

RIVER STORT DRAFT CATCHMENT MANAGEMENT PLAN

FLOOD DEFENCE AND THE ENVIRONMENT

May 1991



NRA

*National Rivers Authority
Thames Region*

**RIVER STORT
DRAFT
CATCHMENT MANAGEMENT PLAN
FOR
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prepared by

The National Rivers Authority
Thames Region

with the assistance of

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A VISION FOR THE RIVER STORT CATCHMENT

The river corridors of the Stort Catchment are a valuable natural resource, comprising sensitive ecological habitats, a landscape of considerable diversity and value, and areas which are popular for informal recreation. The Stort Navigation is of particular historical significance and its characteristics make it unique in the Thames Region.

The objective of the NRA TR is to conserve and, wherever possible, enhance the value of this resource. This will be achieved through appropriate direct management of the water environment, including the provision of appropriate standards of urban flood protection, and partnership with the riparian local authorities, British Waterways Board and other interested organisations. A central part of this objective is to secure the designation of the corridor of the Lower Stort Valley and the Stort Navigation as a 'Special Heritage Area' in the statutory development plans.

EXECUTIVE SUMMARY

Aim of the Catchment Management Plan

Under the 1989 Water Act the National Rivers Authority (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. This plan considers the needs of the NRA Thames Region's (NRA TR) flood defence, conservation, fisheries and recreation functions but not its water quality and water resources functions.

Catchment Characteristics

The River Stort Catchment lies to the north-east of Greater London straddling the boundary between the counties of Hertfordshire and Essex. It drains southwards into the River Thames via the River Lee and is the largest of the six upper tributaries of the River Lee, covering an area of some 280 km². The catchment includes over 180 km of designated 'main river', but the main drainage feature is the Stort Navigation which flows for 22.5 km from Bishop's Stortford to the confluence with the River Lee. The Navigation, which was built during the period 1766-1769, includes 15 locks along its length and a number of bifurcations, weirs and bypass channels. It is operated by British Waterways Board (BWB).

There are three main centres of population in the catchment all of which are located in the Stort Valley. These are Harlow, Bishop's Stortford and Sawbridgeworth. The catchment also includes Stansted airport and is bisected north-south by the M11 motorway and the London to Cambridge railway. These are also located in the river valley.

The remainder of the catchment, however, is much more rural in character. The most significant land use in terms of land area is agriculture, and there is also a sizeable patchwork of relic ancient woodlands. These tend to be on the poor quality agricultural land, much of which is found in the river valleys.

Key Catchment Issues

The interaction between the natural resources and the current and future uses of the catchment has a number of implications for the water environment. These implications raise a number of key issues which are addressed by the CMP. The most important of these are:

Flood Defence

- the inadequate protection from flooding of urban areas (eg. Harlow, Sawbridgeworth);
- the inefficient functioning of flood defence structures (eg. Spellbrook Flood Lagoon, Hockerill Road Bridge adjustable weir);
- the damage to sensitive environmental areas caused by functioning of some flood defence and navigation structures (eg. Hunsdon Mead);
- the need to maintain floodplain storage capacity in the catchment;
- the surface water run-off implications of future major new development in the catchment; and
- the damage to the environmental value of 'main rivers' through inappropriate reach specifications for maintenance activities (eg. dredging).

Consultation and Liaison

- the protection of the water environment through the assessment of planning applications;
- the protection of flood defence levels of service through assessment of planning applications; and
- the requirement from local authorities for guidance on dealing with water related issues in statutory development plans; and
- the need for closer consultation with British Waterways Board particularly with regard to capital works and dredging.

The Environment

- the need to conserve watercourses, floodplains and adjacent habitats of environmental value (particularly the Stort Navigation), and enhance those which have been degraded;
- the requirement for a management plan to ensure that increased recreational activity in the Stort Valley and along the Navigation does not damage the sensitive wildlife habitats;
- the requirement for more efficient dissemination of ecological information;
- the requirement for detailed design guidance for all works which have an impact on the river corridors; and
- the need to work in partnership with local authorities and BWB to ensure that policies for land use planning, including landscape and recreation in particular; are complementary.

Strategy for the Catchment

In pursuance of the NRA TR's vision for the Stort Catchment, the Authority has a vital role to play by:

- undertaking appropriate management of flood defence and environment related interests in the catchment as a whole; and
- managing the water environment of the Lower Stort Valley/Stort Navigation in a way which conserves and, where appropriate, enhances its landscape, ecological and recreational value.

