel extraction have resulted in a highly complex pattern of land ownership and occupancy, with gravel companies having significant involvement in agriculture. Inherently non-viable holdings achieve an income through horse grazing or farm-related enterprises, or are rented without security of tenure by large farm businesses centred some distance away.

3.7.2 Thus within this catchment current agricultural activity largely reflects land use pressures rather than agricultural land quality. The high quality free draining soils (Grades 1 and 2) overlying the gravels of the Colne Valley have all but been lost to gravel extraction whereas the lower grade soils of the Chilterns and valley sides (Grades 3a and 3b) remain in agricultural production.

Future Situation

3.7.3 At present there is an acute national downturn in the agricultural economy. Agricultural units suffering most are those at the margins, ie. the majority of the holdings in the Colne Valley. The likely effects of this will be to encourage:

- marginal farm holdings to move entirely out of agriculture;
- mineral companies to seek recreational rather than agricultural end uses for new mineral sites;
- larger agricultural units, such as those in the Chilterns, to explore options for agricultural diversification;
- further long term land speculation.

3.7.4 The combination of these shifts could lead to further dramatic changes in the landscape, with increasing suburbanisation of the Chiltern and Colne valleys.

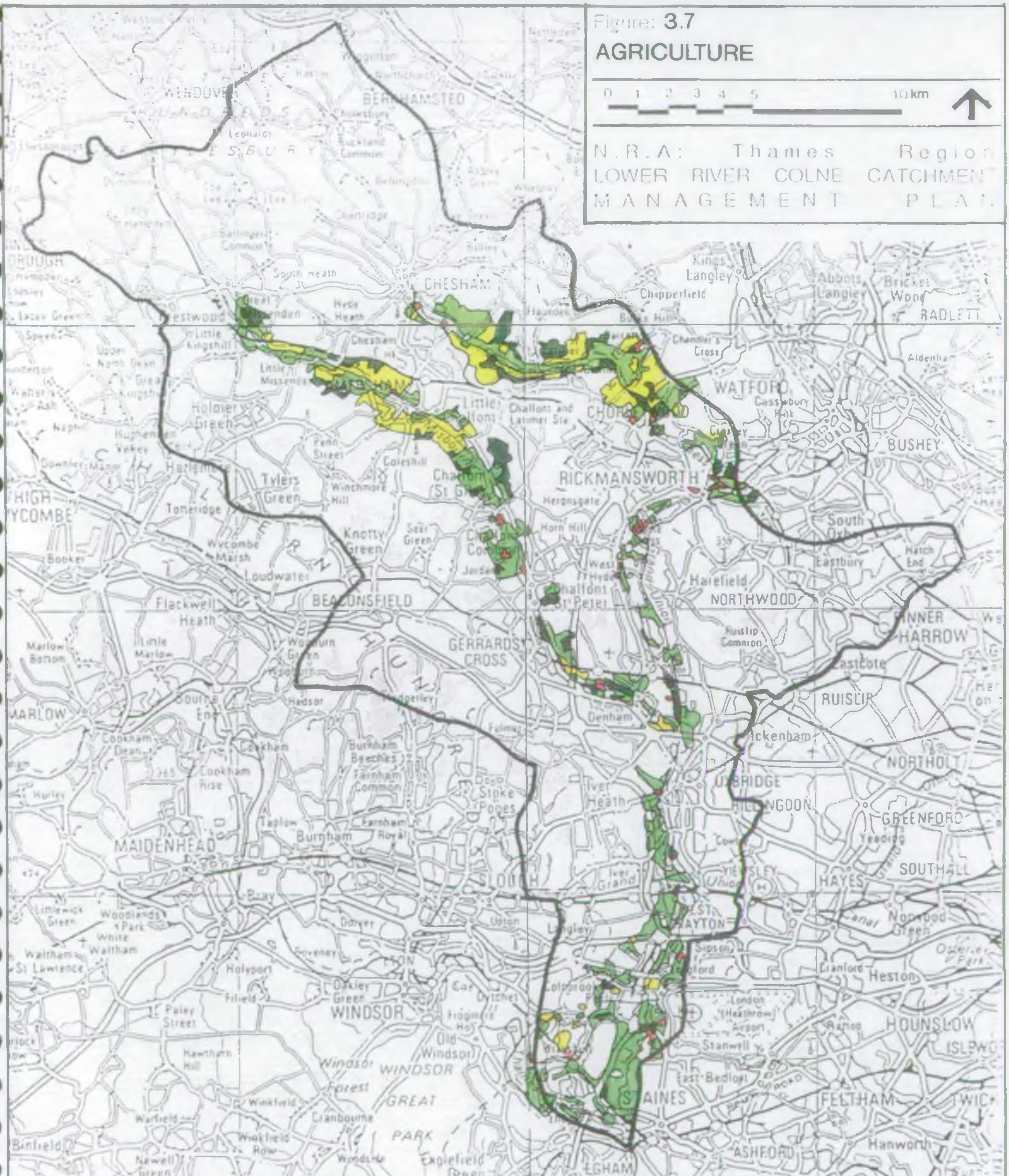
Implications for the Water Environment

3.7.5 In the recent past, agricultural activities affected the water environment, not least through pollution of water courses and aquifers, and by the straightening of watercourses to accommodate arable production (as seen on parts of the Misbourne). The primary effect of current agricultural changes, however, may be to place further emphasis on the landscape and conservation importance of the rivers as one of the few remaining features of continuity in an otherwise changing scene.

Figure: 3.7
AGRICULTURE

0 1 2 3 4 5 10 km

N.R.A: Thames Region
LOWER RIVER COLNE CATCHMENT MANAGEMENT PLAN



WENDOVER
BERKHAMSTED
CHESHAM
Chipperfield
Kings Langley
Abbots Langley
WATFORD
BUSHEY
RICKMANSWORTH
HIGH WYCOMBE
BEACONSFIELD
GERRARDS CROSS
NORTHWOOD
Harefield
RUISLIP
PINNER
HARROW
Eastcote
Ickenham
UXBRIDGE
HILLINGDON
NORTHOLT
GREENFORD
SOUTHALL
HAYES
MARLOW
MAIDENHEAD
SLOUGH
WINDSOR
STAINES
EGHAM
ASHFORD
FELTHAM
HOUNSLOW
Heston
Stanwell
Denham
Iver Heath
Stoke Poges
Burnham
Langley
Colnbrook

Arable

Pasture

Horticulture

Woodland

3.8 RECREATION AND AMENITY

The Current Situation

3.8.1 The catchment is a valuable recreational resource. The rivers and wet gravel pits of the Colne Valley Park provide a regional resource for angling and water-based activities centred on the pits, especially dinghy and board sailing, water skiing, and canoeing. All these activities are primarily club run.

3.8.2 By comparison, formal land-based sports provision is local in character, although there are a number of golf courses which serve a wider audience. However, it is primarily for informal recreation that the Colne Valley Park has been developed although this potential has yet to be fully realised.

Future Situation

3.8.3 To redress the balance, the Colne Valley Park has proposed a programme of improvements for informal recreation for the period to 1998. This will improve informal provision in the north and middle of the Colne Valley but still makes no major provision at the southern end. The proposals include a Wildfowl Centre based on Broadwater (Colneside), Country Parks in the areas of Denham Court/Denham Quarries and Little Britain, and a variety of footpaths, bridleways and picnic sites, many of which relate to the rivers. Of more strategic importance are proposals to draw the Colne Valley and its tributaries into the growing network of regionally and nationally important long distance rights-of-way. Proposals include:

- a footpath link between the Thames long distance footpath and the Grand Union Canal towpath, so linking the Thames to the footpaths of the Midlands;
- a Misbourne Valley footpath linking Wendover to Denham;
- a bridleway running the length of the Colne Valley which will link to the Ridgeway via a developing network of regional routes.

3.8.4 Although there are no strategic plans for the improvement of land-based formal sports facilities, current land use trends (see Minerals and Agriculture) will probably lead to an increase in golf courses and other financially lucrative sporting uses. A major private golf course development is at present underway in the grounds of Denham Court.

Implications for the Water Environment

3.8.5 The current determinants of recreation provision in the catchment are mineral extraction, landfill/development proposals and, increasingly, agricultural diversification. Nevertheless new river works can also offer major opportunities for the creation of strategic riverside links; although increased public access needs to be carefully planned if it is not to adversely affect the wildlife interest of the rivers and wetlands.

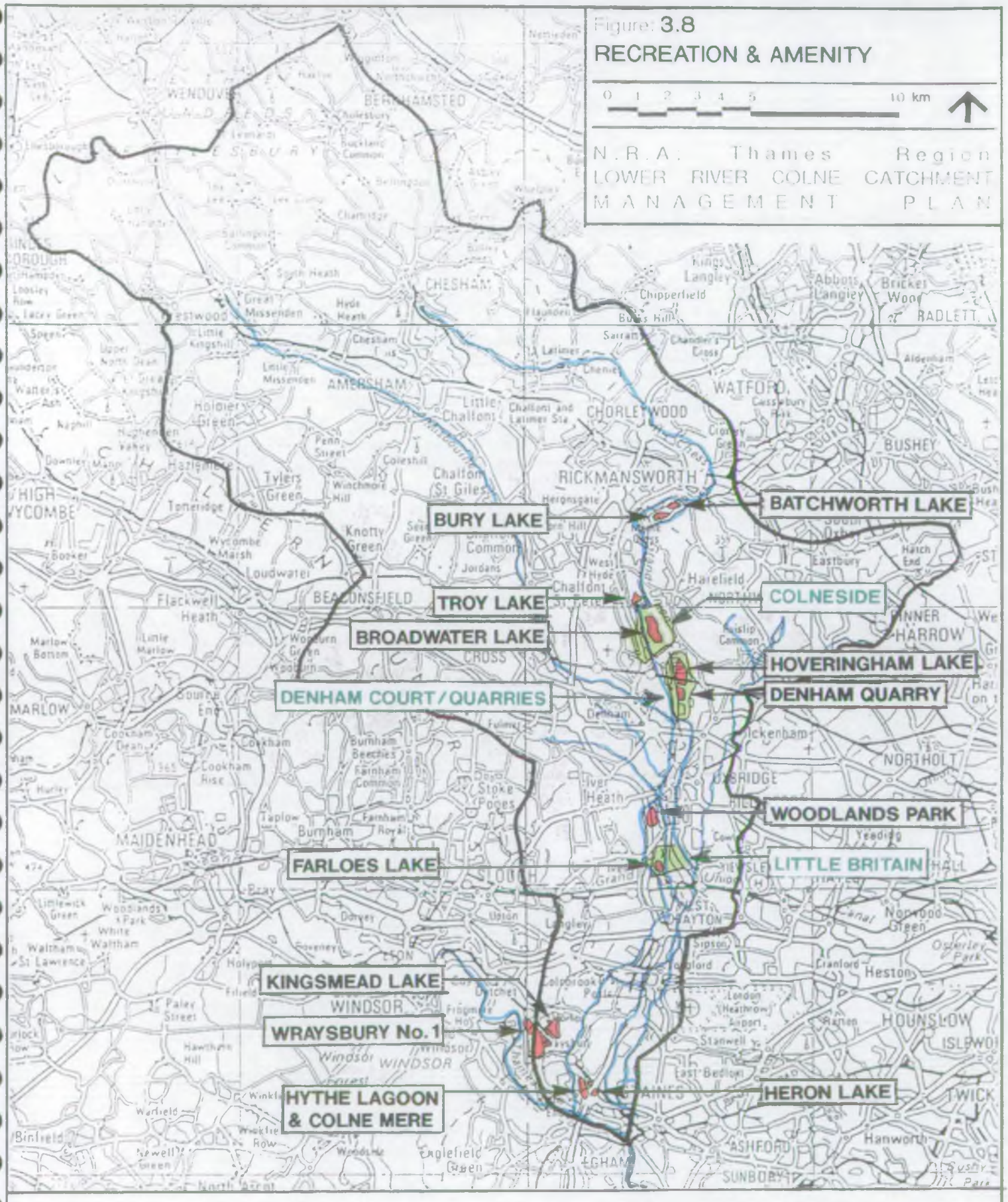


Figure: 3.8
RECREATION & AMENITY
0 1 2 3 4 5 10 km
N.R.A. Thames Region
LOWER RIVER COLNE CATCHMENT
MANAGEMENT PLAN
BATCHWORTH LAKE
BURY LAKE
COLNESIDE
TROY LAKE
BROADWATER LAKE
HOVERINGHAM LAKE
DENHAM COURT/QUARRIES
DENHAM QUARRY
WOODLANDS PARK
FARLOES LAKE
LITTLE BRITAIN
KINGSMEAD LAKE
WRAYSBURY No. 1
HERON LAKE
HYTHE LAGOON & COLNE MERE
Existing Formal Water Based Recreation
Proposed Country Parks

3.9 NAVIGATION

The Current Situation

3.9.1 The Grand Union Canal runs down the Colne Valley as far south as Yiewsley. Recreational boat traffic is the principal user and, although traffic density is not high in the Lower Colne area, pressure for moorings is much heavier as London is approached.

Future Situation

3.9.2 The Inland Waterways Association has put forward a proposal whereby the Grand Union Canal would be linked to the non-tidal Thames via the rivers of the Colne Valley. This would involve seven locks and extensive canalisation of parts of the Colne Brook, Poyle Channel and Wraysbury River, and would cost in excess of £30 million (1987 prices). Regardless of these proposals, BWB would like to create more visitor moorings on the existing canal to encourage boat tourists, preferably sited off the line of the canal, including a proposed 100 berth marina on the Slough Arm of the Grand Union Canal, near Iver.

Implications for the Water Environment

3.9.3 There is little doubt that the proposed Colne Valley Navigation Link (CVNL) would have a fundamental adverse impact on the rivers affected, destroying any remaining natural geomorphology, severely affecting ecological interest, and potentially contributing to low flows. On the other hand, carefully controlled development of recreational facilities on the existing canal could enhance the character of the Valley.

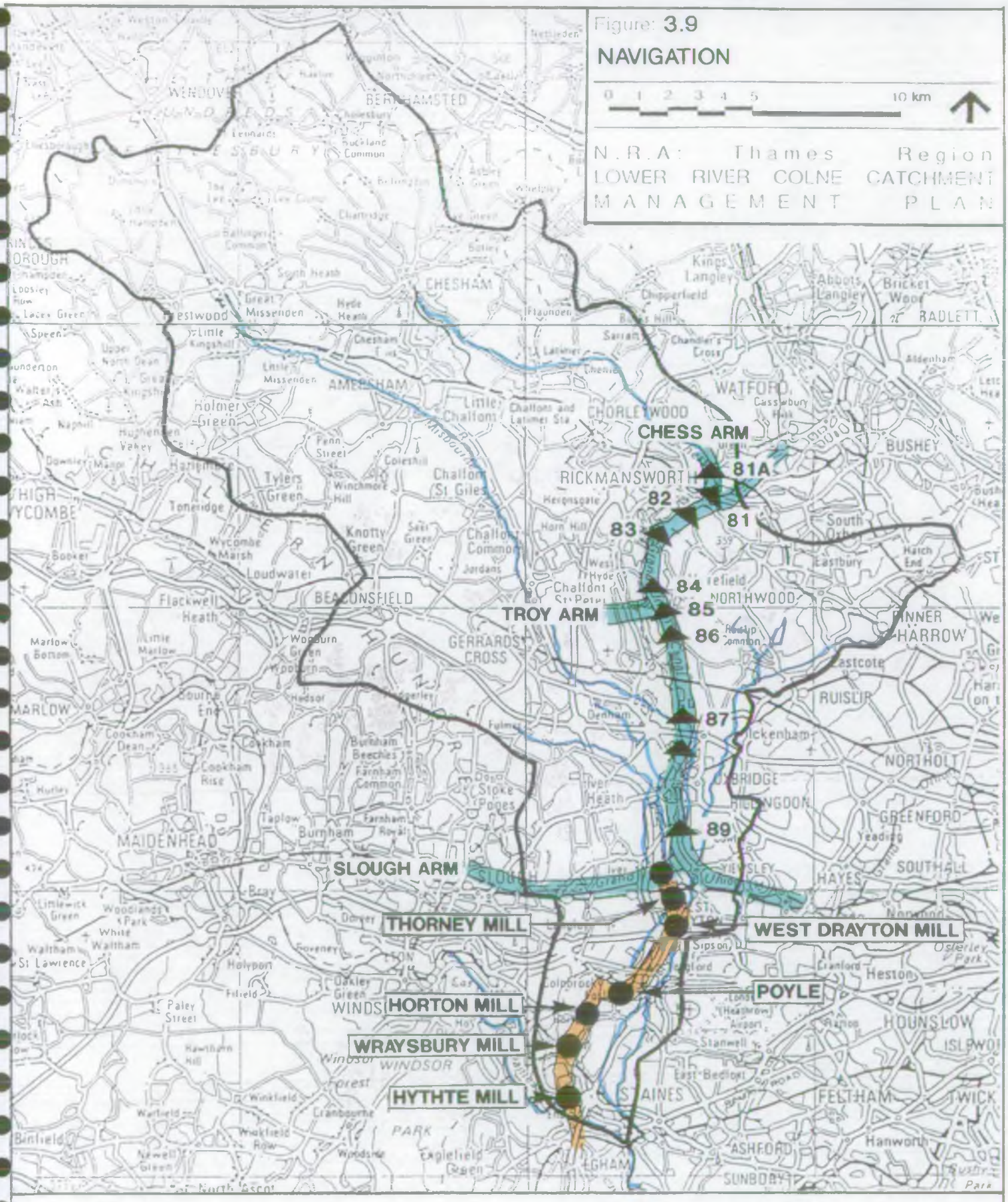


Figure: 3.9
NAVIGATION
0 1 2 3 4 5 10 km
N.R.A: Thames Region
LOWER RIVER COLNE CATCHMENT
MANAGEMENT PLAN
CHESS ARM
TROY ARM
SLOUGH ARM
81A
81
82
83
84
85
86
87
89
THORNEY MILL
WEST DRAYTON MILL
POYLE
HORTON MILL
WRAYSBURY MILL
HYTHTE MILL
Grand Union Canal
Existing Locks
Colne Valley Navigation Link
New Lock Structures (IWA Proposal 1986) as part of C.V.N.L.

3.10 ARCHAEOLOGY/HERITAGE

The Current Situation

Archaeology

3.10.1 The varying geology of the catchment influenced early human occupation. The fertile soils of the Colne Valley gravels favoured early settlement, whilst the clays of the centre and east, and the chalk of the north, proved less hospitable. As a result, archaeological finds are concentrated in the Colne Valley.

3.10.2 A total of 566 archaeological sites or find spots have been recorded across the catchment of which five are scheduled Ancient Monuments. These range from palaeolithic to post medieval times although, in terms of numbers, the prehistoric period (neolithic, bronze and iron age) predominates. The area between Stanwell and Staines is particularly rich in neolithic as well as late bronze and iron age sites, whilst Staines has an important Roman history having developed as a bridgehead of the Thames.

Heritage

3.10.3 The main settlements of the catchment date from the Saxon period and many were closely related to the river system as crossing points, mill sites and spring-line settlements. In the Chilterns, settlements were probably somewhat later, relating to the Medieval Period.

3.10.4 Today there are no less than 33 designated Conservation Areas within the river valleys. These cover many waterside settlements whilst many waterside buildings and structures are also listed.

Future Situation

3.10.5 The main concern of the constituent local authorities is to conserve the character of these listed buildings and Conservation Areas.

Implications for the Water Environment

3.10.6 NRA activities could disrupt listed mills, riverside houses and related structures, and traditional canal vernacular. Equally vulnerable are buried riverside structures of archaeological importance which may have been preserved by waterlogging. Such features should be conserved as part of any NRA operations.

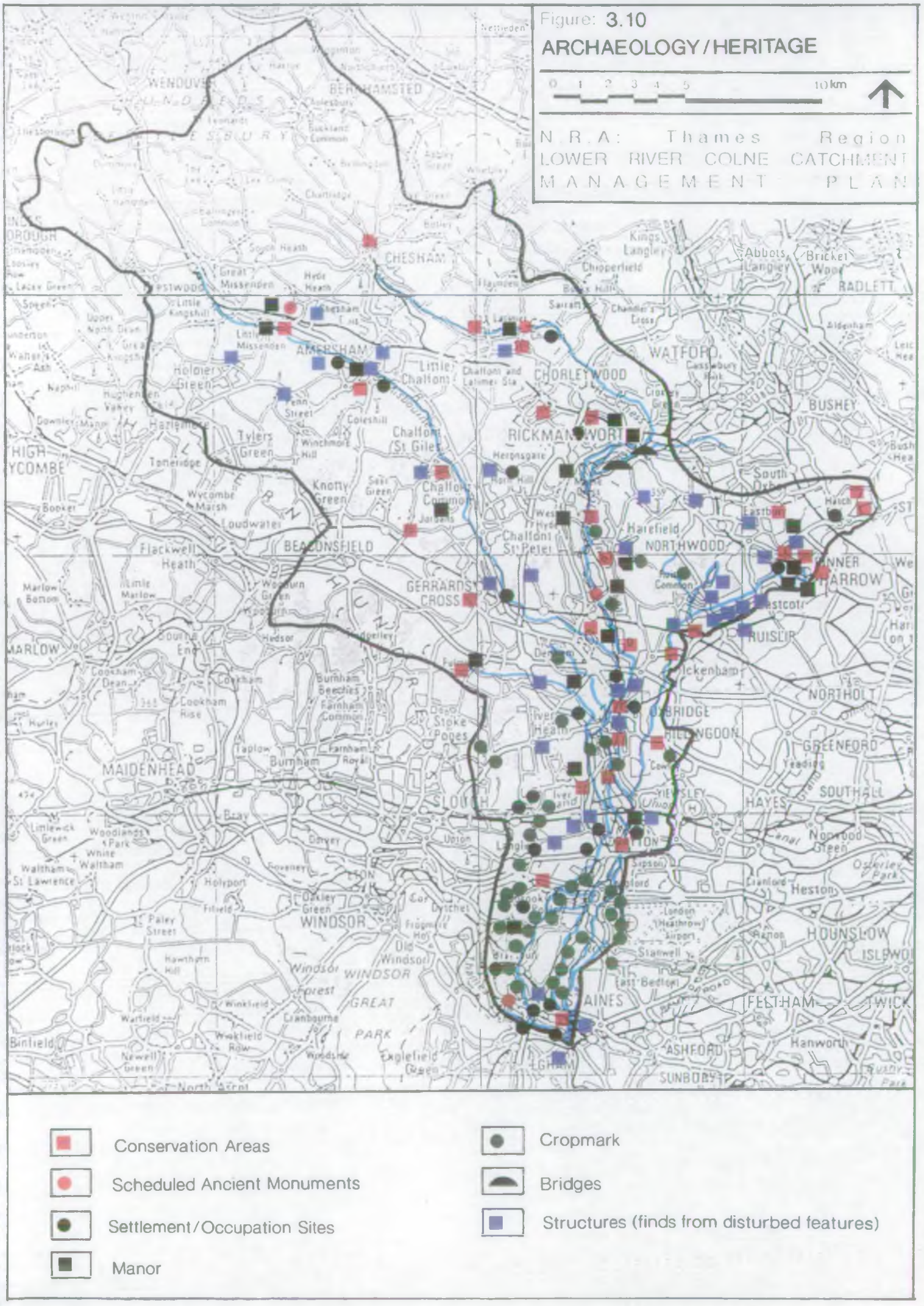


Figure: 3.10
ARCHAEOLOGY / HERITAGE
0 1 2 3 4 5 10km
N.R.A: Thames Region
LOWER RIVER COLNE CATCHMENT
MANAGEMENT PLAN
Conservation Areas
Scheduled Ancient Monuments
Settlement / Occupation Sites
Manor
Cropmark
Bridges
Structures (finds from disturbed features)

3.11 FLOOD DEFENCE

The Current Situation

The Lower Colne Flood Alleviation Scheme

3.11.1 The last major river flood in the Lower Colne Valley occurred in March 1947. Since then there have been several lesser events, with the most recent occurring in October 1987 and May 1988. These led to flooding of properties, particularly in the Colnbrook, Wraysbury and Uxbridge areas. A feature of Lower Colne river floods is their relatively long duration, possibly lasting a week or more.

3.11.2 There has been a dramatic increase in flood risk in the Colne Valley since 1947, with loss of floodplain to development and raised landfill sites, and with increased run-off associated with major development outside the floodplain. In 1987 the potential flood damage associated with a 1:100 year flood event was valued at £18 million, involving over 2,000 homes and many industrial premises. A major scheme is now being implemented to alleviate this problem. This has undergone wide public consultation and seeks to minimise environmental damage whilst maximising enhancement opportunities. Retention of floodplain storage is a fundamental tenet of the proposals, which also include removal of bottle-necks, transfer of flood flows between existing channels and new bypass channels.

3.11.3 In total the scheme consists of some 60 works between Rickmansworth and Staines costing £11m. (1990 prices). Site work commenced in 1988 with completion due in 1995.

3.11.4 Although a comprehensive scheme, some problems remain including identification of: properties still subject to localised flooding, river structures subject to blockage for which there are no refurbishment proposals, and works within the original scheme which require further refinement before implementation (most notably flood conveyance through and/or around Staines).

3.11.5 A recent public survey of the scheme indicates that residents are now generally more confidant about being protected from flooding, although the efficiency of the works has yet to be tested. But the most important factor to emerge was that respondents still felt uninformed about flooding and the alleviation proposals.

Other Flooding Problems

3.11.6 Apart from the Colne the other main sources of flooding within the catchment are: the Pinn, the Thames and surface and ground water drainage.

3.11.7 **The River Pinn:** This river exhibits very peaky flood flows due to its highly urbanised catchment. Following extensive flooding in August 1977, flood alleviation measures were introduced, including construction of a flood storage area at George V Avenue in the upper catchment. However, prior to completion of the work serious flooding in 1987 and 1988 (affecting 300 properties) led to a re-appraisal of the problems and a deferral of the implementation programme.

3.11.8 **The Thames:** Much of the southern end of the Colne Valley lies within the Thames floodplain and therefore is susceptible to Thames flooding. This problem is being addressed through a separate study (the Datchet, Wraysbury, Staines and Chertsey Flood Alleviation Scheme) which is at an early stage of preparation but is likely to involve the construction of a flood relief channel across the southern extremity of the Lower Colne Catchment between Datchet and Staines.

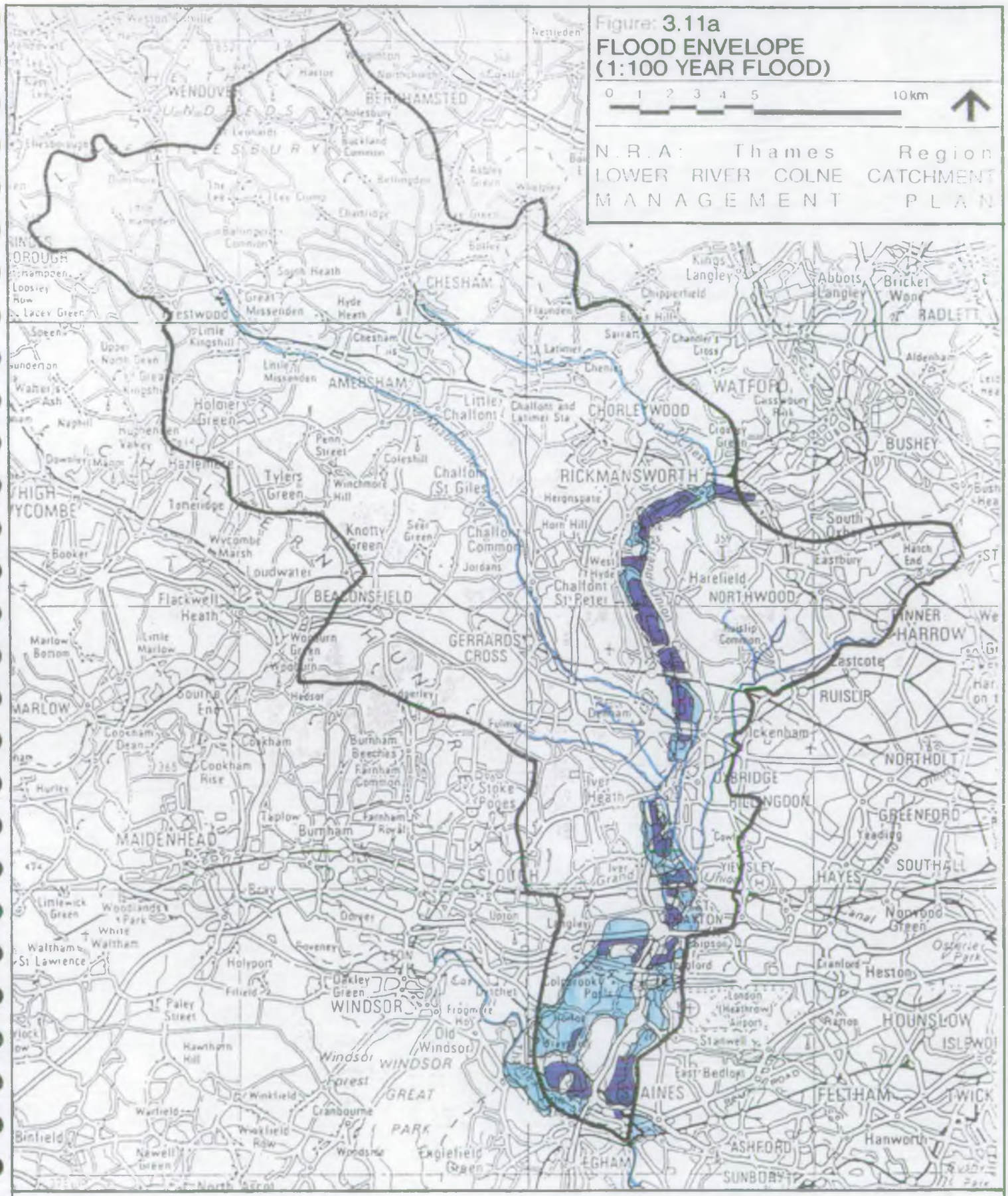


Figure: 3.11a
FLOOD ENVELOPE
(1:100 YEAR FLOOD)
0 1 2 3 4 5 10km
N.R.A: Thames Region
LOWER RIVER COLNE CATCHMENT
MANAGEMENT PLAN
1:100 Year Flood prior to Lower Colne Scheme
1:100 Year Flood post Lower Colne Scheme

3.11.9 **Non-main river flooding:** In the Colne Valley, although major flooding relates to the rivers, localised flooding is caused by the inadequate operation of the low level drainage system and by the rapid fluctuations in ground water levels associated with the gravels of the valley floor. This in turn can lead to infiltration of foul sewers. These problems have not been addressed to-date and so the NRA TR has to rely on inadequate information when advising local authorities on the implications of gravel extraction and landfill proposals, local drainage issues, and potential interactions with the sewerage system. This is of concern, in that for residents of the Valley the most common and frequent problems of flooding relate to these factors, rather than to river flooding which, although much more acute, only occurs relatively infrequently.

Future Situation

3.11.10 Problems of flooding in the Colne Valley will be exacerbated in the future if:

- there is any further erosion of the floodplain area through development, land doming or filling of existing wet pits;
- new green field developments outside the floodplain do not incorporate appropriate flood alleviation measures;
- no allowance is made for increased run-off associated with forthcoming road proposals.

3.11.11 Flood alleviation proposals may also be affected by future more extreme weather conditions associated with global warming.

Implications for the Water Environment

3.11.12 The above problems can be largely avoided if:

- the NRA are able to give precise details on the extent of the floodplain, allowing local authorities to develop an effective floodplain policy. Until recently, control of floodplain development has been hindered by a lack of accurate information on flooding;
- detailed modelling is undertaken to assess the implications of excess road run-off associated with the M4 widening (planned to be discharged largely to the low-level drainage system) and the M25 widening (planned to be discharged direct to the Colne Brook). The implications of the Terminal 5 road network has already been fully modelled and flood measures incorporated in the overall scheme;
- the effectiveness of flood alleviation options are modelled according to alternative climatic scenarios.

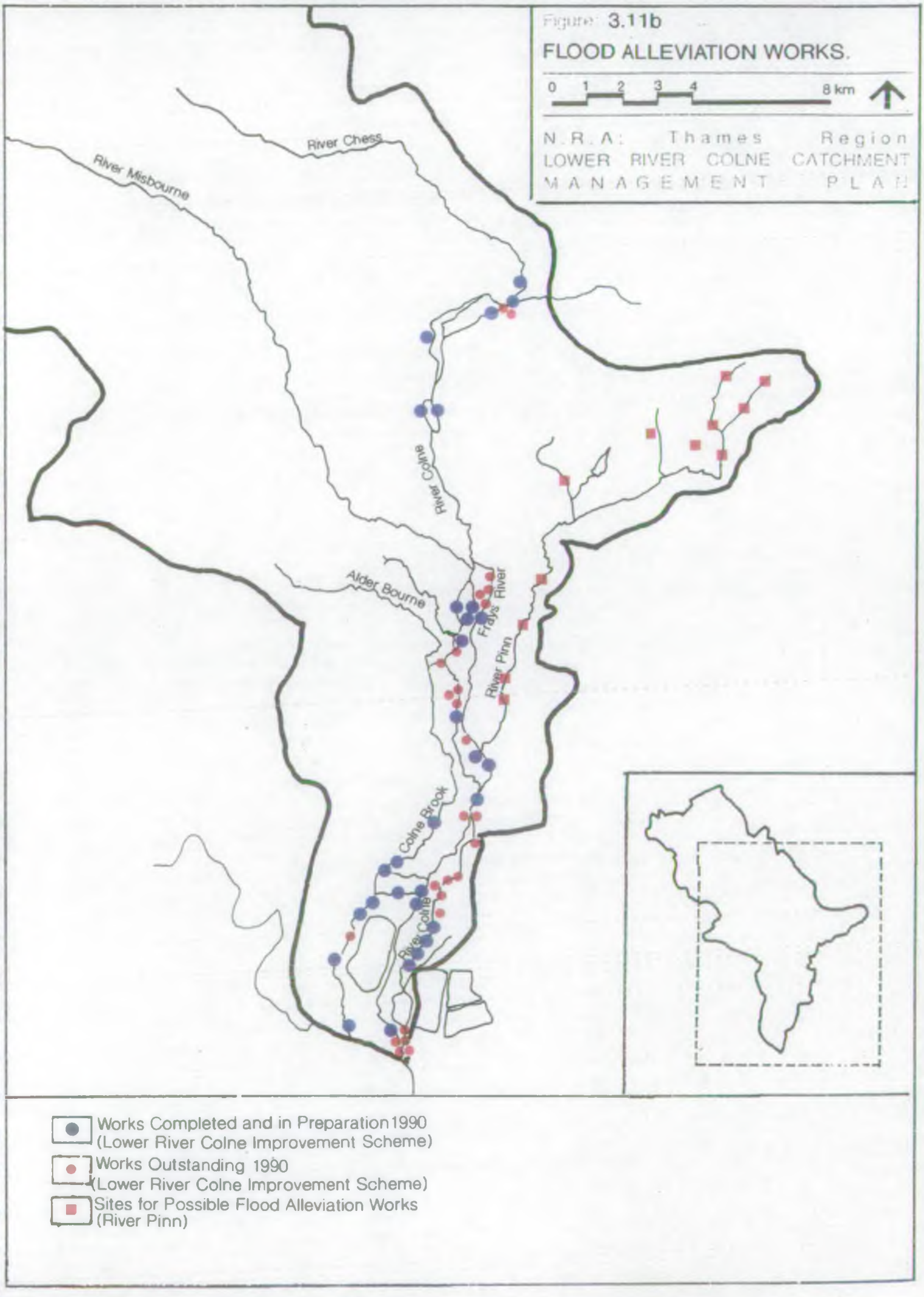


Figure 3.11b
FLOOD ALLEVIATION WORKS.
0 1 2 3 4 8 km
N.R.A: Thames Region
LOWER RIVER COLNE CATCHMENT MANAGEMENT PLAN
River Chess
River Misbourne
River Colne
Alder Bourne
Frays River
River Pinn
Colne Brook
River Colne
Works Completed and in Preparation 1990
(Lower River Colne Improvement Scheme)
Works Outstanding 1990
(Lower River Colne Improvement Scheme)
Sites for Possible Flood Alleviation Works
(River Pinn)

3.12 RIVER GEOMORPHOLOGY

The Current Situation

3.12.1 The rivers of the catchment are highly modified. Historically, the majority of the water courses were harnessed for power. More recently, reaches have been realigned to make way for development, major water storage reservoirs and road improvements and, in the case of the Misbourne, to accommodate agricultural improvements.

Future Situation

3.12.2 Further changes to river geomorphology in the catchment are most likely to arise from:

- on-going flood alleviation proposals including the Lower Colne Flood Alleviation Scheme and any potential work on the Pinn;
- major new commercial developments, such as the Hanover Centre proposed in Central Staines, which will require diversion of the lower reaches of the Colne and Wraysbury;
- infrastructure proposals, most notably Terminal 5 (T5) requiring relocation of a short length of the Colne, and the T5 distributor roads requiring relocation of lengths of the Wraysbury and Bigley Ditch.

Implications for the Water Environment

3.12.3 Whilst the above works could further decrease the geomorphological interest of the rivers, they could equally be turned to advantage to improve on the present situation:

- already a geomorphological input has been made to 12 of the Lower Colne Flood Alleviation Works, in all cases leading to a stable geomorphological design and in some cases allowing introduction of pool/riffle sequences with a meandering low flow channel;
- in the case of new development, the same effects could be achieved by providing geomorphological advice on planning applications and land drainage consents;
- in the case of the T5 road proposals the opportunity exists to recreate natural meandering water courses to replace the current trapezoidal channels of the Wraysbury and Bigley Ditch, realigned in this area during the original M25 construction. At present these river reaches provide a damaging discontinuity for wildlife, fisheries and in terms of landscape.

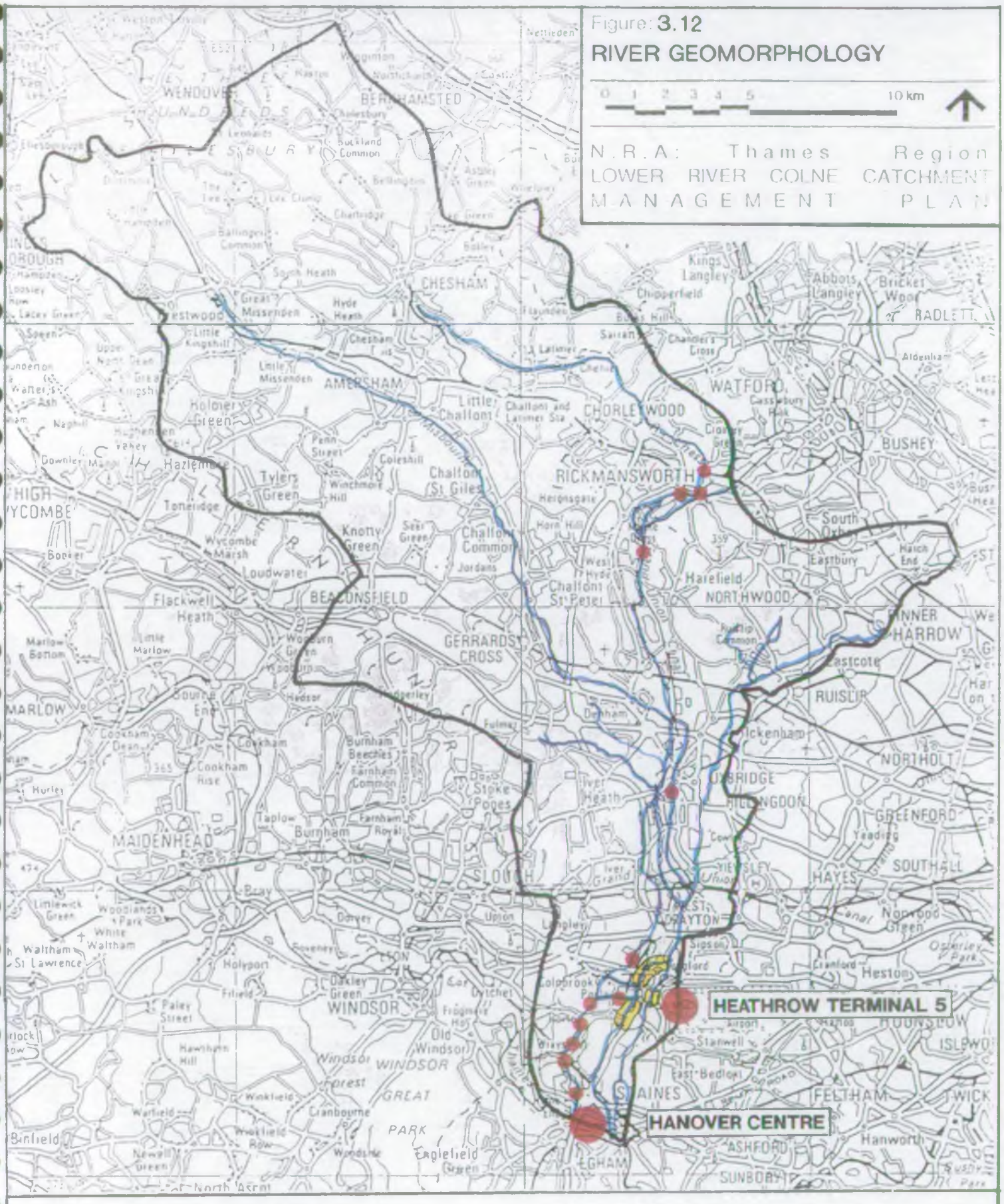


Figure: 3.12
RIVER GEOMORPHOLOGY
0 1 2 3 4 5 10 km
N
N.R.A: Thames Region
LOWER RIVER COLNE CATCHMENT
MANAGEMENT PLAN
HEATHROW TERMINAL 5
HANOVER CENTRE
Lower Colne Flood Alleviation Works which have had a Geomorphological Input
Major Development Proposals likely to affect River Geomorphology
Lengths of River Re-alignment associated with Development Proposals

3.13 WATER RESOURCES

3.13.1 The information which follows is included for completeness but will require substantial refinement when water resources are directly addressed in the catchment planning process.

The Current Situation

3.13.2 At present there is no public water abstraction points from the rivers of the catchment or from the gravels of the Colne Valley, other than one North Surrey Water Company emergency abstraction point. However, there is extensive abstraction from the chalk aquifer. This primarily relates to licensed boreholes located in the valleys of the Misbourne, Chess and Colne between Rickmansworth and the M40. These are operated by the Three Valleys Water Company who extract 74 million m^3 per annum from the chalk aquifer and supply up to 1 million people with potable water. This abstraction represents approximately 50% of the annual recharge of the aquifer but is still not enough to meet the needs of the catchment, which is a importer of water from Grafham in the Anglian Region.

3.13.3 This increasing groundwater abstraction from the chalk aquifer has lowered groundwater levels leading to derogation of base flows in the Misbourne. This has resulted in the river's perennial head moving about 5km downstream, long sections of the river drying up for the majority of the year and flows being reduced in the remaining wet sections upstream of Denham.

3.13.4 In response to increasing public concern a number of options have been examined to alleviate the low flows in the Misbourne. The two options currently being considered are either to reduce abstraction and pump from other resources, or to provide flow augmentation from a borehole at the confluence of the Misbourne with the Colne, connected to the head of the river by pipeline.

3.13.5 So far there have not been any major problems of low flow in the River Colne, partly because the varied geology of the catchment helps even out extremes of flow, and partly because the gravels which lie above the chalk in the Colne Valley have a perched water table which effectively buffers the Colne from any changes in the underlying chalk.

Future Situation

3.13.6 The future of the catchment's water resources will be a balance between the amount of new development allowed and the amount of water imported to meet increased demand.

3.13.7 Although of much lesser concern, greater use of the Grand Union Canal for navigation could ultimately lead to low flow conditions in the Colne[1], especially if the Thames Navigation Link were ever taken forward.

Implications for the Water Environment

3.13.8 If the problems of the Misbourne are not to be repeated it is clearly important for future development decisions to take account of water resource implications. This will become all the more critical if global warming leads to an increased frequency in drought summers.

Footnote:

1. British Waterways (BW) abstracts water from the Colne/Frays Rivers to supply the 22 mile level canal from Slough to Paddington. This abstraction is by Act of Parliament and no prescriptive rights are established. Since the 1940's this source has been a substitute for use of water stored in the BW-owned Brent Reservoir which has had to be kept low for fear of breaching its banks. To date this abstraction from the Colne has not caused low flow conditions in the Colne.

Figure: 3.13

WATER RESOURCES

N.R.A: Thames Region
LOWER RIVER COLNE CATCHMENT
MANAGEMENT PLAN

3.14 WATER QUALITY

3.14.1 The information which follows is included for completeness but will require substantial refinement when water quality is directly addressed in the catchment planning process.

Current Situation

3.14.2 Water quality is a key indicator of the health of any catchment. In the case of the Lower Colne Catchment, water quality issues are impossible to separate from actions taken in the upper catchment.

River Water Quality

3.14.3 The water quality of the rivers is generally good and consequently they are classified as Class 1A or 1B (66% of the main rivers), with the remainder classified as 2A or 2B. However, recent water quality sampling indicates that not all river reaches are achieving their River Quality Objectives.[1]

Groundwater Quality

3.14.4 Currently very little information is available on groundwater quality in the catchment.

Future Situation

3.14.5 In the foreseeable future the prime sources of pollution are likely to be:

- the increasing proportion of sewage effluent in receiving waters, particularly during periods of low flow. For example, already at certain times of the year in the Misbourne, discharges from sewage treatment works can account for well over 50% of stream flows;
- urban storm water run-off, especially that relating to major new road schemes (widening of the M4, M25 and the Terminal 5 proposals). At present motorway run-off passes via oil interceptors direct to the rivers. So far the dilution effect of the rivers is thought to have avoided any major pollution incidents but the long term effect on the rivers is unknown;
- leachate from landfill sites, although as the Environmental Protection Act 1990 makes landfill operators responsible in perpetuity for their sites, this problem is most likely to relate to older sites;
- a rise in the maximum summer water temperature as a result of global warming, leading to oxygen stress and the growth of blue/green algae.

Implications for the Water Environment

3.14.6 The threats to water quality have the following implications for the water environment:

- the need to treat all effluents to a standard compatible with the dry weather freshwater (not enhanced by effluent) fluvial flows and to augment this flow where possible;
- the need to investigate the leachate problems associated with older landfill sites.

Footnote:

1. 'Environmental Quality' End December 1990. Report to the Regional Rivers Advisory Committee from the Regional General Manager.