However, it is recognised that the successful implementation of much of the strategy will depend on organisations other than the NRA TR. The riparian local authorities will be particularly important in this regard because of the control they exercise over land use change throughout the catchment. The final element of the strategy, therefore, is to set up a Catchment Liaison Group comprising representatives from the NRA TR; the riparian local authorities; and other interested organisations (eg. BWB).

The Action Needed

The CMP outlines how individual NRA TR functions can contribute to the overall catchment strategy. Key actions are:

Flood Defence: appraisal studies resulting in flood defence capital investment to overcome levels of service deficiencies and operational problems and the rehabilitation of existing flood defence structures; ongoing work to enhance existing ONDA hydraulic model; and the preparation of environmental guidance (by operational reach) for use by Lee Area Flood Defence Group.

Recreation and Conservation: preparation of landscape detailing guidelines and river enhancement schemes; and the extension of the corridor ecological survey to the remainder of the catchment.

Consultation and Liaison: continuing close liaison with the riparian local authorities and other interested organisations, particularly with regard to the implementation of the Stort Heritage Area concept.

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Background Reports

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 the fundamental role of conserving and enhancing the water environment. The development of truly multi-disciplinary 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 (CMPs). In the NRA Thames Region (NRA TR), flood defence and environmental interests have become the driving force of the present round of catchment management planning. The River Stort 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 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 take regard of 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 The successful implementation of the catchment management plan will depend on maintaining the commitment 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.
- 1.1.5 The CMP fulfils the requirements of Section 136(1) of the 1989 Water Act which requires the NRA to produce a survey of flood defence needs in its area.

1.2 Summary of Approach

Methodology and Report Structure

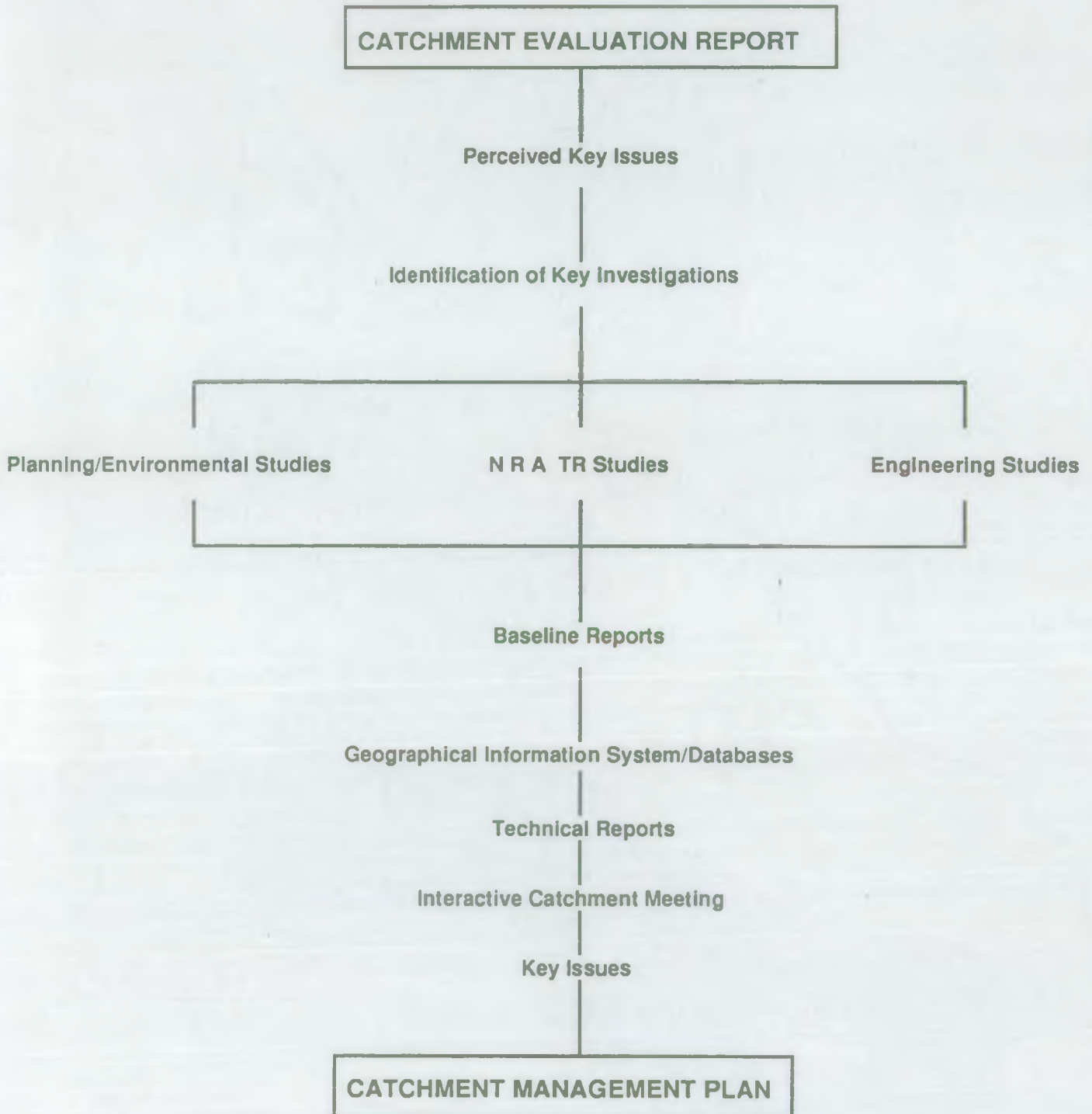
- 1.2.1 The methodology and report structure for the Draft CMP are based on NRA draft guidelines on catchment management planning, prepared in 1990 by its National Catchment Management Planning Group. These guidelines propose a framework encompassing the sequential phases of:
- evaluation;
 - forward planning;
 - implementation;
 - and monitoring.
- 1.2.2 The approach outlined for the River Stort Draft 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 and relating them 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 action plans (Section 5.0).