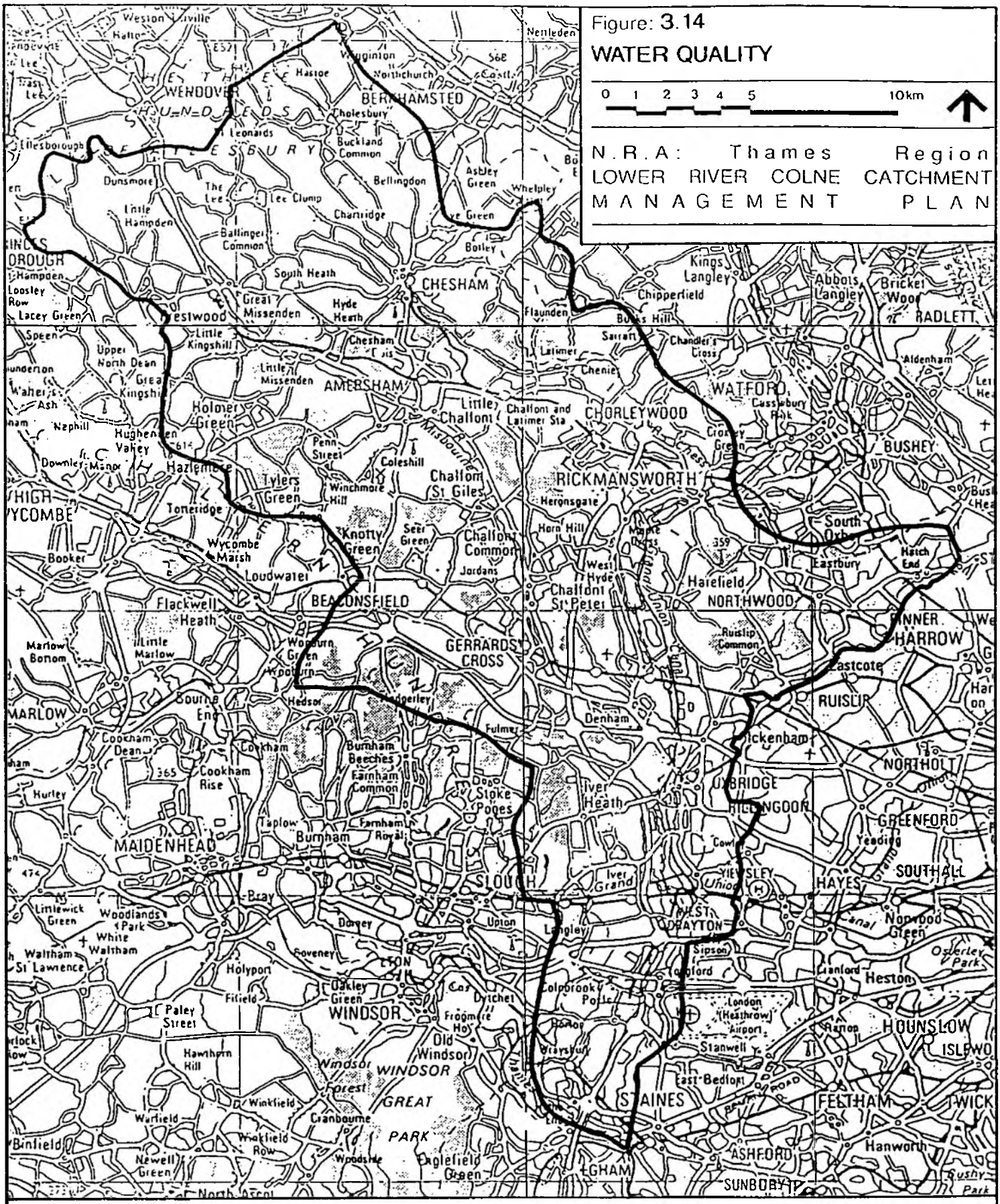


Figure: 3.14
WATER QUALITY
0 1 2 3 4 5 10km
N.R.A: Thames Region
LOWER RIVER COLNE CATCHMENT
MANAGEMENT PLAN
BERKHAMSTED
CHESHAM
AMERSHAM
WENDOVER
CHORLEYWOOD
RICKMANSWORTH
WATFORD
BUSHEY
RADLETT
BEACONSFIELD
GERRARDS CROSS
NORTHWOOD
HARROW
RUISLIP
MARLOW
MAIDENHEAD
WINDSOR
SLOUGH
UXBRIDGE
HILLINGDON
HAYES
SOUTHALL
GREENFORD
HOUNSLOW
HESTON
FELTHAM
STAINES
ASHFORD
SUNBURY
Great Missenden
Little Chalfont
Chalfont St Giles
Chalfont St Peter
Chalfont Common
Holmer Green
Tylers Green
Knotty Green
Flackwell Heath
Little Marlow
Wooburn Green
Burnham Beeches
Farnham Common
Farnham Royal
Cookham
Cookham Dean
Cookham Rise
Bourne End
Hedsor
Taplow
Burnham
Bray
Dorney
Upton
Eton
Oakley Green
Fifield
Paley Street
Old Windsor
Windsor Forest
Great Park
Winkfield
Warfield
Cranbourne
Binfield
Eglefield Green
Newell Green
Wraysbury
Staines
Stanwell
Ickenham
Denham
Eastcote
Northolt
Greenford
Yeading
Southall
Hayes
Harlington
Hillingdon
Uxbridge
Iver
Iver Heath
Iver Grand Union
West Drayton
Yiewsley
Langley
Sipson
Cranford
Heston
Osterley Park
Norwood Green
Hounslow
Isleworth
Hanworth
Feltham
Wick
Bushy Park
Eastbury
Hatch End
Harefield
Horn Hill
Chenies
Chandler's Cross
Sarratt
Kings Langley
Abbots Langley
Bricket Wood
Chipperfield
Flaunden
Bovingdon
Hyde Heath
Penn Street
Coleshill
Winchmore Hill
Heronsgate
Croxley Green
Cassiobury Park
Aldenham
Whelpley Hill
Asbley Green
Bellingdon
Chartridge
Buckland Common
Cholesbury
Ashley Green
Botley
Lee Clump
The Lee
Little Hampden
Dunsmore
Leonards
Hastoe
Wigginton
Northchurch
Nettleden
Ellesborough
Loosley Row
Lacey Green
Speen
Upper North Dean
Great Kingshill
Little Kingshill
Little Missenden
Holmer Green
Hughenden Valley
Downley
Hazlemere
Tylers Green
Toneridge
High Wycombe
Wycombe Marsh
Booker
Loudwater
Marlow Bonom
Little Marlow
Hurley
Littlewick Green
Woodlands Park
White Waltham
Waltham St Lawrence
Holyport
Maidenhead
Windsor
Eton
Slough
Uxbridge
Harrow
Ruislip
Northolt
Greenford
Southall
Hayes
Heston
Feltham
Staines
Ashford
Sunbury
Hounslow
Isleworth
Hanworth
Wick
Bushy Park
Eastbury
Harefield
Northwood
Rickmansworth
Watford
Chorleywood
Radlett
Bushey
Aldenham
Chandler's Cross
Sarratt
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Maidenhead
Windsor
Eton
Slough
Uxbridge
Harrow
Ruislip
Northolt
Greenford
Southall
Hayes
Heston
Feltham
Staines
Ashford
Sunbury
Hounslow
Isleworth
Hanworth
Wick
Bushy Park
Eastbury
Harefield
Northwood
Rickmansworth
Watford
Chorleywood
Radlett
Bushey

3.15 FISHERIES

Current Situation

3.15.1 The catchment has a highly valuable fisheries resource with EEC designated waters for Cyprinid and Salmonid fisheries. As fisheries are highly sensitive to water quality it follows that they are an accurate indicator of the health of the water environment as a whole. Poor water quality affects the size and health of fish populations generally and that of salmonids in particular.

Future Situation

3.15.2 Within the Colne Catchment fisheries are most likely to be affected by:

- changing water quality resulting from low flows, contaminated surface water run-off and sewage effluent;
- other side effects of development not least poor river geomorphology, lack of ecological diversity and sedimentation associated with increased run-off;
- the mal-operation of river structures, releasing excessive flows or silt deposits or both, which in turn lead to scouring or smothering of spawning grounds (as happened at Sarrat Mill Weir on the Chess 1988);
- inappropriate river maintenance;
- impassability of river structures inhibiting fish migration.

Implications for the Water Environment

3.15.3 The fisheries value of the catchment will be greatly enhanced if:

- there is a general improvement in water quality (alleviation of low flows, improved sewage discharges, etc.);
- new developments and river works take account of river geomorphology and ecology;
- river maintenance is sympathetic to the needs of fisheries and includes the localised removal of sediments carried into the rivers by surface water run-off (especially on the Wraysbury, Frays, Chess and Misbourne);
- old river structures are refurbished; and
- a key fish migration route is identified, along which efforts are concentrated to increase fish passibility. The Colne has several parallel routes for migrating fish, therefore, works associated with the Colne Flood Alleviation Scheme cannot hope to cover all impassable structures.

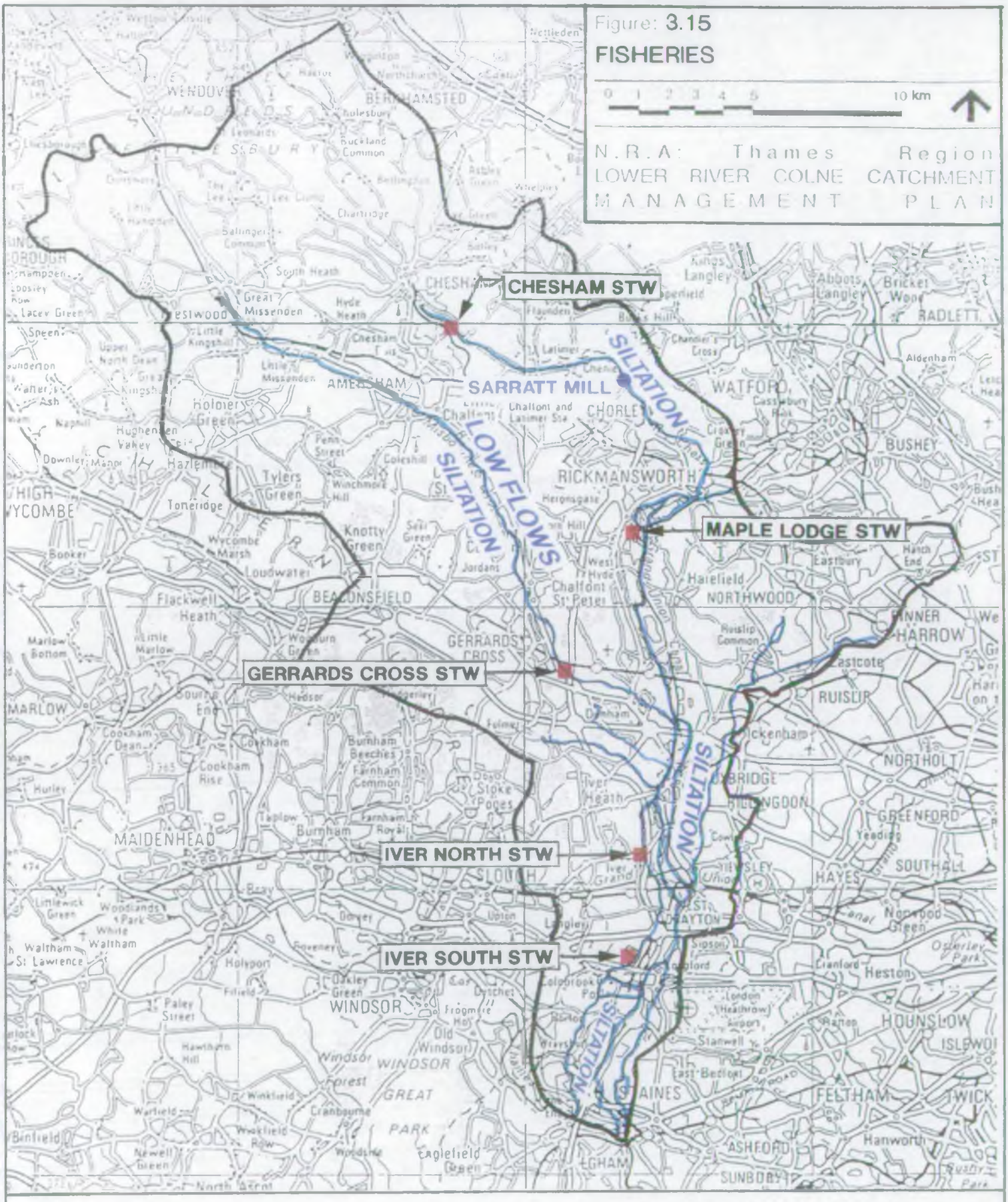


Figure: 3.15
FISHERIES
0 1 2 3 4 5 10 km
N.R.A: Thames Region
LOWER RIVER COLNE CATCHMENT
MANAGEMENT PLAN
CHESHAM STW
SARRATT MILL
LOW FLOWS SILTATION
SILTATION
SILTATION
SILTATION
MAPLE LODGE STW
GERRARDS CROSS STW
IVER NORTH STW
IVER SOUTH STW
Sewage Treatment Works

3.16 ECOLOGY

Current Situation

3.16.1 The habitats of the river corridors are important locally and regionally. Of key significance are the remnant water-table dependent habitats, such as Staines Moor and Frays Meadow SSSI's which are non-recreatable, the mature wet gravel pits at the northern and southern ends of the Colne Valley with their very high ornithological interest, and the extensive marginal flora of the rivers themselves.

Future Situation

3.16.2 The potential threats to these valuable habitats are wide ranging and include:

- direct loss through: gravel extraction (as still threatens Staines Moor SSSI), filling of wet pits in compliance with past restoration conditions (as is in the case of Broadwater SSSI and the Wraysbury Pits, amongst others), and destruction of river habitats through river works associated with flood alleviation schemes and new developments;
- reduction in frequency of inundation, usually associated with flood alleviation works;
- falling water-table levels associated on the chalk with over abstraction for public water supply (as in the case of the Misboume) and on the gravels by mineral extraction on adjacent land. Falling water tables are a particular concern on Staines Moor, as recognised in the current Management Plan being proposed for this important SSSI;
- river and groundwater pollution.

Implications for the Water Environment

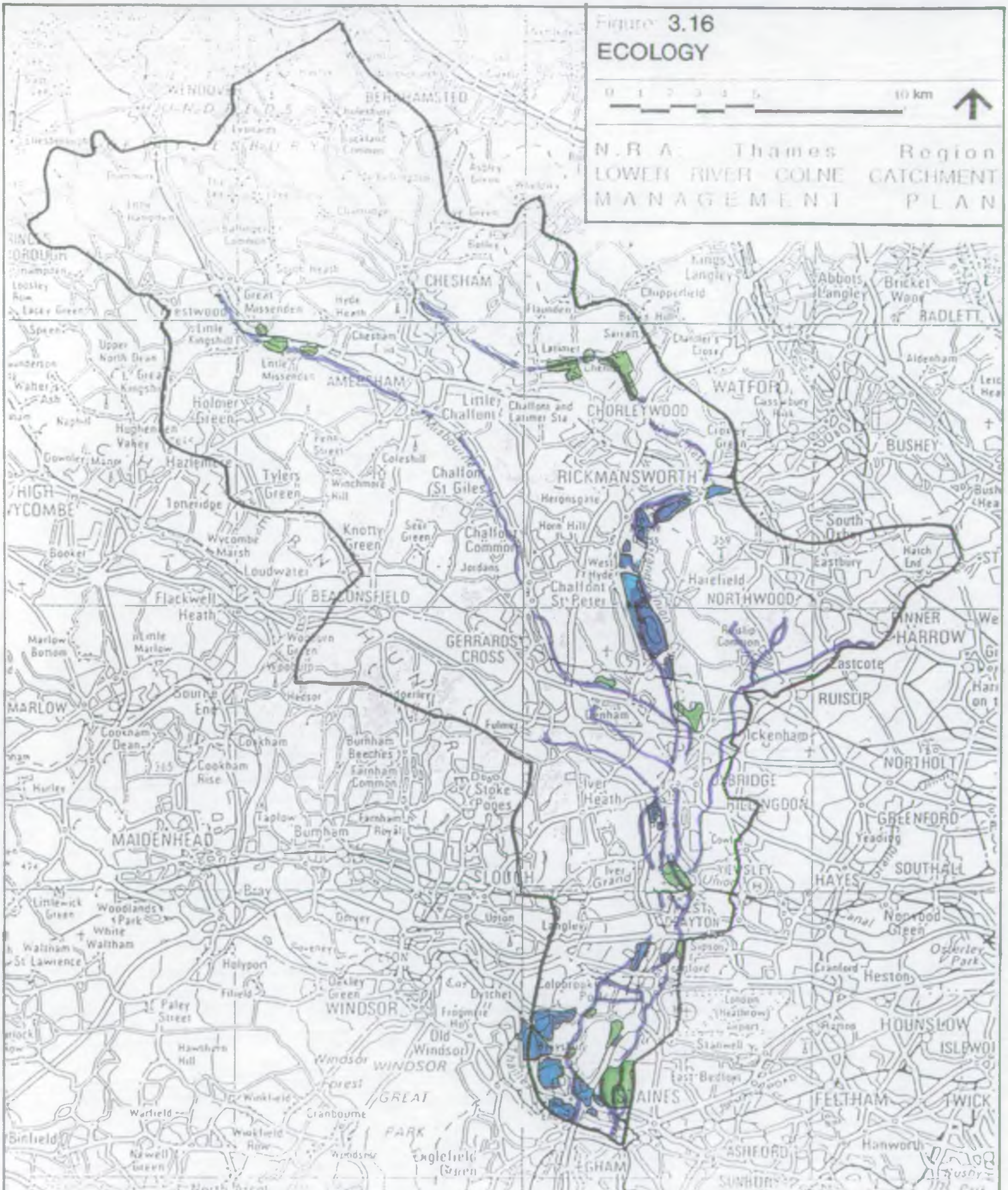
3.16.3 The threats to the ecology of the river corridor suggest the need for the following:

- a review of the water implications of proposed gravel pit filling;
- a review of capital and operational activities which are damaging habitats;
- sufficient inundation of low lying land to protect existing habitats;
- maintenance and, where possible, enhancement of water-table levels and river flows;
- prevention of any further deterioration and, where possible, enhancement of water quality.

Figure 3.16
ECOLOGY

0 1 2 3 4 5 10 km

N.R.A. Thames Region
LOWER RIVER COLNE CATCHMENT MANAGEMENT PLAN



WENDOVER
BERKHAMSTED
CHESHAM
Kings Langley
Abbots Langley
Bricket Wood
RADLETT
Chipperfield
Great Missenden
Little Missenden
AMERSHAM
Little Chalfont
Chalfont and Latimer Sta
CHORLEYWOOD
WATFORD
BUSHEY
RICKMANSWORTH
Chalfont St Giles
HIGH WYCOMBE
Hazlemere
Tylers Green
Knotty Green
Seer Green
Chalfont Common
Jordans
West Hyde
Chalfont St Peter
Harefield
NORTHWOOD
South Oxhey
Hatch End
PINNER
HARROW
BEACONSFIELD
Flackwell Heath
Loudwater
GERRARDS CROSS
Eastcote
RUISLIP
MARLOW
Bourne End
Hedsor
Denham
Ickenham
Cookham
Burnham Beeches
Farnham Common
Stoke Poges
Iver Heath
UXBRIDGE
HILLINGDON
NORTHOLT
GREENFORD
MAIDENHEAD
Burnham
Taplow
SLOUGH
Iver
Yiewsley
HAYES
SOUTHALL
WEST DRAYTON
Langley
Bray
Datchet
Colnbrook
WINDSOR
Old Windsor
Heston
HOUNSLOW
Stanwell
East Bedfont
STAINES
FELTHAM
ASHFORD
ISLEWORTH
TWICKENHAM
Windsor Forest
WINDSOR GREAT PARK
Hanworth
EGHAM

KEY HABITATS OF THE RIVER VALLEYS

- Remnant Water–Table Dependent Habitats (Floodplain Meadows)
- Mature Wet Gravel Pits of Ornithological Importance
- Marginal Flora

3.17 LANDSCAPE

Current Situation

3.17.1 The river valleys of the catchment include both high quality landscapes worthy of strict conservation and downgraded areas in urgent need of enhancement. Broadly, the landscapes requiring conservation are:

- the mature agrarian landscapes of the Misbourne and Chess;
- original floodplain meadows, especially Staines Moor and Frays Meadows;
- the mature wet gravel pits between Rickmansworth and the M40, in the area of Little Britain west of Uxbridge, and around Wraysbury;
- mature parkland landscapes associated with the rivers;
- lengths of river with relatively stable geomorphology and/or good marginal vegetation, tree fringed banks, and historic river/canal vernacular.

3.17.2 Conversely, the areas most in need of enhancement are the western edge of Uxbridge and that part of the Colne Valley lying between the M40 and Wraysbury, which has become fragmented, degraded and open in character, in response to the pressures of gravel extraction, development, building of infrastructure and urban fringe speculation. Also in need of substantial improvement is the largely urbanised corridor of the River Pinn.

Future Situation

3.17.3 In the near future, possibly the greatest single threat to the continuity of the Colne Valley will be the development of a fifth Terminal at Heathrow. If taken forward this development, plus all its infrastructure, could close the already narrow gap which separates the outer edge of London from the eastward extension of Slough at this point. On the other hand, if sensitively handled, the proposals offer the opportunity to revitalise and strengthen this narrow stretch of river corridor which has all but been destroyed by the construction of the M25.

3.17.4 In the longer term, the rivers are likely to become all the more important as key landscape features, reflecting continuity and maturity, in a landscape otherwise characterised by continual change resulting from declining agriculture and further gravel extraction.

Implications for the Water Environment

3.17.5 The protection and enhancement of the landscapes of the river valleys is of central concern to the NRA TR. The contribution which the water environment makes to the landscape is particularly dependent on:

- maintenance of adequate flows in the watercourses;
- the conservation of the remnant natural reaches of channel;
- the restoration, where appropriate, of watercourses which have been substantially altered from their natural form;
- the promotion of design solutions which are sympathetic to their surroundings.

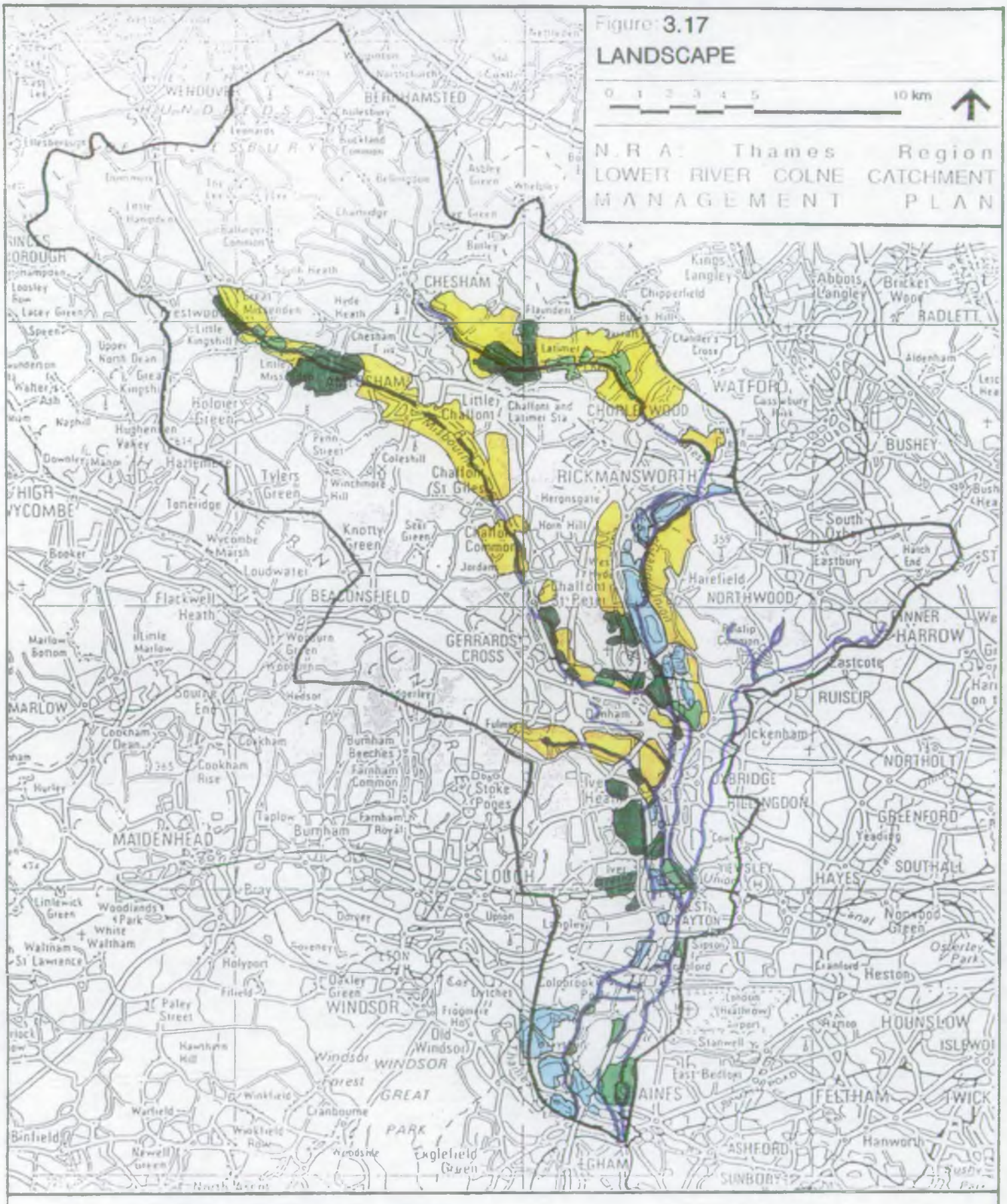


Figure 3.17
LANDSCAPE
0 1 2 3 4 5 10 km
N.R.A. Thames Region
LOWER RIVER COLNE CATCHMENT
MANAGEMENT PLAN
LANDSCAPE REQUIRING CONSERVATION
Mature Agrarian Landscape
Original Floodplain Meadows
Mature Wet Gravel Pits
Mature Parkland
Attractive Riverscape

4.0 NRA OBJECTIVES AND POLICIES

4.0 NRA OBJECTIVES & POLICIES

4.1 INTRODUCTION

4.1.1 The NRA's Corporate Plan defines its role as protecting and improving the water environment. This is to be achieved through effective management of water resources; by substantial reductions in pollution; and by provision of effective flood defence.

4.1.2 Corporate planning in support of this role is based directly on strategies specific to each of the core functions and support services which comprise the NRA's operational activities. These strategies are, in turn, used in the preparation of both the annual regional plans and the long term catchment management plans. The implied ultimate objective of the latter is to link all function and support service activities into an overall integrated programme of work.

4.1.3 The way in which NRA operates and effects its planning is important to the understanding of the way in which strategies are developed and presented in Section 5. Function groups within NRA may find it constructive to see issues in the wider NRA policy context, and local authorities and other interested external bodies should be provided with a tailored summary of NRA policies and objectives to give them a clearer understanding of the context within which catchment management planning takes place. The following format has therefore been adopted for this section:

- description of the NRA Corporate Plan and the NRA TR Business Plan and their respective aims

- outline of policies, objectives and targets for each of the seven core functions, ie.:

  . flood defence and land drainage;
  . water resources;
  . water quality and pollution control;
  . fisheries;
  . recreation;
  . navigation;
  . conservation.

4.1.4 The outline of policies and objectives by function is set out to give:

(i) an overview which briefly summarises the position;

(ii) the relevant national and regional position;

(iii) the catchment objectives; (where defined in the Lower Colne Evaluation Report 1989).

The Corporate Plan

4.1.5 The seven core functions of the NRA form the foundation of its planning. For each of these there is a defined aim and a set of objectives to achieve it. These embody the need for sustainable, forward looking policy oriented to the maintenance, conservation or improvement of resource assets. Fulfilling them implies close cooperation with other bodies concerned in the management of the catchment and, as an important part of that cooperation, a full understanding of the aims and objectives of such bodies.

4.1.6 The aim for each core function is given below with key objectives outlined in Sections 4.2 - 4.8:

Function	Aim to:
Water Resources	- assess, manage, plan and conserve water resources and maintain and improve water quality for all.
Pollution Control	- continue improving the quality of all waters through pollution control. - implement 'polluter pays' policies.
Flood Defence	- provision of effective flood defence. - adequacy of flood forecasting and response.
Fisheries	- maintain, improve and develop fisheries.
Recreation	- develop the amenity and recreational potential of waters and lands under NRA control.
Navigation	- improve and maintain inland NRA managed waterways and their facilities for public use.
Conservation	- conserve and enhance wildlife,landscapes and archaeological features associated with waters under NRA control.

The Thames Region Business Plan

4.1.7 The NRA Thames Region Business Plan is intended to serve two purposes. The first is to propose the means or outputs by which it believes the national NRA should judge the Region's performance. The second is to outline how it intends to manage the Region. The mission it defines for itself is to maintain and enhance the total river environment in its area. The Business Plan sets strategic objectives to achieve this whilst at the same time observing the overall objectives of the NRA. The aims (which NRA TR calls initiatives) for each core function (or NRA TR key business area) are given below. Sections 4.2-4.8 outline the corresponding sets of objectives.

Function	Aim to:
Water Resources	- manage these as legislated but balance consumption/environmental protection against the needs of individual abstractors.
Water Quality & Pollution Alleviation	- ensure that the quality of surface water and groundwater is maintained/ improved for all uses.
Flood Defence	- protect adequately against flooding.
Fisheries & Conservation	- promote vigour/diversity in fish populations and encourage development of river corridor ecosystems and appropriate development of the man made environment.
Recreation	- make best possible use of the river system and water bodies for recreation.

4.2 FLOOD DEFENCE & LAND DRAINAGE

Overview

4.2.1 Corporate objectives focus on flood defence and relate to the managing of tidal and sea flood defence and emergency systems. Within Thames, consideration of flood defence explicitly includes the wider issue of land drainage. It is NRA TR's perspective that the whole catchment needs control and not simply the watercourses. There are three ways in which NRA TR is geared to managing these aspects. They are: using its 'levels of service systematic approach' which provides a methodology for allocating priorities to work programmes and resource allocations; improving the standards of protection through planned maintenance and capital investment; development control based on catchment planning.

National

4.2.2 Key corporate objectives are:

- developing national planning and management systems for flood defence works;
- formulating policies for tidal and sea defence works in response to rising sea levels;
- extending national flood warning systems and improving responses to emergencies.

Regional

4.2.3 Standards of protection are to be improved in the Thames Region. It was NRA TR's objective to have target levels for flood defence/land drainage set for every reach in the catchment by 1989. The criteria used in developing these took account of the needs and influence of adjacent land use. Following the setting of the targets, maintenance and capital works planning would proceed: maintenance programmes are scheduled for completion by April 1990 and the overall programme should be 70% complete by 1993. The plan provides for an additional 4500 properties to be protected from undue risk of flooding by 1993.

4.2.4 NRA TR intends to produce catchment plans for flood defence and the environment for all major urban catchments by March 1993. Also, appropriate impact assessment procedures are to be put in place for major development proposals.

Catchment

4.2.5 The levels of service for the catchment are summarised in Fig. 4.1.

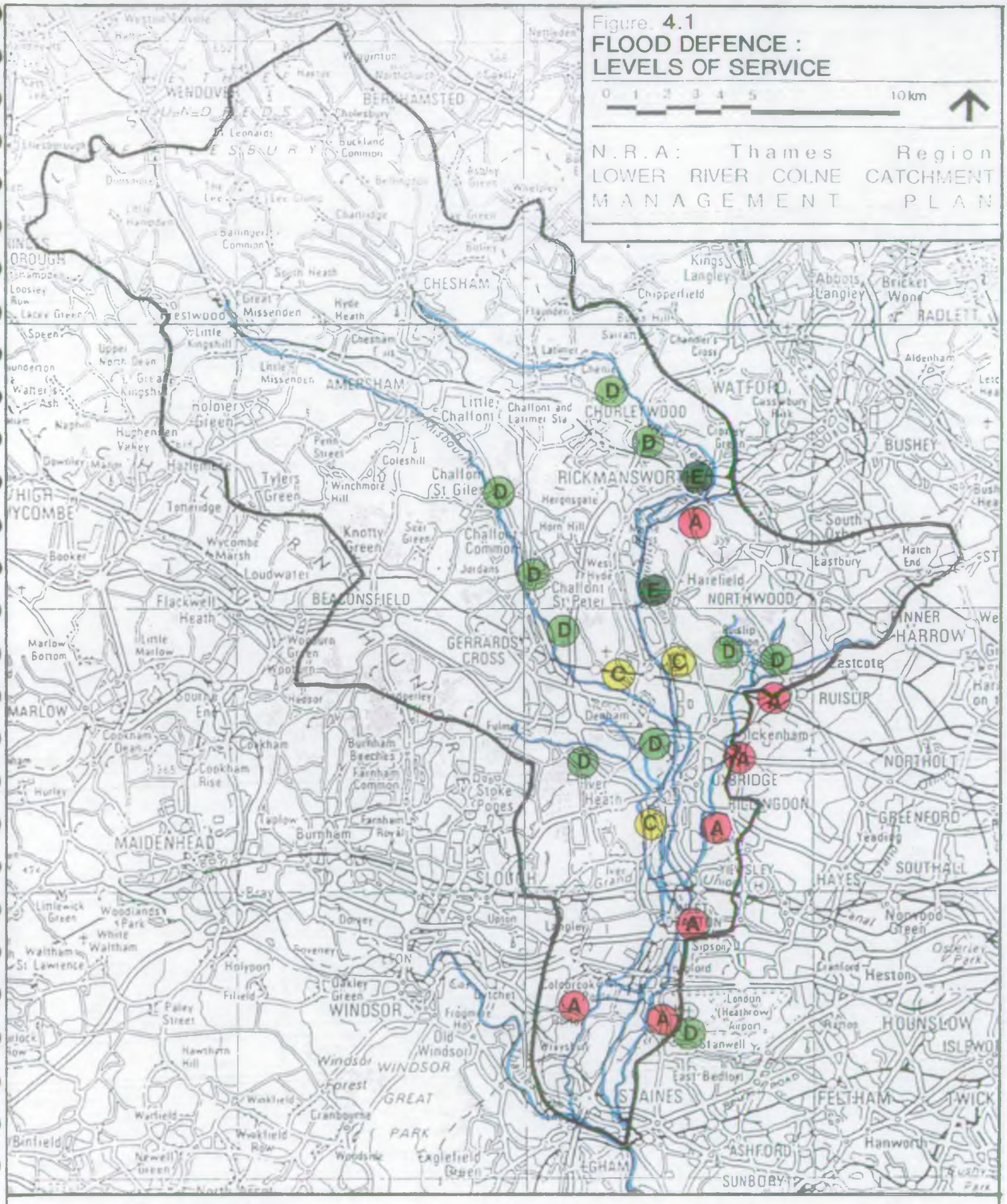


Figure 4.1
FLOOD DEFENCE :
LEVELS OF SERVICE
0 1 2 3 4 5 10 km
N.R.A: Thames Region
LOWER RIVER COLNE CATCHMENT
MANAGEMENT PLAN
CHESHAM
AMERSHAM
BEACONSFIELD
GERRARDS CROSS
MARLOW
MAIDENHEAD
WINDSOR
WATFORD
RICKMANSWORTH
CHORLEYWOOD
NORTHWOOD
HARROW
RUISLIP
UXBRIDGE
HILLINGDON
NORTHOLT
GREENFORD
SOUTHALL
HAYES
HEATHROW
HOUNSLOW
FELTHAM
ASHFORD
STAINES
SUNBURY
LAND USE BANDS.
A Heavily Urbanised
B
C
D
Unintensive Agricultural.

4.3 WATER RESOURCES

Overview

4.3.1 The NRA sees that it must establish a consistent water resources policy throughout the regions with policies for water resources and water quality linked as closely as possible. Controlling abstraction is clearly the key to the proper management of the resource and so corporate objectives relate primarily to ensuring adequacy of supply and countering over abstraction/low flows. However, they also highlight the importance of aquifer protection and the principle of enforcement. Of particular importance to Thames Region are the linked issues of low flows and adequacy of supply. Improving the ability to monitor changes in flow is seen as vital to the management of this issue. The Region's water resources include both surface and groundwater and control of effluent quality and pollution are of equal importance.

National

4.3.2 The key corporate objectives are:

- formulating a sustainable policy and plans for developing and augmenting resources to meet demands;
- formulating and implementing an aquifer protection policy;
- developing a policy to overcome low flows problems caused by over-abstraction in various catchments;
- developing licensing, determination, enforcement and charging policies, charging databases and billing systems.

Regional

4.3.3 The intensive development of the Thames Catchment means that there is both heavy use and significant 're-use' of water. Supply is tending to move out of balance with demand and increased licensed abstractions have led to the existing low flow conditions in a number of rivers. Water resources are therefore threatened in terms of both quantity and quality. The 'Alleviation of Low Flows' scheme (commencing 1990) is not expected to be sufficient to counter the situation.

4.3.4 There are two parts to NRA TR's water resource planning: strategic water resources planning and the management of licensed abstractions. Little change is expected to the latter but resource planning is given a new significance. The main objective here is to use the 1989 review of water resource strategic options and demand forecasts to identify work priorities and objectives to 1992/93.

Catchment

4.3.5 There are no catchment specific policies for water resources.

Figure: 4.2

WATER RESOURCE OBJECTIVES

0 1 2 3 4 5 10km

N.R.A: Thames Region
LOWER RIVER COLNE CATCHMENT
MANAGEMENT PLAN

4.4 WATER QUALITY

Overview

4.4.1 Comprehensive management of water quality is impeded by the historic absence of standards. There are European Community Directives on some aspects but until the situation has become fully rationalised, the NRA has to cope with a mixed legacy of consents to discharge and consequent quality problems. The setting, maintaining and improving of water quality standards and the improving of response to unconsented and/or emergency pollution are therefore essential requirements of the corporate plan.

4.4.2 In Thames Region the extent of both consented and unconsented discharges has made protection of groundwater resources of paramount importance, together with the need to monitor for pollution and adjust charging policy to deal with it.

National

4.4.3 Key corporate objectives are:

- setting water quality objectives (WQOs) for controlled waters, producing appropriate water quality standards (WQSs), defining water protection zones (WPZs);
- undertaking monitoring and surveillance of all controlled waters;
- ensuring a close relation between water quality and water resources management;
- implementing measures to prevent potential pollution of controlled waters at source;
- developing consent, compliance and enforcement policies;
- increasing the use of automated instrumentation for sampling ;
- undertaking increased pollution prevention activities and initiating site specific clean-up campaigns, eg litter removal.

Regional

4.4.4 In translating this into regional objectives, the first priority is to establish (by March 1991) the current quality of the Region's rivers. A second priority is to demonstrate through the River Survey Programme (1990/91 to 1995/96) that water quality is being maintained and improved.

4.4.5 **Surface Water:** Improvements to surface water quality are essential if the newly vested NRA is to be regarded as a success. The objective of NRA TR is to maintain existing water quality in the 95% of its rivers already in River Quality Objective (RQO) Classes 1 or 2, whilst upgrading all non-urban watercourses to achieve an RQO of Class 2 by 1996.

4.4.6 New statutory Water Quality Objectives (WQOs) are likely to become mandatory by 1992. The strategies which NRA TR is developing to meet these include, reviewing existing standards and developing a new approach using biological parameters so that ecological requirements are taken into consideration when establishing water quality.

4.4.7 **Ground Water:** The quality of groundwater is of increasing concern. Contamination from agricultural use of nitrates and pesticides and from waste disposal are the two sources of pollution currently receiving the most attention. Mandatory protection zones have been suggested as one form of containment.

4.4.8 **Effluent Quality and Pollution Control:** All discharges need to comply with their consents and to be compatible with WQOs by April 1993. Particular attention will be paid to sewage discharges. Overall, pollution must be minimised with improved response to incidents.

Catchment

4.4.9 Within the Lower Colne Catchment 200km of channel have designated River Quality Objectives (RQOs) of which some 24% are class 1A (the Upper Misbourne and Chess, and the Frays between the Pinn and the Colne), whilst the majority (42%) is 1B; and the remainder is 2A or 2B.

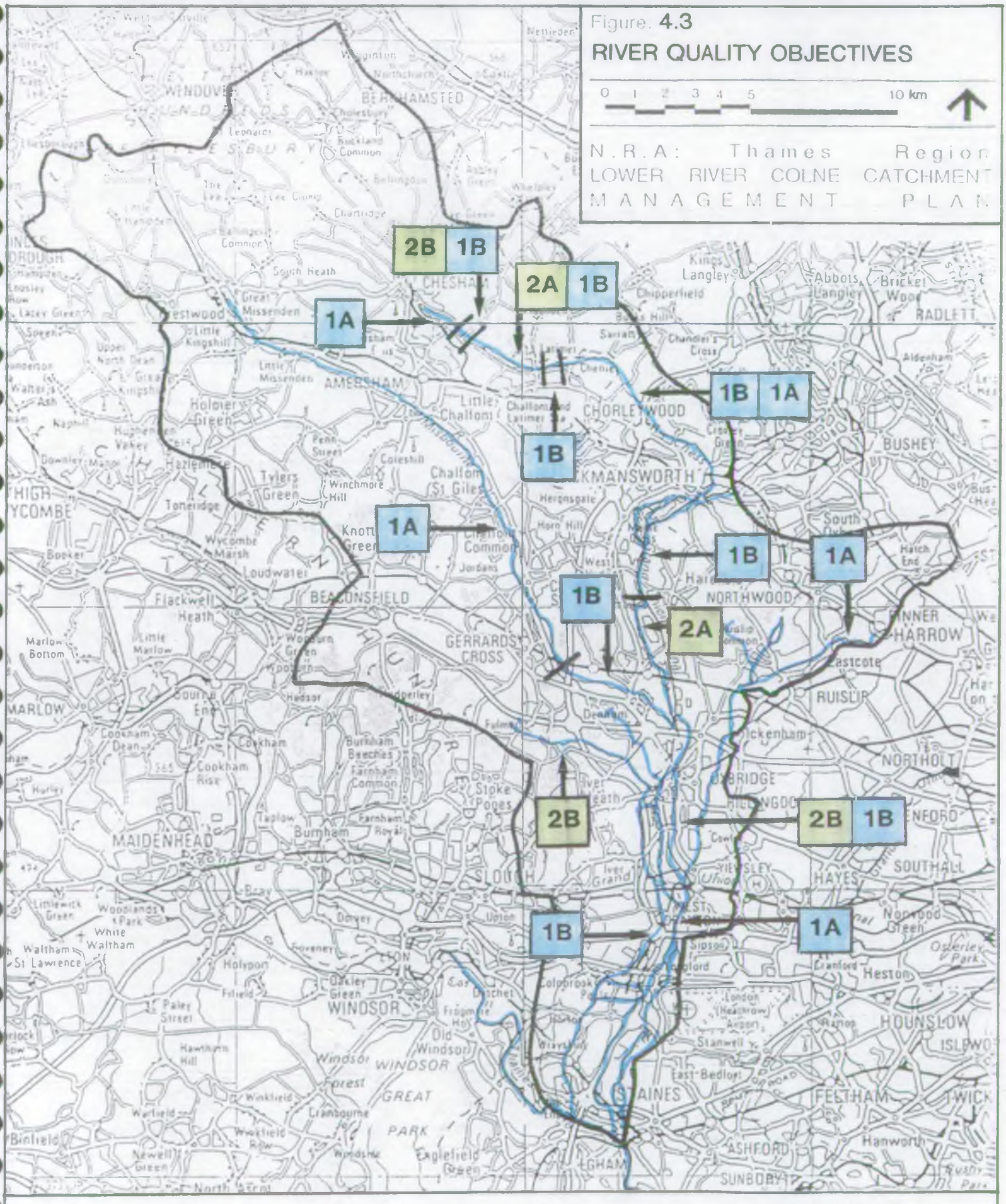


Figure: 4.3
RIVER QUALITY OBJECTIVES
0 1 2 3 4 5 10 km
N.R.A: Thames Region
LOWER RIVER COLNE CATCHMENT
MANAGEMENT PLAN
2B 1B
2A 1B
1A
1B 1A
1B
1A
1B 1A
1B
2A
2B
2B 1B
1B
1A
WENDOVER
BERKHAMSTED
CHESHAM
AMERSHAM
CHORLEYWOOD
RICKMANSWORTH
BUSHEY
RADLETT
HIGH WYCOMBE
BEACONSFIELD
GERRARDS CROSS
NORTHWOOD
HARROW
RUISLIP
NORTHOLT
MARLOW
MAIDENHEAD
SLOUGH
WINDSOR
HAYES
SOUTHALL
HEATHROW
HOUNSLOW
FELTHAM
ASHFORD
SUNBURY
WINDSOR GREAT PARK
1A High Quality Waters 1A – 44km – (24%)
1B High Quality Waters 1B – 79.2 km – (42%)
2A Fair Quality Waters 2A – 28.3km – (15%)
2A Fair Quality Waters 2B – 34.8km – (19%)
186.3km.
Note: Where two objectives are given, the first represents the current objective, and the second the long term objective. No time scale has been set for long term objectives.

4.5 FISHERIES

Overview

4.5.1 Variety and abundance of fish species present in UK rivers has been affected not only by pollution incidents and generally poor water quality but also by the use of in-river structures which are insensitive in design and are in some measure impassable to migratory fish. The corporate strategy recognises that there is a need to enhance or rehabilitate at least one river in every region of the NRA and objectives focus on the assessment and improvement of stock. An important element of this is maintaining water quality standards. Improving emergency pollution response will alleviate fish kill problems as will increasing protection against illegal fishing. For Thames Region, the priority objectives are to survey fish stocks in all watercourses, and to improve fishery work and enforcement.

National

4.5.2 The key corporate objectives are:

- assessing the status of fish stocks;
- formulating policies to maintain, improve, develop, restore and rehabilitate fisheries ;
- reviewing licensing, regulatory and charging policies, especially seeking additional income;
- developing response policies to actions following fish kills and disease outbreaks;
- developing methods to prevent illegal fishing and to protect fisheries.

Regional

4.5.3 NRA TR is taking active steps to increase the number and types of fish in its rivers. It places particular emphasis on surveys since these provide an indicator of river health as well as providing information on fish life. The current survey programme is to be completed by 1991, following which a new survey will be initiated, focussing on stretches of river which were given water quality upgrading priorities in 1990.

4.5.4 NRA TR recognises the importance of re-stocking, particularly after pollution incidents, and is developing its own fish stocks. Enforcement is designed both to control illegal practices and to regulate fish movements.

Catchment

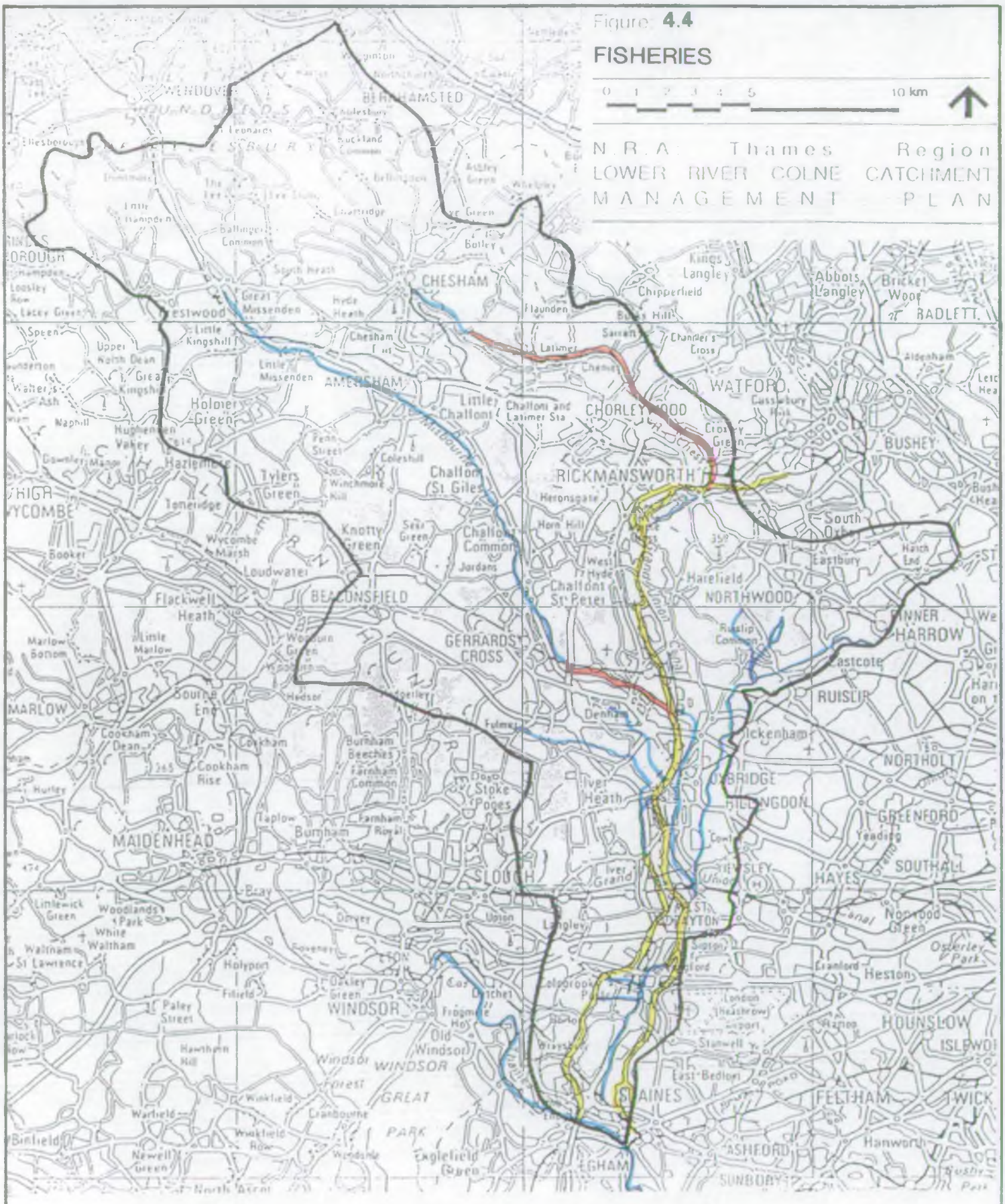
4.5.5 The River Colne and the lower reaches of the Colne Brook are EEC designated waters for Cyprinid fisheries, whilst the lower reaches of the Misbourne and Chess are ECC designated waters for Salmonid fisheries, in accordance with EC Regulation 78/659/EEC.