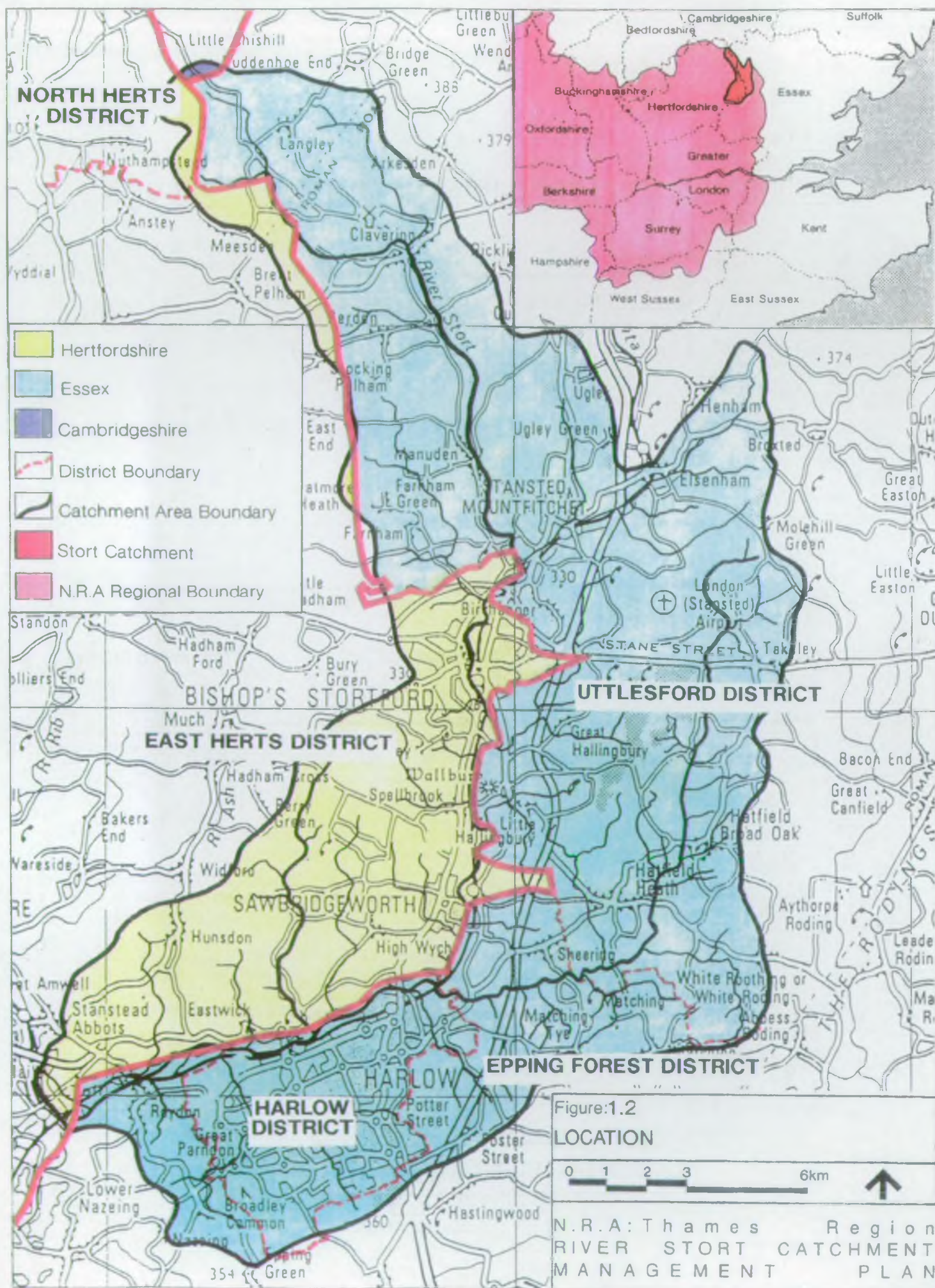
The Foundation of the CMP

- 1.2.3 There are two preparatory levels of study underlying the Draft CMP: Baseline Surveys and Technical Reports (see Figure 1.1). 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 of the local authorities and other bodies recognised as having a managing role or interest in the catchment. The comprehensive database created has been inputted into the NRA TR'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 River Stort Evaluation Report (NRA TR, November 1989). These were verified and updated and linkages between issues were 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 River Stort Draft 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 Draft 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 MANAGEMENT PLAN



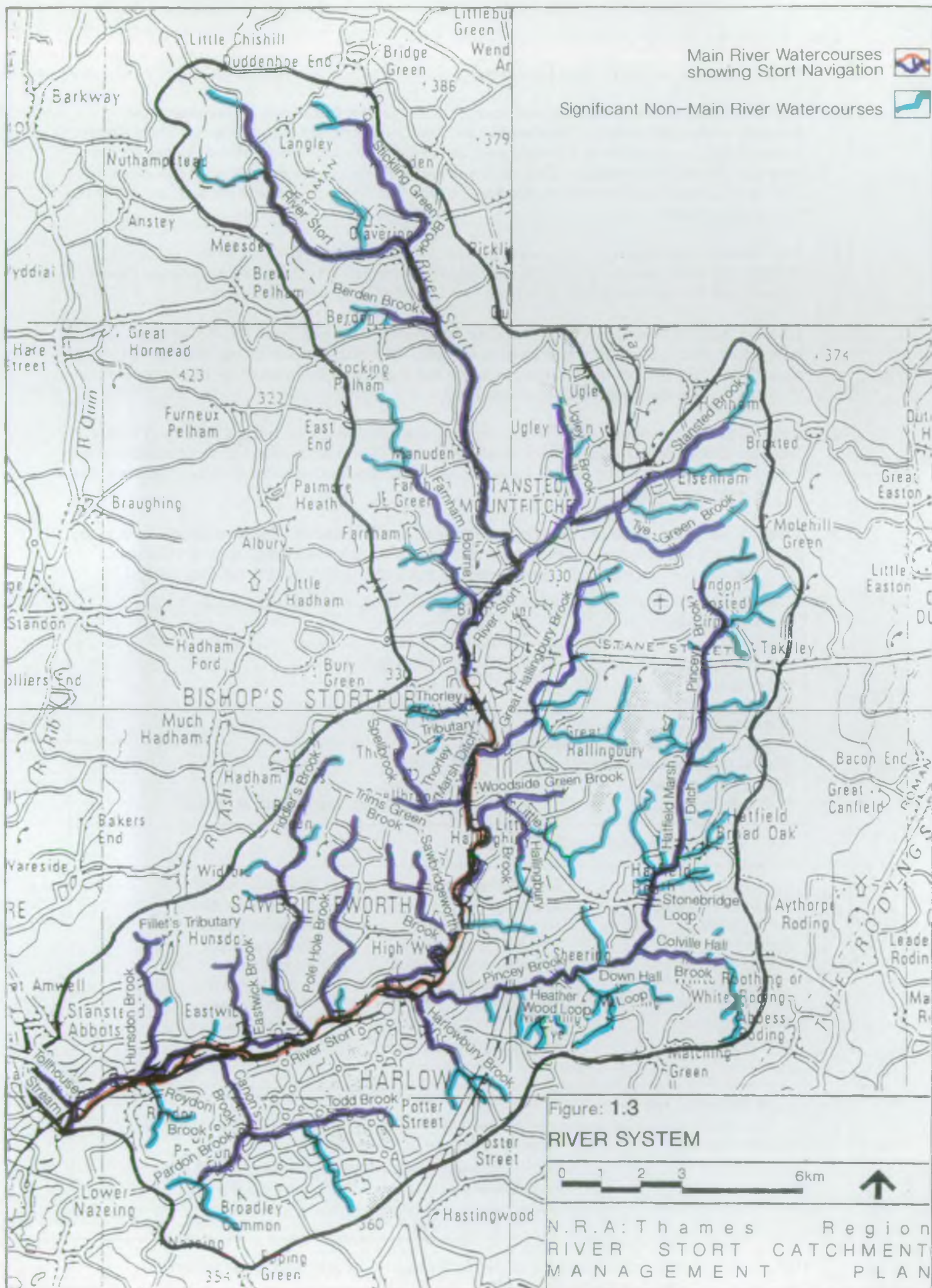


1.3 Introduction to the River Stort Catchment

- 1.3.1 The River Stort Catchment lies to the north-east of Greater London (see Figure 1.2) straddling the boundary between the counties of Hertfordshire and Essex. It sits between the catchments of the River Roding to the east and the River Ash to the west, and drains southwards into the River Thames via the River Lee. The northern boundary of the catchment marks the limit of the area drained by the River Thames and, consequently, the area managed by the NRA TR. The catchments to the north are within the NRA Anglian Region.
- 1.3.2 The catchment is the largest of the six upper tributaries of the River Lee, covering an area of some 280 km². The river system comprises the main watercourse and its tributaries; mill pounds and bypass channels; and the Stort Navigation. It includes over 180 km of designated 'main river'.¹
- 1.3.3. The main drainage feature of the catchment is the Stort Navigation which flows for 22.5 km from Bishop's Stortford to the confluence with the River Lee. The Navigation, which was built during the period 1766-1769, includes 15 locks along its length and a number of bifurcations, weirs and bypass channels. It is operated by British Waterways Board.
- 1.3.4 There are three main centres of population in the catchment all of which are located in the Stort Valley. These are Harlow, Bishop's Stortford and Sawbridgeworth. The catchment also includes Stansted airport and is bisected north-south by the M11 motorway and the London to Cambridge railway. These are also located in the river valley.
- 1.3.5 The remainder of the catchment, however, is much more rural in character. The most significant land use in terms of land area is agriculture, and there is also a sizeable patchwork of relic ancient woodlands. These tend to be on the poor quality agricultural land, much of which is found in the river valleys.

Catchment Details		
Area (km ²):	280.2 km ²	
Population:	134,000	
Main River Length (km):	181.9 km	
Number of SSSIs:	8	
Number of Scheduled Ancient Monuments:	9	
Number of Conservation Areas:	15	
Average Annual Rainfall:	630 mm	
Highest Point	139 m (High Wood, north of Langley)	
'Main River' Designations ¹ (see Figure 1.3)		