Figure **4.4**

FISHERIES

0 1 2 3 4 5 10 km

N.R.A. Thames Region
LOWER RIVER COLNE CATCHMENT
MANAGEMENT PLAN



E.E.C. Designated Waters for Cyprinid Fisheries (20gms/m² Biomass objective)

E.E.C. Designated Waters for Salmonid Fisheries (15gms/m² Biomass objective)

4.6 RECREATION

Overview

4.6.1 Nationally, the agreed objective for recreation is to promote provision, access, Code of Practice and management. In Thames Region this is translated into the need for a recreation strategy, the management of existing sites and the provision of new sites.

National

4.6.2 The key corporate objectives are:

- formulating a recreation policy incorporating the statutory duty to promote recreation;
- implementing the Code of Practice on access, conservation and recreation;
- producing management plans for NRA controlled sites;
- reviewing charging and regulatory practice and procedures.

Regional

4.6.3 In Thames Region, recreation and navigation are seen as closely linked and, indeed, the two are treated jointly in the NRA TR Business Plan. There is a wish to increase river facilities whilst minimising conflicts between sectional interests. Encouraging greater use of water and associated land facilities will be promoted by adding to public facilities including footpaths; camp sites; provision for sailing, canoeing and ornithology; and hire of boats and bicycles. The Thames Long Distance Path is to be completed by 1995. The provision of a visitor centre similar to that at the Thames Barrage but situated in the non tidal reaches is also a possibility.

Catchment

4.6.4 There are no catchment specific policies.


Figure: 4.5
RECREATION OBJECTIVES
0 1 2 3 4 5 10km
N.R.A: Thames Region
LOWER RIVER COLNE CATCHMENT
MANAGEMENT PLAN
WENDOVER
BERKHAMSTED
CHESHAM
AMERSHAM
CHORLEYWOOD
WATFORD
RICKMANSWORTH
BUSHEY
HIGH WYCOMBE
BEACONSFIELD
GERRARDS CROSS
NORTHWOOD
PINNER
HARROW
RUISLIP
NORTHOLT
UXBRIDGE
HILLINGDON
GREENFORD
SOUTHALL
HAYES
HEATHROW
HESTON
HOUNSLOW
ISLEWORTH
TWICKENHAM
FELTHAM
STAINES
ASHFORD
EGHAM
SUNBURY
MARLOW
MAIDENHEAD
SLOUGH
WINDSOR
WINDSOR GREAT PARK
Old Windsor
Eton
Burnham
Taplow
Cookham
Bourne End
Flackwell Heath
Loudwater
Wooburn Green
Hedsor
Denham
Iver
Iver Heath
Langley
Colnbrook
Poyle
Stanwell
Wraysbury
Datchet
Eton Wick
Farnham Royal
Burnham Beeches
Stoke Poges
Fulmer
Harefield
Eastcote
Ruislip Common
Ickenham
Yeading
Osterley Park
Hanworth
Sunbury
Bellingdon
Chartridge
Ashley Green
Chesham
Great Missenden
Little Missenden
Holmer Green
Tylers Green
Chalfont St Giles
Chalfont Common
Chalfont St Peter
Chalfont and Latimer Sta
Chorleywood
Rickmansworth
Chipperfield
Kings Langley
Abbots Langley
Bricket Wood
Radlett
Aldenham
Watford
Cassiobury Park
Croxley Green
Eastbury
Harefield
Hare Hill
Mount Wise
Denham
Uxbridge
Yiewsley
West Drayton
Cranford
Heston
Osterley Park
Hounslow
Isleworth
Twickenham
Feltham
Staines
Ashford
Egham
Sunbury
Hanworth
Bedfont
Stanwell
London (Heathrow) Airport
Colnbrook
Poyle
Iver Grand
Iver Heath
Langley
Slough
Windsor
Eton
Datchet
Farnham Royal
Burnham
Taplow
Cookham
Bourne End
Flackwell Heath
Loudwater
Wooburn Green
Hedsor
Marlow
Marlow Bonham
Little Marlow
Cookham Dean
Cookham Rise
Hurley
Maidenhead
Littlewick Green
Woodlands Park
White Waltham
Waltham St Lawrence
Bray
Dorney
Eton
Eton Wick
Holyport
Oakley Green
Fifield
Paley Street
Hawthorn Hill
Windsor Forest
Winkfield
Warfield
Cranbourne
Winkfield Row
Binfield
Newell Green
Englefield Green
Wraysbury
Staines
Bedfont
Stanwell
Colnbrook
Poyle
Iver Grand
Iver Heath
Langley
Slough
Windsor
Eton
Datchet
Farnham Royal
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Maidenhead
Littlewick Green
Woodlands Park
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Waltham St Lawrence
Bray
Dorney
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Holyport
Oakley Green
Fifield
Paley Street
Hawthorn Hill
Windsor Forest
Winkfield
Warfield
Cranbourne
Winkfield Row
Binfield
Newell Green
Englefield Green
Wraysbury
Staines
Bedfont
Stanwell
Colnbrook
Poyle
Iver Grand
Iver Heath
Langley
Slough
Windsor
Eton
Datchet
Farnham Royal
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Taplow
Cookham
Bourne End
Flackwell Heath
Loudwater
Wooburn Green
Hedsor
Marlow
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Little Marlow
Cookham Dean
Cookham Rise
Hurley
Maidenhead
Littlewick Green
Woodlands Park
White Waltham
Waltham St Lawrence
Bray
Dorney
Eton
Eton Wick
Holyport
Oakley Green
Fifield
Paley Street
Hawthorn Hill
Windsor Forest
Winkfield
Warfield
Cranbourne
Winkfield Row
Binfield
Newell Green
Englefield Green

4.7 NAVIGATION

Overview

4.7.1 Navigation is complex in that it is closely associated with recreation, general riparian interests and a number of other functions. However, the maintenance of water levels is important to all these interests. The corporate objectives for navigation mainly concern the need for a navigation policy and for the review of licensing, charging and regulation procedures. In Thames Region, river use is almost entirely by pleasure craft and is both seasonal and intensive. NRA TR will pay greater attention to the maintenance of the navigation fairway, reviewing navigation objectives generally and introducing revised performance indicators.

National

4.7.2 Key objectives for navigation are:

- formulating a navigation policy;
- reviewing licensing, charging and regulatory policies.

Regional

4.7.3 NRA TR's primary task is to improve and increase recreational navigation facilities. Plans so far are limited to improving the provision of supporting facilities on the River Thames such as lock lay-bys, water and sanitary facilities.

Catchment

4.7.4 The only navigable waterway in the catchment is the Grand Union Canal. This is the maintenance responsibility of British Waterways Board (BWB) who would like to create more visitor moorings associated with the canal.

4.7.5 The NRA TR has no catchment specific policies for navigation.

Figure 4.6

NAVIGATION OBJECTIVES

N.R.A. Thames Region
LOWER RIVER COLNE CATCHMENT
MANAGEMENT PLAN


0 1 2 3 4 5 10km
CHESS ARM
TROY ARM
SLOUGH ARM
WENDOVER
BERKHAMSTED
CHESHAM
AMERSHAM
WATFORD
RICKMANSWORTH
BEACONSFIELD
GERRARDS CROSS
NORTHWOOD
HARROW
RUISLIP
UXBRIDGE
HILLINGDON
NORTHOLT
GREENFORD
SOUTHALL
HAYES
MAIDENHEAD
MARLOW
SLOUGH
WINDSOR
STAINES
FELTHAM
HOUNSLOW
ASHFORD
EGHAM
BUSHEY
RADLETT
WEST DRAYTON
Grand Union Canal
(responsibility of B.W.B.)

4.8 CONSERVATION

Overview

4.8.1 Waterways and wetlands are well recognised as important habitats for flora and fauna. Both the NRA and NRA TR see a pressing need for the formulation of a conservation policy to ensure conservation of such areas together with their associated lands, landscapes and archaeology. NRA TR attributes particular importance to developing a conservation policy which treats river corridors as an entity and increases public perception of this view. In implementation, emphasis is being given to both maintenance and capital schemes.

National

4.8.2 Key corporate objectives are:

- formulating a conservation policy;
- implementing the Code of Practice on access, conservation and recreation;
- reviewing and developing a river corridor survey methodology for increased application in river management.

Regional

4.8.3 In Thames Region, the objective is to increase environmental awareness generally and to ensure that conservation issues are taken into account in decision making. In practical terms, NRA TR is accelerating its river corridor survey programme and has prepared guidelines (1990) on conservation and fisheries for use by its Land Drainage, Catchment Control and Statutory Planning departments.

Catchment

4.8.4 There are no catchment specific policies.


Figure: 4.7
CONSERVATION OBJECTIVES
0 1 2 3 4 5 10km
N.R.A: Thames Region
LOWER RIVER COLNE CATCHMENT
MANAGEMENT PLAN
WENDOVER
BERKHAMSTED
CHESHAM
AMERSHAM
CHORLEYWOOD
WATFORD
RICKMANSWORTH
BUSHEY
BEACONSFIELD
GERRARDS CROSS
NORTHWOOD
HARROW
RUISLIP
MARLOW
MAIDENHEAD
SLOUGH
WINDSOR
UXBRIDGE
GREENFORD
SOUTHALL
HAYES
HOUNSLOW
STAINES
FELTHAM
TWICKENHAM
ASHFORD
Chalfont St Giles
Chalfont St Peter
Chalfont Common
Great Missenden
Little Chalfont
Tylers Green
Knotty Green
Seer Green
Flackwell Heath
Cookham
Cookham Rise
Burnham
Burnham Beeches
Farnham Common
Taplow
Bray
Datchet
Old Windsor
Great Park
Heathrow Airport
Stanwell
Ickenham
Ruislip Common
Eastcote
Denham
Iver Heath
Iver
West Drayton
Harefield
Northolt
Yeading
Hanworth
Sunbury
Egham
Staines
Abbots Langley
Kings Langley
Chipperfield
Radlett
Aldenham
Watford
Cassiobury Park
Bushey
Rickmansworth
Chandler's Cross
Croxley Green
Eastbury
Hatch End
Harefield
Northwood
Ruislip
Ickenham
Uxbridge
Hillingdon
Yiewsley
Hayes
Southall
Greenford
Northolt
Harrow
Wembley
Heston
Isleworth
Hounslow
Feltham
Twickenham
Staines
Ashford
Sunbury
Hanworth
Egham
Windsor
Eton
Slough
Maidenhead
Marlow
Beaconsfield
Gerrards Cross
Amersham
Chesham
Berkhamsted
Tring
Wendover

5.0 KEY ISSUES, STRATEGY AND ACTION PLANS

5.0 KEY ISSUES, STRATEGY AND ACTIONS

5.1 INTRODUCTION

Development of the Strategy

5.1.1 The purpose of this section of the CMP is to identify and prioritise the key issues which have emerged following consideration of:

- the natural resource base of the catchment;
- the current and future uses of the catchment; and
- the relevant NRA objectives and policies.

5.1.2 It is this process which makes it possible to identify the preferred NRA strategy for managing the catchment and to prepare an action plan for each of the NRA core functions.

The Lower Colne Catchment Context

5.1.3 From the description of the catchment in the preceding sections a number of specific characteristics emerge. These form the context to any future strategy for the catchment and are as follows:

- one of the key problems in the catchment, namely, the risk of river flooding in the Colne Valley, is in the process of being addressed through the implementation of the Lower Colne Flood Alleviation Scheme;
- the catchment ranges from the entirely urbanised valley of the River Pinn, through the interwar ribbon development of much of the Colne Valley itself, to the predominantly rural character of the Chiltern tributaries;
- strong policies of restraint including Green Belt, the Chilterns AONB and the Colne Valley Park, should prevent any major new greenfield residential development in the catchment, although the excellent communication links and proximity to London will continue the pressure for select large scale prestige commercial developments and new infrastructure proposal in the Colne Valley;
- the character of the Colne Valley itself has been drastically altered over the last 50 years by gravel extraction leaving a legacy of wet gravel pits and landfill sites, and by major road developments;
- the Colne Valley includes substantial areas of degradation which stand in direct contrast to the high quality landscapes of the Chiltern dip slope;
- despite areas of degradation, the catchment can boast many valuable river corridor habitats, fine river landscapes and an increasingly diverse range of water related recreation activities.

5.1.4 In summary, although commercial/infrastructure proposals will continue to affect the Colne Valley, the main areas of urbanisation are now established and are unlikely to expand. These are in the process of being protected from river flooding. The concern now, therefore, is the need to conserve those aspects of the water environment worthy of conservation, of which there are many, and to enhance those areas degraded by past activities.

5.2 THE KEY ISSUES

5.2.1 The interactions between the natural resources and current and future uses of the catchment have a number of implications for the water environment. These can be summarised as key issues which must be addressed in any future strategy for the catchment.

5.2.2 These key issues are listed in Table 5.1 under the headings of:

- Flood Defence;
- the Environment;
- Other.

5.2.3 In each case the following information is given:

- issue;
- NRA policy support (ie. whether a national, regional or catchment objective);
- location; and
- priority.

5.2.4 The priority attached to each is as follows:

(1) High Priority - requiring immediate attention;

(2) Medium Priority - requiring attention in the medium term (ie. up to five years).

(3) Low Priority - requiring attention in the medium to long term (ie. five years plus).

5.2.5 The catchment has undergone many land use changes over this and preceding centuries and in recent years has been the subject of many detailed studies. The key issues, therefore, are concerned primarily with the refinement of existing controls rather than the introduction of entirely new arrangements. They are also often related, either directly or indirectly, to the development pressures associated with commercial, gravel extraction, landfill, and infrastructure proposals.

TABLE 5.1: KEY ISSUES IN THE LOWER COLNE CATCHMENT

FLOOD DEFENCE: KEY ISSUES

Subject	Issue	Policy Support Nat. Reg. Catch.	Location	Priority
Flood Defence	**Lower Colne Flood Alleviation Scheme:**			
	i) There is a need to reappraise certain works included in the current scheme proposals.		Staines/Church Lammas, Trout Lane Area	1
	ii) Some older structures on the Colne are still subject to blockage, jeopardising the effectiveness of the overall scheme.		Willowbank Weir, Hale Hamilton Screen, Valentine's Paint Mill, West Drayton Mill Weir, Ash Offtake.	1
	iii) Protection is still required to certain properties within the Colne floodplain.		Hithermore Road, Stanwell Moor, flooded from Stanwell Moor Ditch and Rockingham Recreation Ground, Uxbridge, flooded from the Frays River.	1
	iv) Increased run-off from new road proposals could increase flood flows in the receiving water courses thereby threatening the integrity of the scheme.		M25 widening affecting the Colne Brook, M4 widening affecting the low level drainage system and the Terminal 5 road proposals affecting the Wraysbury and Colne.	1
	v) Potential further loss of floodplain and flood attenuation may occur through development, land doming and filling of existing wet gravel pits. This would severely undermine the current flood alleviation scheme.		Colne Valley.	1
	The Pinn:			
	vi) Uncontrolled out of bank flows from the River Pinn cause extensive flooding of surrounding properties.		Central Pinner and several areas upstream and downstream.	1

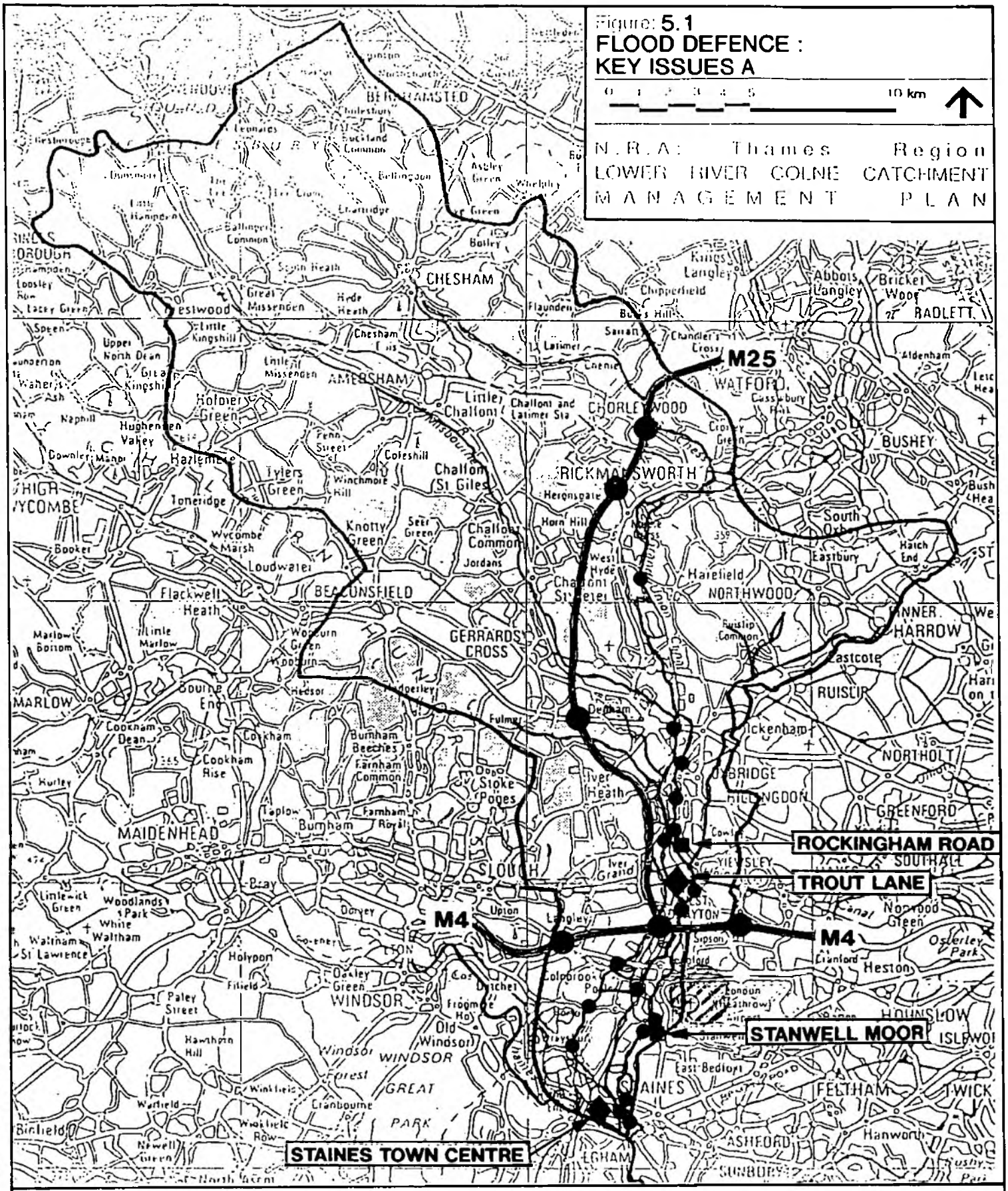


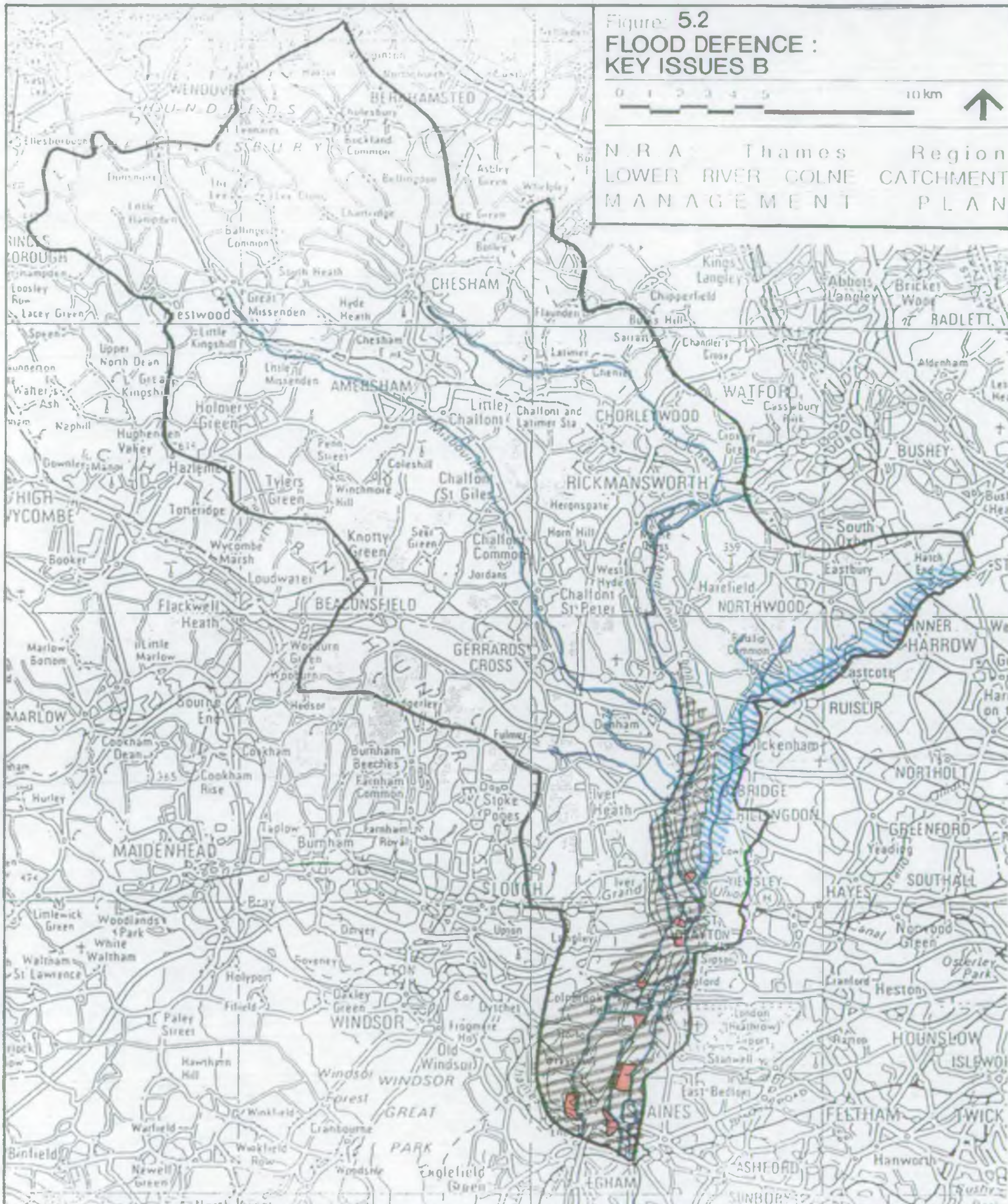
Figure: 5.1
FLOOD DEFENCE :
KEY ISSUES A
0 1 2 3 4 5 10 km
N.R.A: Thames Region
LOWER RIVER COLNE CATCHMENT
MANAGEMENT PLAN
CHESHAM
AMERSHAM
BEACONSFIELD
HIGH WYCOMBE
MARLOW
MAIDENHEAD
WINDSOR
SLOUGH
GERRARDS CROSS
RICKMANSWORTH
WATFORD
M25
M4
ROCKINGHAM ROAD
TROUT LANE
STANWELL MOOR
STAINES TOWN CENTRE
HARROW
NORTHWOOD
RUISLIP
UXBRIDGE
HILLINGDON
HOUNSLOW
HESTON
FELTHAM
TWICKENHAM
GREAT PARK
LOWER RIVER COLNE IMPROVEMENT SCHEME
Reappraisal of Current Proposals
Structures Prone to Blockage
Outstanding Protection to Properties
Proposed Widening of M4 & M25 Motorways
Terminal 5, Heathrow Airport
Gravel Pits Subject to Filling

Subject	Issue	Policy Support Nat. Reg. Catch.	Location	Priority
	Low Level Drainage and Groundwater:			
	vii) Inadequate operation of the low level drainage system and rapid fluctuations in ground water levels in the gravels, lead to frequent incidents of water-logging and localised groundwater flooding. These problems are exacerbated where rivers are perched above surrounding levels and/or gravel pit filling forms a barrier to groundwater movement.		Colne Valley	2
	Other:			
	viii) There is insufficient knowledge of the potential effects of more extreme weather conditions induced by global warming on existing and proposed flood alleviation proposals.		Catchment-wide	2/3
	ix) Damage to the environmental value of main rivers is occurring through inappropriate reach specification for maintenance works (eg. dredging).		Catchment-wide	1
	x) At present National NRA flood warning targets cannot be guaranteed because of gaps in data gathering and limitations of forecasting technology.		Pinn & Colne	2/3
	xi) Many residents feel uninformed about potential flood risk and proposed alleviation methods.		Pinn & Colne	2/3
Planning Liaison/ Forward Planning	i) There is no definitive post scheme floodplain map for the Colne, which can be used by local authorities when forming floodplain protection policies.		Colne Valley	1
	ii) Local authorities require guidance when dealing with water related issues in statutory development plans.		Catchment-wide	1

Figure: 5.2

FLOOD DEFENCE : KEY ISSUES B

N R A Thames Region
LOWER RIVER COLNE CATCHMENT
MANAGEMENT PLAN



THE PINN & LOW LEVEL/GROUNDWATER DRAINAGE

- River Flooding from the Pinn
- Low Level Drainage/Groundwater Problems
- Recent Gravel Pit Filling (where known)

ENVIRONMENT: KEY ISSUES

Subject	Issue	Policy Support Nat. Reg. Catch.	Location	Priority
Fisheries	i) There is a need to identify a preferred fish migratory route up the Colne system to allow development of a co-ordinated programme of fish pass construction.		Catchment-wide	1
Recreation	i) The Colne Valley Broadsheet sets out a series of proposals for the Colne Valley Park, but falls short of recognising the particular recreational opportunities of the Colne river corridor.		Colne Valley	2/3
Landscape & Conservation	i) Despite land use changes there are many areas within the river valleys worthy of conservation, not least traditional agrarian landscapes, water-dependent habitats, parklands, mature wet gravel pits and attractive lengths of river. These are threatened not only by development and river works but also by landfilling and changes in water level.		Catchment-wide	1
	ii) Equally there are many aspects of the river valleys which require enhancement including poorly restored landfill sites, downgraded agriculture, poor urban riverscape and realigned river reaches.		Catchment-wide	1/2
	iii) The value of the rivers as features of continuity in the landscape is likely to become all the more important in the future as the current downturn in the agricultural economy leads to a gradual but significant change in the landscape of the catchment.		Catchment-wide	1/2

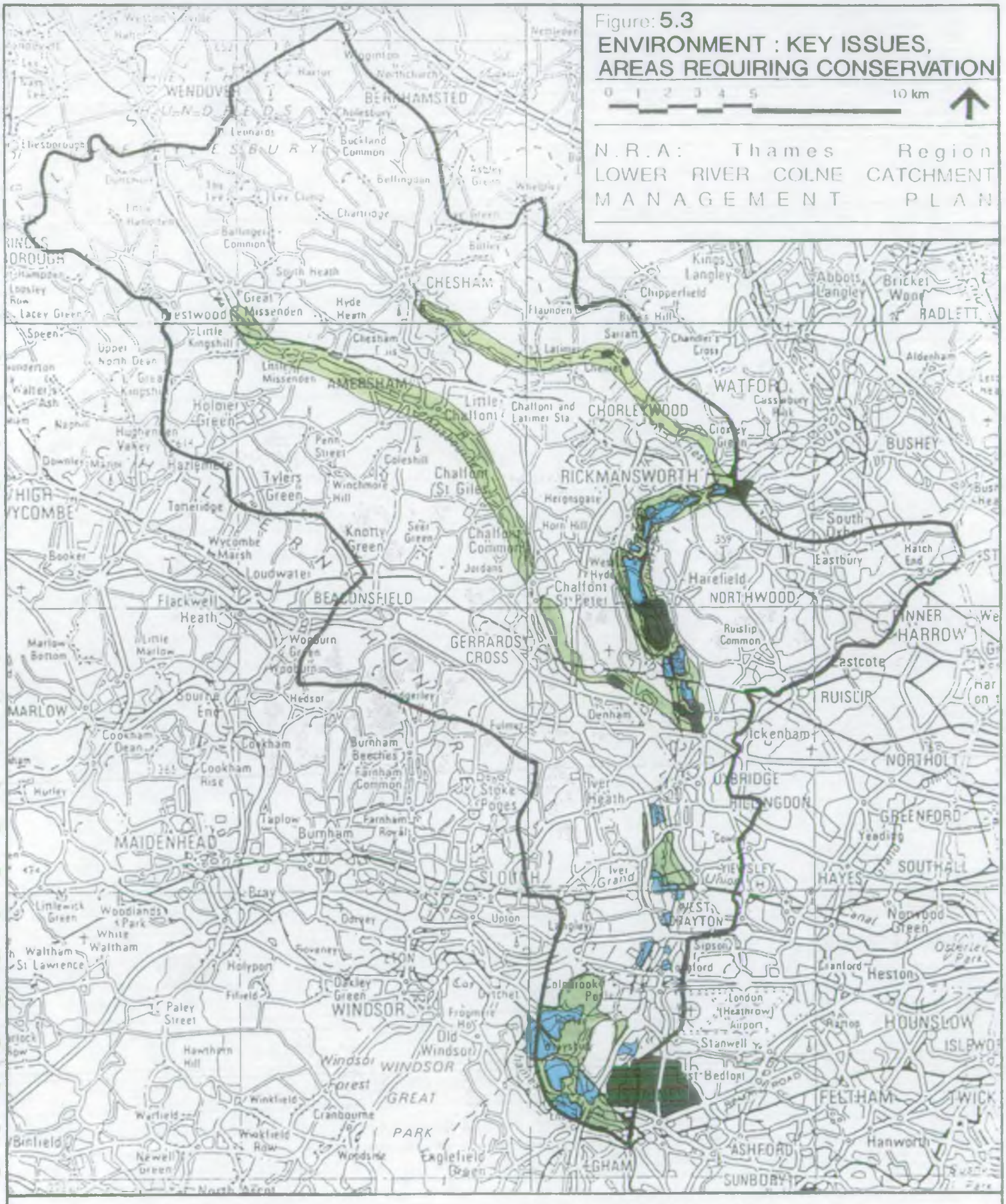


Figure: 5.3
ENVIRONMENT : KEY ISSUES, AREAS REQUIRING CONSERVATION
0 1 2 3 4 5 10 km
N.R.A: Thames Region
LOWER RIVER COLNE CATCHMENT MANAGEMENT PLAN
Sites of Special Scientific Interest
Areas of Landscape/Ecological Value
Worked Out Wet Gravel Pits

Subject	Issue	Policy Support Nat. Reg. Catch.	Location	Priority
	iv) Development pressures continue to pose a threat to the environment, but if carefully planned can offer a key to the improvement of areas of past degradation and especially the resolution of landfill problems. This is exemplified by the Terminal 5 proposals which if insensitively handled could effectively break the continuity of the Colne Valley but if carefully planned could strengthen this important but degraded length of river corridor.		Colne Valley	1

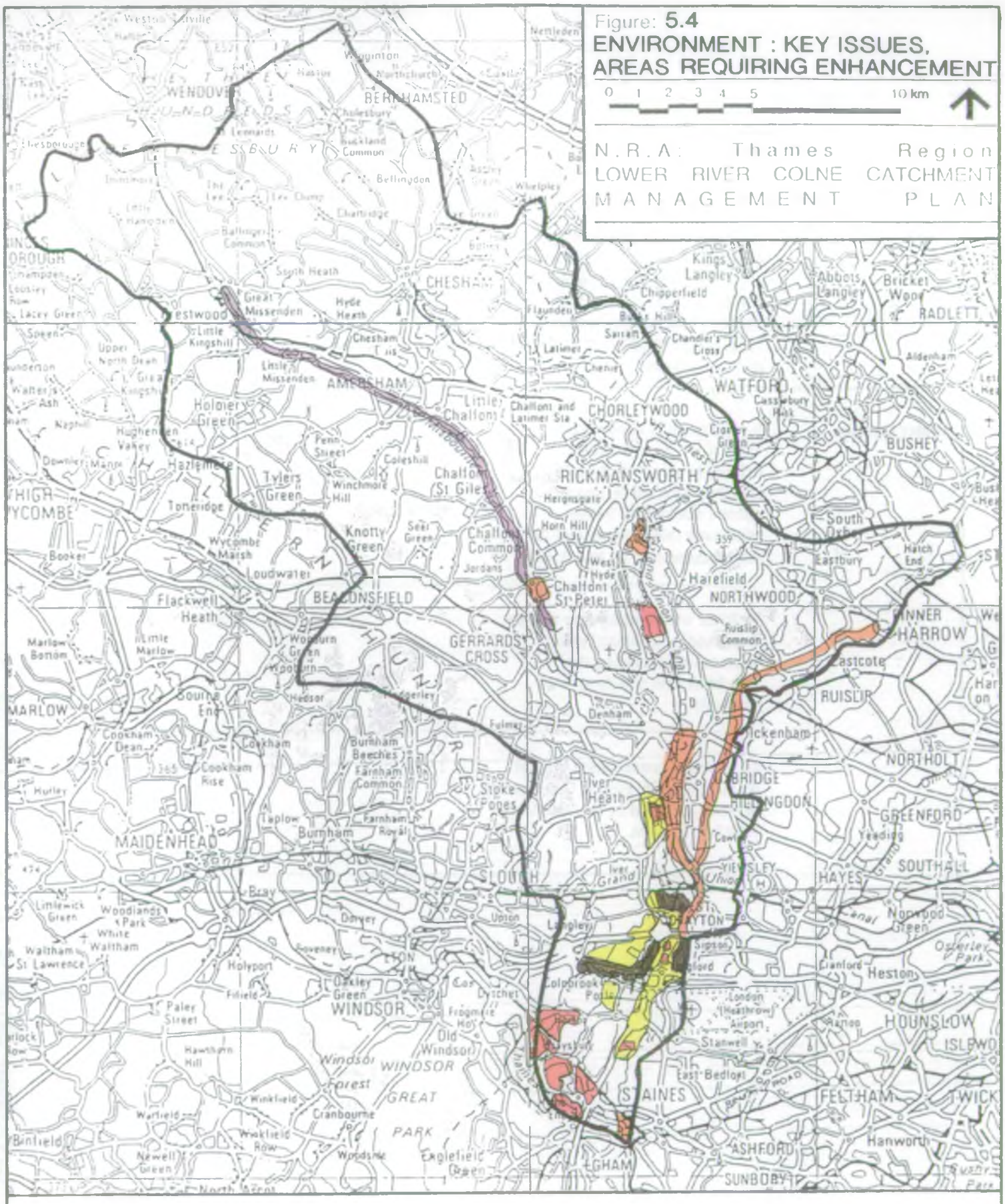


Figure: 5.4
ENVIRONMENT : KEY ISSUES, AREAS REQUIRING ENHANCEMENT
0 1 2 3 4 5 10 km
N.R.A: Thames Region
LOWER RIVER COLNE CATCHMENT MANAGEMENT PLAN
Gravel Pits with Outstanding Filling Conditions
Past Landfill Areas Requiring Major Enhancement
Downgraded Agricultural Areas Requiring Enhancement
Urban/Urban Edge Areas Requiring Enhancement
Low Flows Requiring Alleviation

OTHER: KEY ISSUES

Subject	Issue	Policy Support Nat. Reg. Catch.	Location	Priority
Water Resources	i) Low flows in the Misbourne, resulting from over abstraction of the chalk aquifer, are of great public concern affecting the amenity, fisheries and wildlife value of this attractive high quality chalk river.		The Misbourne	1
	ii) A major impact on the Lower Colne system arises from the Upper Colne Catchment drainage. A broad assessment of this impact is needed in any future integration of the Catchment Management Plans prepared for the Upper and Lower Colne.		Catchment-wide	2
Water Quality	i) The amenity and fisheries value of the rivers is being reduced by river water quality adversely affected by sewage effluent discharges. In the Misbourne this problem may be being exacerbated by low flows.		Catchment-wide	2/3
	ii) River water quality may also be threatened by increased urban water run-off including that associated with new road proposals.		Catchment-wide	2/3
	iii) Areas of conservation interest are threatened by ground water quality adversely affected by leachate from older landfill sites.		Colne Valley	2/3
	iv) A preliminary assessment of the water quality impacts associated with the Upper Colne e.g. Radlett Brook, Mimshall Brook, is essential for a balanced overview. This should be addressed in any future integration of the Upper and Lower Colne Catchment Management Plans.		Catchment-wide	2/3

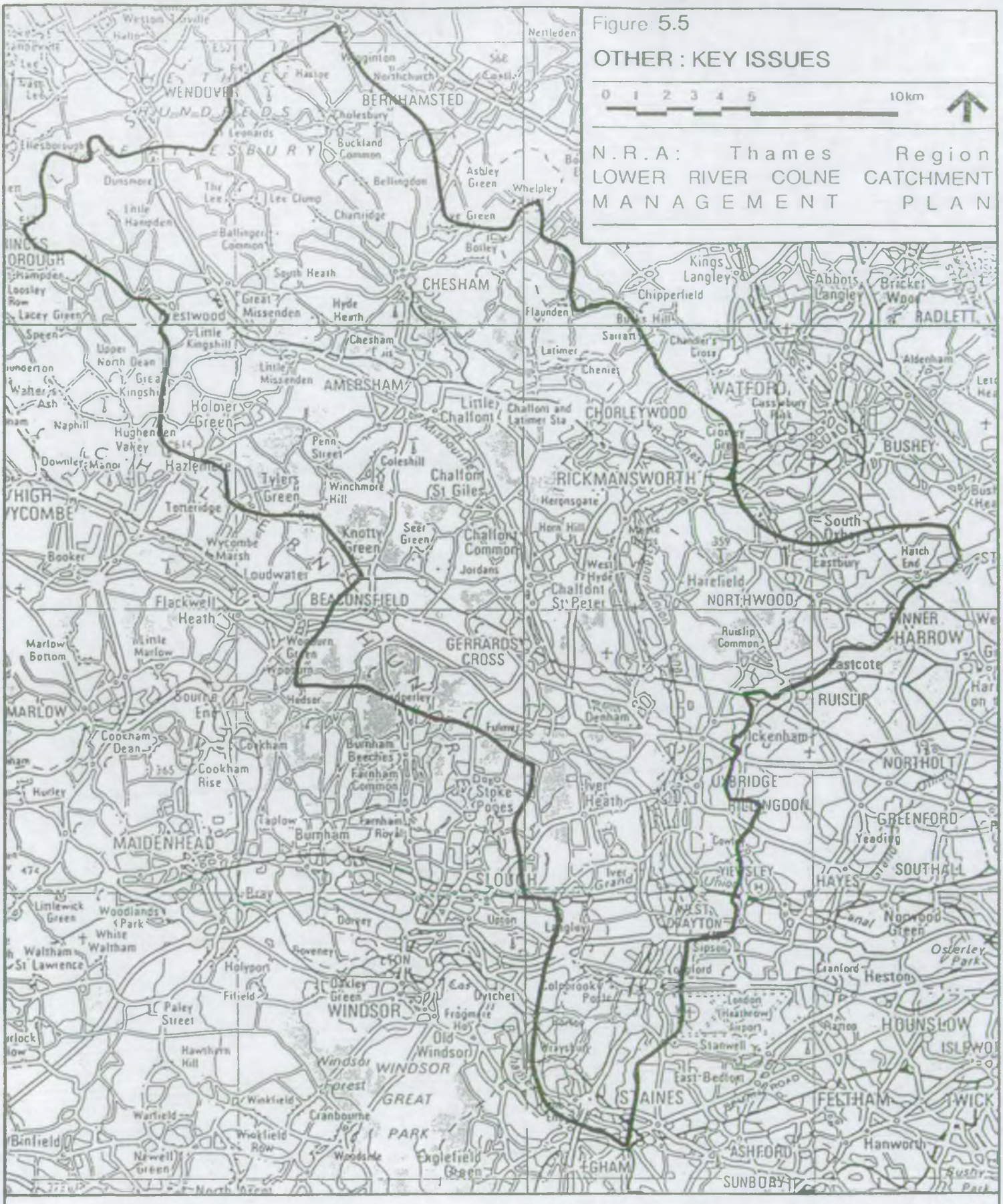


Figure 5.5
OTHER : KEY ISSUES
0 1 2 3 4 5 10km
N.R.A: Thames Region
LOWER RIVER COLNE CATCHMENT
MANAGEMENT PLAN
WENDOVER
BERKHAMSTED
CHESHAM
AMERSHAM
BEACONSFIELD
HIGH WYCOMBE
MARLOW
MAIDENHEAD
WINDSOR
SLOUGH
GERRARDS CROSS
CHORLEYWOOD
RICKMANSWORTH
WATFORD
NORTHWOOD
HARROW
RUISLIP
UXBRIDGE
HILLINGDON
NORTHOLT
GREENFORD
SOUTHALL
HAYES
HOUNSLOW
FELTHAM
STAINES
ASHFORD
SUNBURY
RADLETT
BUSHEY
Kings Langley
Chipperfield
Abbots Langley
Bricket Wood
Aldenham
Chalfont St Giles
Chalfont St Peter
Chalfont Common
Tylers Green
Holmer Green
Penn Street
Coleshill
Winchmore Hill
Knotty Green
Seer Green
Jordans
Loudwater
Flackwell Heath
Wooburn Green
Hedsor
Burnham Beeches
Farnham Common
Stoke Poges
Taplow
Burnham
Cookham
Cookham Dean
Cookham Rise
Bray
Dorney
Eton
Eton Wick
Oakley Green
Fifield
Paley Street
Holyport
Hawthorn Hill
Windsor Forest
Great Park
Old Windsor
Winkfield
Warfield
Cranbourne
Binfield
Newell Green
Wokefield Row
Woodside
Eagle Field Green
Littlewick Green
Woodlands Park
White Waltham
Waltham St Lawrence
Hurley
Marlow Bottom
Little Marlow
Bourne End
Flaunden
Latimer
Chenies
Sarratt
Chandler's Cross
Croxley Green
Cassiobury Park
Harefield
Eastbury
Hatch End
Eastcote
Ruislip Common
Denham
Ickenham
Iver Heath
Iver
Iver Grand Union Canal
Yiewsley
West Drayton
Langley
Sipson
Cranford
Heston
Osterley Park
Norwood Green
Southall Canal
Yeading
London (Heathrow) Airport
Stanwell
East Bedfont
Hanworth
Bushy Park
Twickenham
Isleworth
Colnbrook
Poyle
Wraysbury
Staines Reservoir
Whelpley Hill
Ashley Green
Buckland Common
Bellingdon
Chartridge
Ballinger Common
South Heath
Great Missenden
Hyde Heath
Little Missenden
Little Chalfont
Chalfont and Latimer Sta
Hughenden Valley
Naphill
Downley
Hazlemere
Tylers Green
Terriage
Wycombe Marsh
Booker
Flackwell Heath
Marlow Bottom
Little Marlow
Bourne End
Hedsor
Cookham Dean
Cookham Rise
Burnham Beeches
Farnham Common
Stoke Poges
Taplow
Burnham
Dorney
Eton
Oakley Green
Fifield
Paley Street
Holyport
Hawthorn Hill
Windsor Forest
Great Park
Old Windsor
Winkfield
Warfield
Cranbourne
Binfield
Newell Green
Wokefield Row
Woodside
Eagle Field Green
Littlewick Green
Woodlands Park
White Waltham
Waltham St Lawrence
Hurley
Marlow Bottom
Little Marlow
Bourne End
Flaunden
Latimer
Chenies
Sarratt
Chandler's Cross
Croxley Green
Cassiobury Park
Harefield
Eastbury
Hatch End
Eastcote
Ruislip Common
Denham
Ickenham
Iver Heath
Iver
Iver Grand Union Canal
Yiewsley
West Drayton
Langley
Sipson
Cranford
Heston
Osterley Park
Norwood Green
Southall Canal
Yeading
London (Heathrow) Airport
Stanwell
East Bedfont
Hanworth
Bushy Park
Twickenham
Isleworth
Colnbrook
Poyle
Wraysbury
Staines Reservoir
Whelpley Hill
Ashley Green
Buckland Common
Bellingdon
Chartridge
Ballinger Common
South Heath
Great Missenden
Hyde Heath
Little Missenden
Little Chalfont
Chalfont and Latimer Sta
Hughenden Valley
Naphill
Downley
Hazlemere
Tylers Green
Terriage
Wycombe Marsh
Booker

5.3 THE LOWER COLNE STRATEGY FOR FLOOD DEFENCE AND THE ENVIRONMENT

The Vision

5.3.1 The NRA TR's vision of the catchment is:

A VISION FOR THE LOWER COLNE CATCHMENT
Despite many alterations by man, the rivers of the Lower Colne Catchment are a highly valuable natural resource. They stand in stark contrast to the urban fringe degradation of much of the Colne Valley, while the main Colne tributaries are a major contributor to the high environmental quality of the Chilterns Area of Outstanding Natural Beauty. The Lower Colne Improvement Scheme is addressing one of the fundamental problems of the catchment, namely that of severe flooding in the Colne Valley. In consequence, this Catchment Management Plan can embrace a wider remit. Thus the two objectives of the NRA are to resolve more minor outstanding flooding problems and to retain and improve the quality of the river environment as a whole. Central to this thinking will be identification of the river corridors of the catchment as special areas to which specific conservation policies apply in statutory development plans.

Turning the Vision into Reality

5.3.2 Turning the vision of the Lower Colne Catchment into reality depends on having a simple robust strategy which is supported by all those with responsibility for managing future changes in the catchment. The strategy comprises the following basic components:

	STRATEGY	KEY ACTIONS
(i)	Resolution of outstanding flooding problems (Fig. 5.6)	- resolution of certain outstanding flood alleviation works relating specifically to the Lower Colne Improvement Scheme; - prevention of further loss of floodplain to land doming and development; - resolution of inadequate operation of the Colne low level drainage system; - review of the rapid fluctuations in groundwater levels in the Colne gravels leading to waterlogging and localised groundwater flooding; - resolution of uncontrolled flooding of the River Pinn.


Figure 5.6
STRATEGY: RESOLOUTION OF OUT
– STANDING FLOODING PROBLEMS
0 1 2 3 4 5 10 km
N.R.A. Thames Region
LOWER RIVER COLNE CATCHMENT
MANAGEMENT PLAN
CHESHAM
AMERSHAM
BERKHAMSTED
RICKMANSWORTH
WATFORD
CHORLEYWOOD
BUSHEY
NORTHWOOD
HARROW
RUISLIP
NORTHOLT
GREENFORD
SOUTHALL
HAYES
HEATHROW
HOUNSLOW
FELTHAM
ISLEWORTH
BEACONSFIELD
GERRARDS CROSS
MARLOW
MAIDENHEAD
SLOUGH
WINDSOR
WINDSOR GREAT PARK
ASHFORD
HIGH WYCOMBE
Resolution of Outstsanding Flooding Problems in the Colne Valley
Resolution of River Flooding from the Pinn

	STRATEGY	KEY ACTIONS
(ii)	Conservation of remaining river-related features and areas of interest (Fig. 5.7)	- ensuring appropriate management mechanisms are in place; - prevention of filling of mature wet gravel pits; - localised habitat creation and enhancement; - improvements in river geomorphology and river habitats through the re-direction of river maintenance; - improvements in watertable levels in areas supporting watertable-dependant habitats; - improvements to existing river structures and restoration of historic features; - improvements in riverside public access.
(iii)	Enhancement of degraded areas (Fig. 5.7)	- ensuring all new development contributes to the enhancement of the catchment; - fundamental restructuring of past areas of landfill leading to habitat creation and landscape enhancement; - river channel restoration.

Area of Influence of the Strategy

5.3.3 Specifically, the areas to be addressed by the strategy will be the river corridors of the catchment (Fig. 5.8), in other words the rivers themselves plus all adjacent land having an existing or potential value relating to the presence of the rivers. In the case of the Colne this is largely defined by the 1 in 100 year floodplain, and in the case of the Misbourne and Chess by the valley floors, which are generally fairly narrow. In the case of the Pinn, however, which has been squeezed by urban development, the current width of the river corridor is sometimes little more than the width of the river itself. Here, therefore, it is suggested that the river corridor should be defined as the area of land required for the river to achieve a natural meandering course with associated riparian habitats. This would be on the basis that future riverside redevelopment should be obliged to take account of restoration of the river corridor as a conservation principle.

Purpose of the Strategy

5.3.4 The purpose of the strategy is twofold, first to provide a programme of action and second to provide context to individual proposals and river works so that their acceptability or otherwise can be judged against wider objectives; in other words to encourage comprehensive planning rather than ad hoc decision making. It should also have the benefit of:

- encouraging closer consideration of the interaction between changing land uses and the water environment;
- ensuring that all land use changes in the river corridors make a direct and positive contribution to an overall plan;

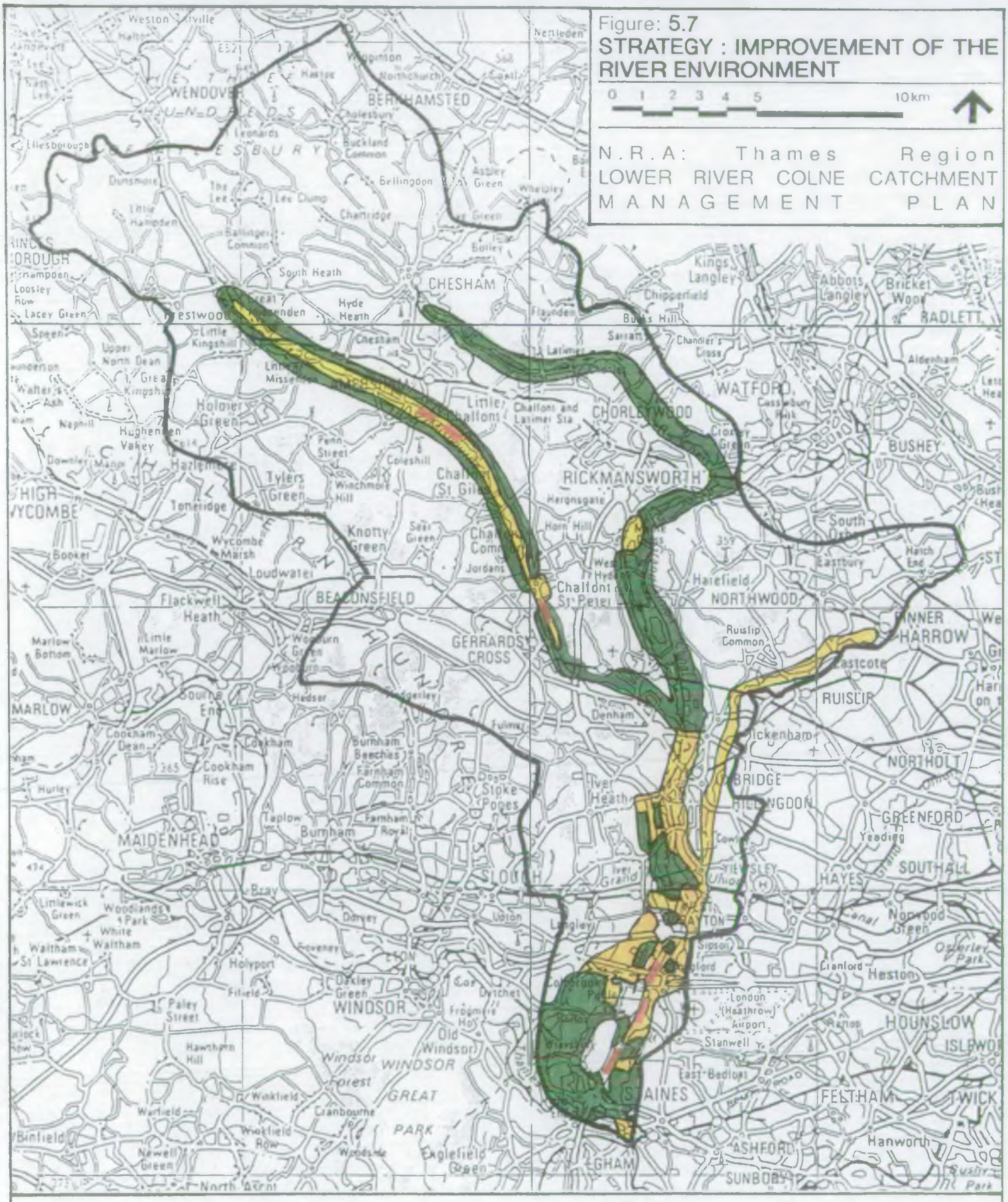


Figure: 5.7
STRATEGY : IMPROVEMENT OF THE RIVER ENVIRONMENT
0 1 2 3 4 5 10km
N.R.A: Thames Region
LOWER RIVER COLNE CATCHMENT MANAGEMENT PLAN
Areas Requiring Conservation
Areas Requiring Enhancement
River Channels Requiring Enhancement

- ensuring that localised enhancement works identified as part of individual proposals contribute to a wider plan.

Implementation of the Strategy

5.3.5 Whilst resolution of outstanding river flooding problems is the direct responsibility of the NRA, management of the river corridors is obviously well beyond the NRA's remit. In seeking conservation and enhancement of the river corridors the requirement is for the NRA to form a partnership with the constituent local authorities and conservation interests of the catchment (including the Colne Valley Groundwork Trust). Then, within this forum, to identify a preferred conservation and enhancement plan for the river corridors and to agree the most appropriate methods of implementation. The respective roles of the NRA and local authorities are outlined below.

IMPLEMENTATION OF A CONSERVATION AND ENHANCEMENT PLAN

(i) Main Areas Requiring Conservation

Mechanisms are already largely in place to ensure conservation and management of prime areas of the river corridor. (Appendix 1-Table 1).

Now the most critical concern is to prevent mature wet gravel pits being filled in accordance with outdated planning conditions. The local authorities will take the lead on this but the NRA can provide a valuable contribution by predicting the effects of filling, particularly on flood attenuation and groundwater quality and flows. Ultimately, the prevention of filling is likely to require negotiation on a quid pro quo basis with the loss of void space being balanced by the offer of alternative void space, further gravel extraction rights or even development of an equivalent value.

There will also be a need for small-scale enhancement projects required to improve the status quo. Here the NRA can take a positive lead as part of capital works and river maintenance.

(ii) Main Area Requiring Enhancement

These areas require fundamental restructuring. They consist of poorly restored mineral workings and urban developments which have turned their back on the rivers. The resolution of these problems is likely to prove well beyond the resources of the local authorities or the NRA. Therefore, whilst priorities should be identified, the NRA and local authorities should work in concert seeking the appropriate advancement of identified river corridor improvements through a pro-active involvement in development and infrastructure proposals as they come forward. Within this broader context small scale enhancements can still form a part of ongoing NRA capital works. (Current development and infrastructure proposals potentially contributing to river corridor improvements are shown in Fig. 5.9.).

The adoption of a pro-active approach to development is already beginning to bear fruit (Appendix 1-Table 2). Major restoration schemes are now being put forward as part of development/infrastructure proposals for some of the most degraded parts of the Colne Valley.

Development Plans

5.3.6 As highlighted above the successful implementation of much of the proposed strategy will depend on organisations other than the NRA TR. The riparian local authorities will be particularly important because of the control they exercise over land use change throughout the catchment. A key element of the overall strategy, therefore, is to provide these organisations with a robust rationale for promoting the conservation and enhancement of the river corridors.

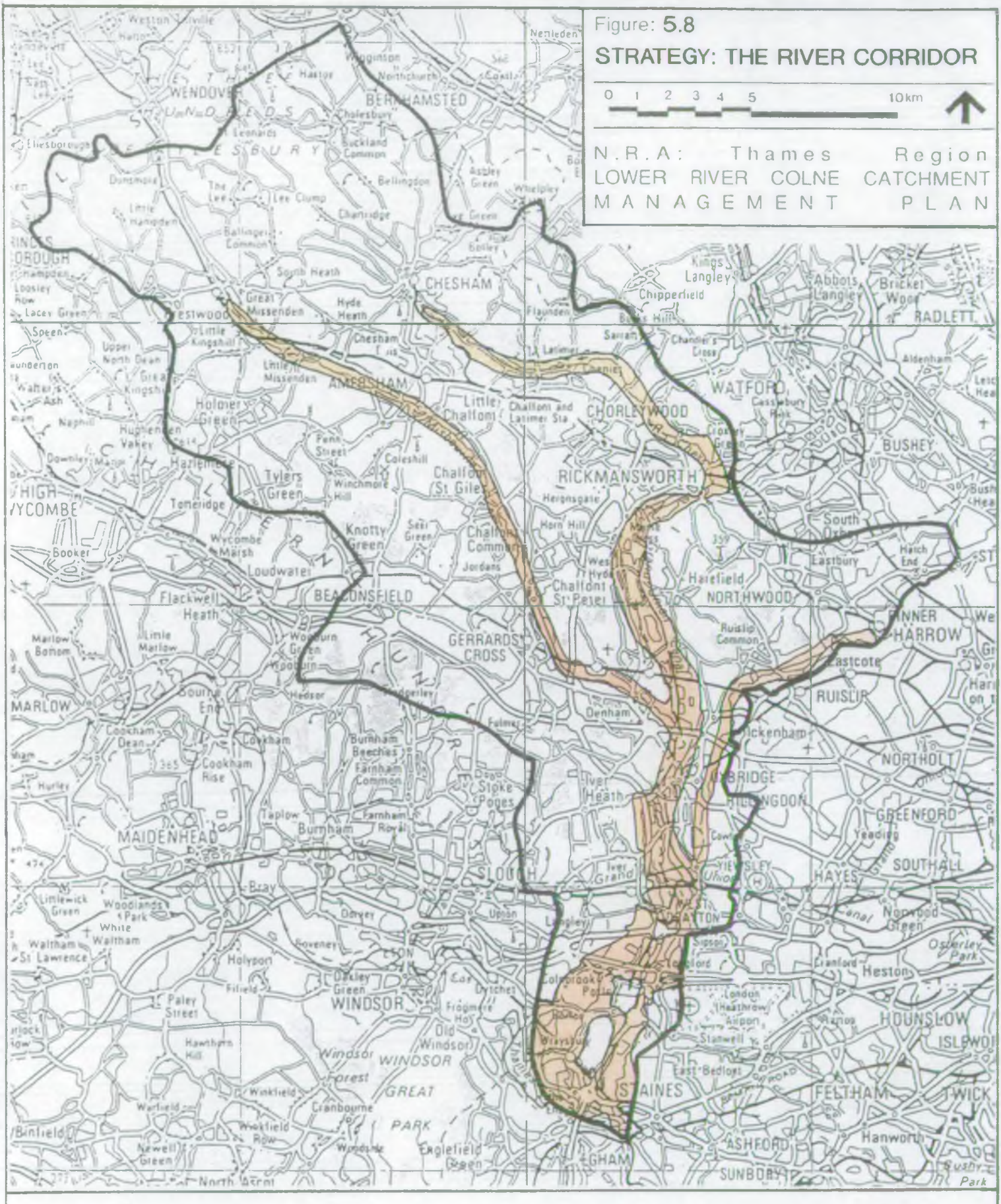


Figure: 5.8
STRATEGY: THE RIVER CORRIDOR
0 1 2 3 4 5 10km
N.R.A: Thames Region
LOWER RIVER COLNE CATCHMENT
MANAGEMENT PLAN
CHESHAM
AMERSHAM
BERKHAMSTED
CHORLEYWOOD
RICKMANSWORTH
WATFORD
BUSHEY
RADLETT
HIGH WYCOMBE
BEACONSFIELD
GERRARDS CROSS
NORTHWOOD
NORTH HARROW
RUISLIP
NORTHOLT
GREENFORD
SOUTHALL
HAYES
HEATHROW
HOUNSLOW
ISLEWORTH
TWICKENHAM
FELTHAM
STAINES
ASHFORD
SUNBURY
MARLOW
MAIDENHEAD
SLOUGH
WINDSOR
WINDSOR GREAT PARK
Area of the River Corridors

5.3.7 It is important, therefore, to ensure that the information contained in this CMP is translated into policies in the development plans covering the catchment. At the very least these policies should include:

- floodplain protection policies;

- identification of the river corridors of the catchment as special areas to which specific conservation and enhancement policies apply.

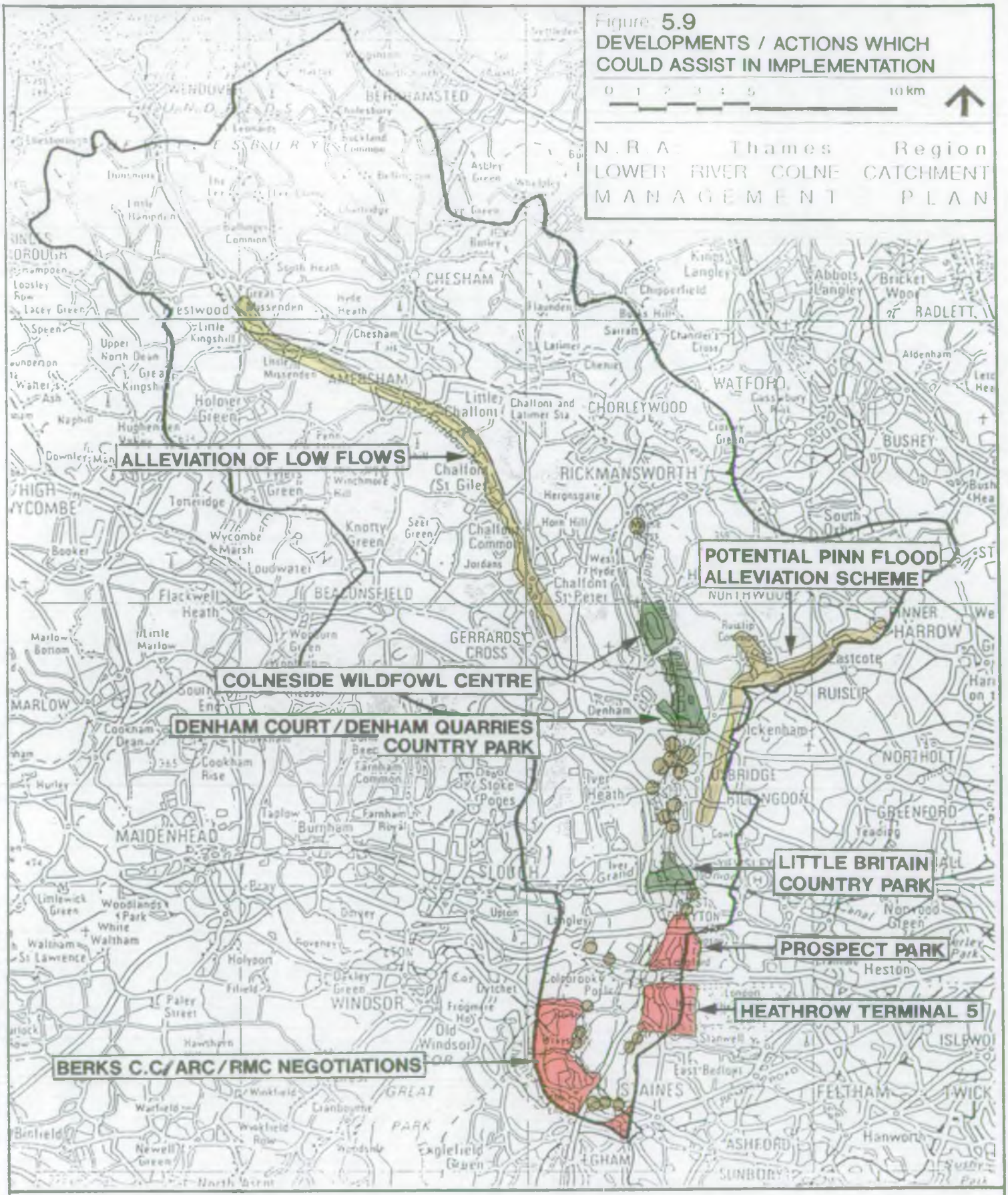


Figure 5.9
DEVELOPMENTS / ACTIONS WHICH COULD ASSIST IN IMPLEMENTATION
0 1 2 3 4 5 10 km
N.R.A. Thames Region
LOWER RIVER COLNE CATCHMENT MANAGEMENT PLAN
ALLEVIATION OF LOW FLOWS
POTENTIAL PINN FLOOD ALLEVIATION SCHEME
COLNESIDE WILDFOWL CENTRE
DENHAM COURT/DENHAM QUARRIES COUNTRY PARK
LITTLE BRITAIN COUNTRY PARK
PROSPECT PARK
HEATHROW TERMINAL 5
BERKS C.C/ARC/RMC NEGOTIATIONS
Major Developments: Areas of Influence
Possible N.R.A. Proposals
N.R.A. Works Associated with the Lower Colne Flood Improvement Scheme
Colne Valley Park Proposals

5.4 THE SUMMARY ACTION PLANS

Introduction

5.4.1 On the following pages consideration is given to how the individual NRA functions can contribute to the overall catchment strategy. On this basis an Action Plan is provided for each of the following NRA functions:

- Flood Defence;
- Water Quality;
- Fisheries;
- Recreation/Navigation;
- Landscape and Conservation;
- Planning Liaison/Forward Planning.

5.4.2 Guidance is also given on Water Resources and Water Quality as they relate to flood defence and environmental matters, however, these outline Action Plans are only put forward as suggestions and require detailed consideration by the relevant functions of NRA TR.

5.4.3 Each Summary Action Plan is structured as follows:

- a statement of function-specific objectives;
- a list of actions required to complete the identified objective or objectives including the priority attached to each;
- a comment on the other internal NRA functions and external organisations likely to be involved in implementation.

5.4.4 The priority attached to each action will need to be reviewed against the resources available.

1. FLOOD DEFENCE SUMMARY ACTION PLAN

Objective 1 (River Flooding)

The primary investment objective is to complete the Lower Colne Flood Alleviation Scheme at the earliest opportunity, combined with resolving other, generally more minor, river flooding issues remaining in the catchment. In all cases, revisions to existing proposals and identification of new works should not compromise the levels of service achieved by the Colne Scheme. All works should seek to minimise environmental disruption (both short and long term) and maximise opportunities for environmental enhancement, consistent with any wider conservation and enhancement objectives for the river corridor under consideration.

Specific activities required to achieve this objective are:

Ref.	Activity	Comment
First Priority		
LC/FD/1	Lower Colne Improvement Scheme: Resolution Resolution of those parts of the Lower Colne Scheme which have yet to be fully defined. Primarily: - The Trout Lane area - Central Staines	
LC/FD/2	Lower Colne Improvement Scheme: Blockages Inclusion of all structures subject to blockage in the Lower Colne Scheme i.e. the addition of Harefield Mill, West Drayton Mill, Hale Hamilton Screen, Willowbank Weir, Valentine's Paint Mill and the Ash Offtake in the current refurbishment proposals.	
LC/FD/3	Lower Colne Improvement Scheme: Outstanding Flooding Review of all built up areas in the Colne Valley, to ensure that all property susceptible to flooding is drawn into the scheme leading, to identification of flood alleviation works required to resolve outstanding problems, including: - flooding of Hithermore Road from Stanwell Moor Ditch (an outline proposal has already been prepared); and - Rockingham Recreation Ground flooded from the Frays.	
LC/FD/4	Lower Colne Improvement Scheme: T5 Continued liaison with Heathrow Airports Ltd to ensure that appropriate environmentally acceptable flood alleviation options are adopted to accommodate excess road run-off associated with Terminal 5 (the implications of this have already been modelled).	
LC/FD/5	Lower Colne Improvement Scheme: Motorway Widening Continued liaison with the DTp to ensure that appropriate environmentally acceptable flood alleviation options are adopted as part of motorway widening proposals with: - additional run-off from M4 to be discharged to the low level drainage system; - additional run-off from M25 to be discharged to the Colne Brook, requiring hydraulic modelling, leading to identification of any necessary additional flood alleviation measures.	
LC/FD/6	River Pinn Flooding Resumption of feasibility study into options for flood alleviation on the River Pinn, combined with environmental assessment, leading to identification of a preferred environmentally sensitive flood alleviation scheme acceptable to the relevant local authorities. Following public consultation, this should be taken to detailed design with the aim of starting construction as soon as possible.	

Second Priority

LC/FD/7 Weather/Climatic Changes
Review of the implications of different weather conditions on existing and proposed flood alleviation schemes eg. implications of a frozen catchment on flooding characteristics, and the implications of potential climatic changes associated with global warming.

LC/FD/8 Low Level Drainage System: Maintenance
Consideration of the maintenance implications relating to the Horton Drain, the Mildridge Green Drain and the Drain on the Green, if it is resolved that these watercourses should be the prime recipients of increased surface water run-off associated with the M4 widening. A preferred option would be the 'maining' of these water courses.

LC/FD/9 Past Completion Appraisal
Introduction of a formal system of post-completion appraisal as a check on the implementation of projects and as a means of improving future assessments. This should include consideration of river geomorphology and enhancements.

Objective 2 (Non-main River and Groundwater Issues)

To gain a clearer picture of how the low level drainage system operates and to understand the groundwater characteristics of the Colne Valley. This information is required to:

- help identify the cause of local flooding problems;
- allow the NRA TR to give clear advice to local authorities when consulted on local drainage issues;
- allow identification of the implications of future gravel extraction and landfill proposals on local drainage and groundwater characteristics;
- allow a more precise understanding of how local drainage and ground water levels operate within and adjacent to important watertable-dependent habitats.

Specific activities required to achieve this objective are:

Ref.	Activity	Comment

First Priority

LC/FD/10 Operation of Low Level Drainage System
A scoping exercise to identify the present operation of the low level drainage system.

LC/FD/11 Groundwater Characteristics
A scoping exercise, including review of the 1981 groundwater model, to assess the general characteristics of groundwater flows, levels and quality within the gravels of the Colne Valley.

LC/FD/12 Type of Channel Improvements
An assessment of whether channel improvements should replace outstanding flood defence works on the Lower Colne Scheme bearing in mind the hydraulic gradient which exists between the perched rivers of the valley and the surrounding flood plain gravels. Any such review must take account of the environmental implications of such a change of emphasis.

Objective 3: (Improvement in Information Dissemination on Flooding)

To keep local authorities and the public informed about flood alleviation measures being adopted. In particular, the co-operation of local authorities must be enlisted to prevent any further loss of floodplain to development or land doming.

Ref.	Activity	Comment
First Priority		
LC/FD/13	Post-Scheme Floodplain Map Preparation of a definitive post-scheme floodplain map for the Colne Scheme, based on a 1 in 100 year flood event, which can be used by local authorities when forming floodplain protection policies and when reviewing individual planning applications.	
LC/FD/14	Gravel Pit Restoration Preparation of a co-ordinated plan to ensure the most effective restoration of existing and future gravel pits in order to maintain flood defence target levels and accommodate groundwater flows.	
Second Priority		
LC/FD/15	Newsletter Publication of a regular newsletter (6-monthly or yearly) informing the public about flooding problems in the catchment and flood alleviation works being undertaken (such a newsletter should not be seen as an alternative to public consultation on individual schemes as they come forward).	

Objective 4: (Operations and Maintenance)

To establish maintenance regimes appropriate to the levels of service criteria for flood defence and the environment, together with prioritising emergency operations and blockage clearance at vulnerable sites.

The specific activities required to achieve this objective are:

Ref.	Activity	Comment
First Priority		
LC/FD/16	River Maintenance/Geomorphology/Levels of Service The setting up of experimental trials to assess the inter-relationship between river maintenance, river geomorphology and levels of service based on 3 or 4 sample reaches.	
LC/FD/17	River Structures Preparation of an 'Operations and Maintenance Manual' for all major river structures divided into two parts. The first would describe how all structures worked in sequence and the second would be an operation guide for each of the structures in turn. The production of this manual will be greatly assisted by the survey of control structures undertaken as a baseline survey for this catchment plan.	

Second Priority

LC/FD/18 Levels of Service
Refinement of the levels of service defined for the catchment, based on further flood monitoring and river flow gauging.

Objective 5: (Flood Warning)

To provide three levels of flood warning (YELLOW, AMBER, RED associated with increasing risk), in accordance with the NRA National Flood Warning System. It is intended that a RED warning should be issued 2 hours before flooding occurs in London (eg. River Pinn) and 4 hours elsewhere (eg. the Colne).

The specific activities required to achieve this objective include:

Ref.	Activity	Comment
First Priority		
LC/FD/19	PSTN System Completion of the system of Public Switched Telephone Network (PSTN) water level recorders. This requires completion of their installation, provision of maintenance procedures and contracts, and development of software to allow automatic interrogation and data handling.	
Second Priority		
LC/FD/20	Radar Coverage Extension of the analytical radar coverage, presently on trial in London, to cover the Pinn.	
LC/FD/21	Rain Gauges Telemetering more rain gauges and establishing stage/discharge relationships at selected sites.	
LC/FD/22	Trigger Levels Identifying trigger levels for warnings and further developing the predictive river flow/modelling techniques.	

Organisations

This Action Plan will require consultation with:

NRA Core Functions	External
Recreation and Conservation	Local Authorities
Fisheries	Department of Transport
Water Quality	Heathrow Airports Ltd.
Planning Liaison/Forward Planning	Private Mineral Operators

2. FISHERIES SUMMARY ACTION PLAN

Objective

To encourage a thriving fish population consistent with a healthy river system and to ensure that the rivers live up to their recognition as EEC-designated waters for both Salmonid and Cyprinid fisheries.

The fisheries of the catchment will be greatly improved by resolution of low flows in the Misbourne (Water Resources), and by improvement in river water quality associated with the upgrading of sewage effluent discharges and improvements in the control of surface water run-off (Water Quality). They will also be greatly enhanced by the proper operation of individual river structures (Maintenance) and by improvements to river geomorphology (discussed under Landscape and Conservation). Other tasks which would assist in the meeting of the above objective include:

Ref.	Activity	Comment
LC/F/1	Fisheries Survey A new fish survey programme, more closely attuned to river quality priorities, potentially using additional indicators of fish performance (other than just biomass). The results of these surveys are essential not just to fisheries but also provide a key indicator to water quality.	
LC/F/2	Key Fish Migratory Route Identification of a key fish migratory route, linking the Thames with the spawning grounds of the Misbourne and Chess. Once identified, the key objective will be to make all river structures along this route passable either through incorporation in flood defence proposals or as part of a separate project.	
LC/F/3	River Maintenance Identification of a maintenance programme for the de-silting of reaches on the Wraysbury, Frays, Chess and Misbourne, affected by silts washed into the watercourse by local run-off.	
Second Priority		
LC/F/4	Restocking Continuation of current restocking programmes including grayling, brown trout and barbel in the Lower Colne rivers, and brown trout in the Chess and Misbourne.	
LC/F/5	Habitat Improvements Identification of river habitat improvements, including increased marginal cover on reaches of the Chess, which could be implemented as part of wider river corridor enhancements.	

Organisations

This Action Plan will require consultation with:

NRA Core Functions	External
Flood Defence	Colne Valley Anglers Consultative Group
Water Resources	
Water Quality	
Recreation and Conservation	

3. RECREATION/NAVIGATION SUMMARY ACTION PLAN

Objective

To improve opportunities for informal recreation within the river corridors, consistent with conservation objectives.

The activities required to achieve this objective are:

Ref.	Activity	Comment
First Priority		
LC/R/1	Riverside Routes Identification of potential riverside routes for inclusion in an overall programme of river corridor enhancements. Only those routes judged to have minimal impact on wildlife should be included in the final programme.	
LC/R/2	Afteruse of Mineral Workings Identification of the preferred amenity afteruse for existing and proposed mineral extraction sites within the Colne Valley river corridor. This should form part of a wider NRA TR review of the future of mineral workings.	
Second Priority		
LC/R/3	Recreation Enhancement Incorporation of recreation enhancement proposals in river works and planning proposals as they come forward.	

Organisations

This Action Plan will require consultation with:

NRA Core Functions	External
Flood Defence	Local Authorities
Planning Liaison/Forward Planning	English Nature
	Countryside Commission
	BWB
	Colne Valley Groundwork Trust
	Colne Valley Working Party
	Colne Valley Naturalists Liaison Committee
	Colne Valley Anglers Consultative Group

4. LANDSCAPE AND CONSERVATION SUMMARY ACTION PLAN

Objective

To identify a conservation and enhancement plan for the river corridors of the catchment. Before this work can be finalised, however, some basic survey work has still to be completed.

Specific activities required to complete this objective are:

Ref.	Activity	Comment
	First Priority	
LC/C/1	Wildlife Survey A river corridor wildlife survey of the River Chess and River Pinn.	
LC/C/2	Landscape Assessment A landscape assessment of the River Chess and River Pinn with the specific objective of identifying conservation and enhancement opportunities.	
LC/C/3	Geomorphological Survey Geomorphological survey of all the main rivers in the Lower Colne system with the specific objective of identifying conservation and enhancement opportunities.	
LC/C/4	Conservation & Enhancement Plan Preparation of a Conservation and Enhancement Plan for each of the river corridors of the catchment. This should draw on existing baseline surveys and further survey work noted above. The proposals should cover Landscape, Nature Conservation, River Geomorphology, with separate inputs on Fisheries, Groundwater Issues and Control of Urban Run-off.	
LC/C/5	Allocation of Tesks Allocation of tasks identified in the Conservation and Enhancement Plan according to the most appropriate methods of implementation, e.g. as a special project, through river maintenance, as part of a flood alleviation programme, or as part of a major development.	
	Second Priority	
LC/C/6	Design Guide Preparation of a Design Guide demonstrating how new river structures can be blended with their surroundings within the Colne context. This should include consideration of brick types, bridge designs, paving, hand rails and fencing for different circumstances, including imitation of canal vernacular in the case of works affecting the Grand Union Canal. This should contribute to the Conservation and Enhancement Plan.	

LC/C/7 GIS

Transfer of all baseline survey data covering wildlife, landscape and geomorphology to GIS to provide a readily available source of information.

LC/C/8 River Maintenance

Use of the above baseline data to guide regular river maintenance activities, with the objective of limiting environmental damage and maximising opportunities for improving river geomorphology and marginal and aquatic habitats.

Organisations

This Action Plan will require consultation with:

NRA Core Functions	External
Flood Defence	Local Authorities
Water Resources	English Nature
Water Quality	Countryside Commission
Fisheries	Colne Valley Groundwork Trust
Planning Liaison/Forward Planning	Colne Valley Working Party
	Colne Valley Naturalists Liaison Committee
	Colne Valley Anglers Consultative Group

5. FORWARD PLANNING SUMMARY ACTION PLAN

Objective

The achievement of the NRA's aims will depend, to a large extent, on the co-operation and support of the statutory planning authorities of the catchment. There is a need therefore for continued close working relationships with the relevant local authority departments, with the specific objectives of:

- facilitating NRA TR input into statutory and non-statutory planning documents (including Unitary Development Plans, District Development Plans, County Minerals Plans and non-statutory Waste Disposal Plans and the Colne Valley Broadsheet);
- encouraging local authorities to designate the river corridors of the catchment as protected land to which specific policies relate;
- seeking early warning of major development proposals and land use changes which could affect NRA interests and ensuring, through liaison, that these interests are fully taken into account in any final planning decisions.

Specific activities required to achieve this objective are:

Ref.	Activity	Comment
First Priority		
LC/FP/1	Local Authority Briefing Note: Catchment Planning Preparation of a briefing note for local authorities setting out the purpose of the Catchment Plan.	
LC/FP/2	Model Policies: General Continued preparation of model policies (fine-tuned to suit individual local authorities) for incorporation in statutory plans as and when they come forward for public consultation.	
LC/FP/3	River Corridors Definition of a boundary for the River Corridors of the Colne and its tributaries.	
LC/FP/4	Model Policies: River Corridors Preparation of a model policy(s) for the River Corridors backed by a statement of objectives for these areas.	
LC/FP/5	Pro-active Involvement in Major Developments Ensuring that a pro-active role is pursued on all major developments. This should lead to an assessment of the implications for the water environment, with conclusions clearly set out in an Environmental Statement. The first Environmental Statement to be prepared is likely to relate to Terminal 5.	
Second Priority		
LC/FP/6	Local Authority Briefing Note: Development Proposals Preparation of a briefing note for local authorities and potential developers, setting out preferred procedures to be adopted when consulting the NRA TR on specific development proposals.	

Organisations

This Action Plan will require consultation with:

NRA Core Functions	External
Flood Defence	Local Authorities
Water Quality	Heathrow Airports Ltd.
Recreation and Conservation	Department of Transport

6. WATER RESOURCES

NRA Objective

To address the alleviation of low flows associated with over abstraction, through such actions as are necessary on licensing, abstraction, monitoring and enforcement, and through charging for water abstraction, as is consistent with or indicated by national policy.

The tasks required to achieve this objective will depend on the work programme and priorities already established for Water Resources. However, work on this Catchment Plan suggests that activities should include:

Ref.	Activity	Comment
LC/WR/1	ALF Implementation of a scheme to relieve low flows on the Misbourne, following further review and environmental assessment of options.	
LC/WR/2	Abstraction Licences Prevention of the problems of the Misbourne re-occurring or other rivers becoming affected by low flows, by ensuring that future applications for abstraction licences are thoroughly assessed in terms of their potential impact on river flows and associated water-dependent habitats.	
LC/WR/3	Water Demand Continued review of future water demands and assessment of the needs for further importation of water from outside the catchment.	

Organisations

This Action Plan will require consultation with:

NRA Core Functions	External
Water Quality	Local Authorities
Fisheries	Parish Councils
Recreation and Conservation	Local Amenity Groups

7. WATER QUALITY

NRA Objective

To ensure that the present quality of both surface and groundwater is maintained and, where appropriate, improved so as to be fit for all present and potential uses.

The tasks required to achieve this objective will depend on the work programme and priorities already established for Water Quality. However, work on this Catchment Plan indicates that there would be great benefit in inclusion of the following activities (if not already programmed):

Ref.	Activity	Comment
LC/WQ/1	Effluent Discharge A review of effluent discharges in relation to fisheries and ecological interests.	
LC/WQ/2	Gravel Pit Filling To assist in planning liaison, preparation of a strategic plan indicating where and what type of gravel pit filling will be acceptable to the NRA in terms of water quality issues. This should pay particular attention to protection of the chalk and gravel aquifers of the catchment and should be accompanied by guidance on the types of condition which should be imposed by the Waste Regulation Authority to achieve the required level of environmental protection.	
LC/WQ/3	Pro-active Control of Pollution In line with the potential provision of buffer strips for flood defence, exploration of pro-active methods for controlling pollution impacts associated with surface water run-off, for example, the use of riverside buffer strips, cross land flows and reed bed pollution traps.	

Organisations

This Action Plan will require consultation with:

NRA Core Functions	External
Flood Defence	Local Authorities
Water Resources	
Fisheries	
Recreation and Conservation	
Planning Liaison/Forward Planning	

APPENDICES

APPENDIX 1

TABLE 1

Main Conservation Areas: Mechanisms in Place for their Continued Management

Location	Management Mechanisms in Place	Potential NRA Contribution
Colne Valley: Wet Gravel Pits North of M40		
1. Rickmansworth Aquadrome: Bury & Batchworth Lakes	Owned and managed as water recreation areas by Three Rivers District Council.	
2. Stockers Lake	SSSI and Local Nature Reserve managed by Herts and Middlesex Wildlife Trust who now have plans to improve public access	To ensure that there is no change in water quality or frequency of inundation in the wet gravel pits.
3. Lynsters, Pynesfield & Troy Lake	Managed by private clubs for recreational use including shooting and sailing.	
4. The Broadwater Complex of Lakes	SSSI, still being worked, with Colne Valley Park proposals to develop it as a major Wildfowl Centre, perhaps managed by an organisation such as the Wildfowl and Wetland Trust. However, the main waterbody is subject to an outstanding filling condition (1949) although a recent application for a site licence to fill a small area was turned down on the grounds of threat to groundwater quality. Assuming that filling could eventually be allowed Redlands (the primary landowners) are pulling together a major development package involving Green Belt office development as an option in lieu of filling.	To pursue ground water quality issues in relation to filling of Broadwater
5. Stockers Lake	Fishing Lake forming part of the overall development proposals currently being investigated by Redlands for Broadwater.	

Location	Management Mechanisms in Place	Potential NRA Contribution
6. Harefield Moor	Privately run canal marina.	
7. The Denham Quarries Area including Hoveringham Lake & Frays Meadows SSSI	All owned by London Borough of Hillingdon with plans to develop the area for informal recreation/ as a Country Park, linking to the proposed Denham Court Country Park on the other side of the Grand Union Canal. Implementation constrained at present by lack of funds, therefore, consideration being given to allowing gravel extraction adjacent to Frays Meadow SSSI, to assist with raising of funds.	i) To assist with review of river access links. ii) To assist with assessment of any groundwater changes which might be experienced in Frays Meadows resulting from adjacent gravel extraction.
8. Denham Court	Majority of parkland being converted to a private Golf Club with residual riverside area being developed as a Country Park by Bucks C.C. in association with the Colne Valley Groundworks Trust.	To assist with review of river access links.
Colne Valley: Little Britain Area		
9. Delaford Manor	In private ownership, land between Colne Brook and M25 now degraded.	To assist in improvements to parkland character, perhaps as part of any future works to the Colne Brook required to accommodate additional run-off from the M25.
10. Huntsmoor Park	In private ownership, although there are Colne Valley Park proposals (Bucks) to undertake parkland restoration.	To assist in provision of Colneside bridleway, proposed by Colne Valley Park.

Location	Management Mechanisms in Place	Potential NRA Contribution
11. Complex of wet pits lying to either side of Slough Arm of the Grand Union Canal	These mature lakes are actively managed for angling and are planned to form the Little Britain Country Park, one of the strategic proposals for the Colne Valley Park.	i) To assist with review of river access links. ii) To review enhancement contributions which could be made by the proposed flood alleviation works in this area, eg. Little Britain Defences and Trout Lane Flood Carrier, forming part of the Lower Colne Flood Alleviation Scheme.
Colne Valley: South of the M4		
12. Old Slade Lake	Managed as a nature reserve by the RSPB.	To prevent bank erosion which could eventually breach the embankment between the lake and the Colne Brook.
13. Orlette Lake	Still being worked. Proposed by the Colne Valley Park to be developed as a Nature Reserve although no management agency has been identified.	To assist in ensuring the long term management of the site.
14. Bedfont Court Estate	Potentially forming part of Heathrow Terminal 5 proposals.	(See Table 2)
15. Staines Moor	SSSI, managed as common land. At present subject of a management plan being prepared by Spelthorne Borough Council. Suffering from falling water table levels.	To assist in improving groundwater levels in line with the requirements of the management plan.

Location	Management Mechanisms in Place	Potential NRA Contribution
16. Complex of Wet Pits south of Horton, inc. Kingsmead and Wraysbury No.1 and No.2	Nearly all these lakes have outstanding conditions to fill. However, Berkshire County Council is actively involved in negotiation with ARC and RMC (the two land owners) to secure a package which allows some landfill but ensures the conservation and management in perpetuity of the most valuable wet pits and ensures the creation of a Country Park at Hythe End.	NRA-TW is working in partnership with the County on these negotiations in order to secure required flood alleviation measures, (namely, Horton Diversion Channel forming part of the Lower Colne Flood Alleviation Scheme and a Thames flood relief channel forming part of the Thames flood relief programme) and to secure river corridor enhancements, including control of leachate from a past tip site.
Tributary Valleys		
17. Misbourne Valley	Parish and Town Councils have expressed an interest in carrying out localised enhancements to the river and its surroundings if a scheme were introduced to alleviate low flows. However, the valley floor could be subject to agricultural change in the future.	In association with the District and Parish Councils, to identify and carry out a programme of enhancements as part of any scheme to alleviate low flows. Ideally this should be combined with the setting up of a liaison group with those farmers whose land is crossed by the Misbourne.
18. Chess Valley	Situation not known.	?

TABLE 2

Main Enhancement Areas: Mechanisms Available to Achieve Enhancement Works

Location	Mechanisms for Achieving Enhancement	Potential NRA Contribution
Colne Valley: North of M40		
1. Maple Lodge and adjacent industrial estate	**Urban edge:** No known mechanisms available to improve this area.	Partial screening of sewage works is now being achieved through a current landscape contract associated with Lower Colne Flood Alleviation Scheme.
Uxbridge Area		
2. Urban edge of Uxbridge	**Urban fringe:** No known mechanisms available to improve this area. Despite the unsatisfactory character of some of the urban development in this area, the Colne Brook provides a clear dividing line between the urban edge and a traditional agricultural landscape. This distinction is likely to be eroded, however, by loss of this agricultural land to gravel extraction (Round Coppice Farm is a designated Preferred Extraction Area' in the Berkshire Minerals Plan).	i) To liaise with the Mineral Planning Authority to ensure a satisfactory afteruse for the current agricultural land. ii) To review any redevelopment proposals which affect land adjacent to the rivers, with the aim of encouraging river-side improvements. iii) To review options for carrying out wider enhancements as part of outstanding works on the Lower Colne Flood Alleviation Scheme, eg. Grand Union Canal Overflow, Bell Punch Works, Palmers Moor Bund and any protection required to Cowley Industrial Estate.
West Drayton/ Harmondsworth		
3. Land between railway line and Thorney Mill Road	**Mixture of degraded agriculture and landfill:** No known mechanisms available to improve the area other than a past Hillingdon/private initiative to secure improvement to the land lying immediately to the west of the Colne, known as the Philglow Study.	i) To assist in securing a long term future for this area. ii) To undertake planting along the Colne Brook.

Location	Mechanisms for Achieving Enhancement	Potential NRA Contribution
4. Larbourne Farm	**Past gravel extraction site cut in two by the M25:** The eastern half has been restored as a recreation lake by Bucks C.C. while the western half has been restored to good quality productive agriculture with boundary planting undertaken by the Colne Valley Groundwork Trust. However, the Colne Brook which was diverted as part of the M25 construction, has an unattractive trapezoidal form across both blocks of land.	To ensure a mechanism for reforming the Colne Brook in this area. Options include: - any works required to improve the conveyance of the Colne Brook associated with additional run-off from the M25; - works associated with the Lower Colne Scheme, eg. 'Motorway Interchange Embankments'.
5. Land between Thorney Mill Road and the A4	**Mixture of old landfill sites, active landfill sites and gravel extraction:** The future of this area is largely dependent on the fate of **Prospect Park**. The enhancements associated with this major development proposal are likely to include: - relocation of non-conforming users on 'the Common'; - landscape works to the gypsy site; - major restructuring of current and past mineral workings (including noxious landfill sites), lying between the M4 and the A4 to create an area of public open space; - retention of a small wet gravel pit, of Metropolitan Importance for Nature Conservation, at present subject to a filling condition. Alterations to the M4/M25 interchange to accommodate the Terminal 5 distributor roads will also require relocation of the Bigley Ditch in this area.	i) To work with the London Borough of Hillingdon to ensure that the Prospect Park proposals meet the needs of the NRA TR. ii) To work with Heathrow Airport Ltd./the DTp to ensure that relocation of the Bigley Ditch allows for the recreation of a natural sinuous course.
6. Tanhouse Farm Between M4 & A4	**Past gravel extraction and noxious landfill site restored to low grade agriculture:** No known mechanisms to improve this area at present, although in the past Bucks C.C. investigated the possibility of creating a farm theme park on this site.	To work with Bucks C.C. to secure high quality reclamation.

Location	Mechanisms for Achieving Enhancement	Potential NRA Contribution
7. Land between A4 and Colnbrook	**Downgraded paddocks along Northern edge of Colnbrook:** Identified as part of a landscape enhancement programme by Bucks C.C. in 1985 but little work so far carried out.	?
Land in the Vicinity of Heathrow		
8. Land between Heathrow & Poyle	**Major landfill sites largely restored to agriculture except for Bedfont Court Estate which is an area of small holdings:** This area, lying between the present edge of Heathrow and Poyle and between the A4 and Airport Way, forms part of the package of proposals being put forward for Terminal 5 including: - creation of a permanent well managed agricultural land holding to either side of the M25; - relocation of the Colne Brook, Bigley Ditch, Duke of Northumberland's River and Longford River to accommodate the development proposals.	NRA TR has already been closely involved with Heathrow Airports Ltd. over these proposals for the last 2 years. This liaison must continue to ensure that: - relocated rivers achieve a natural sinuous form; - the scheme addresses all landfill leachate problems associated with land covered by the scheme; - a strong and defensible river corridor is created centred on the Colne and relocated Duke of Northumberland's and Longford Rivers; - any required river works do not damage sensitive areas.
9. Poyle Farm immediately west of Poyle Industrial Estate	**Active landfill sites:** The need for further work will depend on the final quality of restoration achieved, but there will almost certainly be a requirement for further enhancement.	?

Location	Mechanisms for Achieving Enhancement	Potential NRA Contribution
Areas South of Heathrow		
10. Stanwell Moor	**Mixture of well restored agricultural land, active landfill (domed) and wet pit with outstanding filling condition:** The need for further work will depend on the final quality of restoration achieved.	i) To ensure that these works do not affect watertable quality or levels on Staines Moor immediately to the south. ii) To ensure that local riverside enhancements are included with the works required to improve conveyance in the Colne, necessitated by the road proposals of Terminal 5.
11. Staines Town Centre	**Poor riverscape where Colne and Wraysbury pass through Staines Trading Estate:** Potential major restructuring of area if the Hanover Centre is granted planning permission.	To liaise with Spelthorne Borough Council to ensure that any redevelopment of Staines Town Centre acknowledges the requirements of NRA TR.
River Pinn		
12. The river corridor of the Pinn	**Urbanised river corridor** No known major proposals for this area.	i) to implement river corridor enhancements incrementally as riverside redevelopment occurs. ii) to develop a comprehensive enhancement programme as part of any future Pinn flood alleviation scheme.