River Stort	Great Hallingbury Brook	Pole Hole Brook
Stickling Green Brook	Spellbrook	Fiddler's Brook
Berden Brook	Trims Green Brook	Eastwick Brook
Stansted Brook	Woodside Green Brook	Canon's Brook
Tye Green Brook	Little Hallingbury Brook	Todd Brook
Ugley Brook	Sawbridgeworth Brook	Parndon Brook
Farnham Bourne	Pincey Brook	Hunsdon Brook
Stort Navigation	Colville Hall Brook	Roydon Brook
Thorley Tributary	Harlowbury Brook	
Local Authorities (see Figure 1.2)		
County Councils:	Essex, Hertfordshire, (Cambridgeshire)	
District Councils:	East Herts, Epping Forest, Harlow, Uttlesford (North Herts, South Cambs)	

Footnote 1: 'Main rivers' are those defined on the Main River Map held by the Ministry of Agriculture, Fisheries and Food.



2.0 CATCHMENT DESCRIPTION

2.0 CATCHMENT DESCRIPTION

2.1 Introduction

2.1.1. The purpose of this section of the CMP is to describe the natural resource base of the catchment. It is divided into the following sections:

- geology;
- geomorphology;
- climate;
- drainage;
- water quality;
- fisheries;
- ecology;
- landscape.

2.1.2 A clear appreciation of these natural resources is the key to understanding the functioning of the water environment. It also helps to explain the nature of many human activities which go on in the catchment; for example agricultural practice is to a very large extent a function of the underlying geology.

Overview

2.1.3 The River Stort and its tributaries are a valuable natural resource, comprising important ecological habitats and a landscape character of considerable diversity and value. One of the key contributory factors to this value within the river corridor is the relatively good quality of the water. This creates the necessary conditions for wildlife to thrive, whilst at the same time ensuring that the rivers display those characteristics associated with the traditional river scene, eg. clear water, the presence of aquatic vegetation and fish, etc. A further very valuable characteristic of the river valley is the significant area of original floodplain which remains largely intact and uninterrupted by development. At the same time, however, some of the watercourses have suffered very considerable environmental degradation as a result of past works.

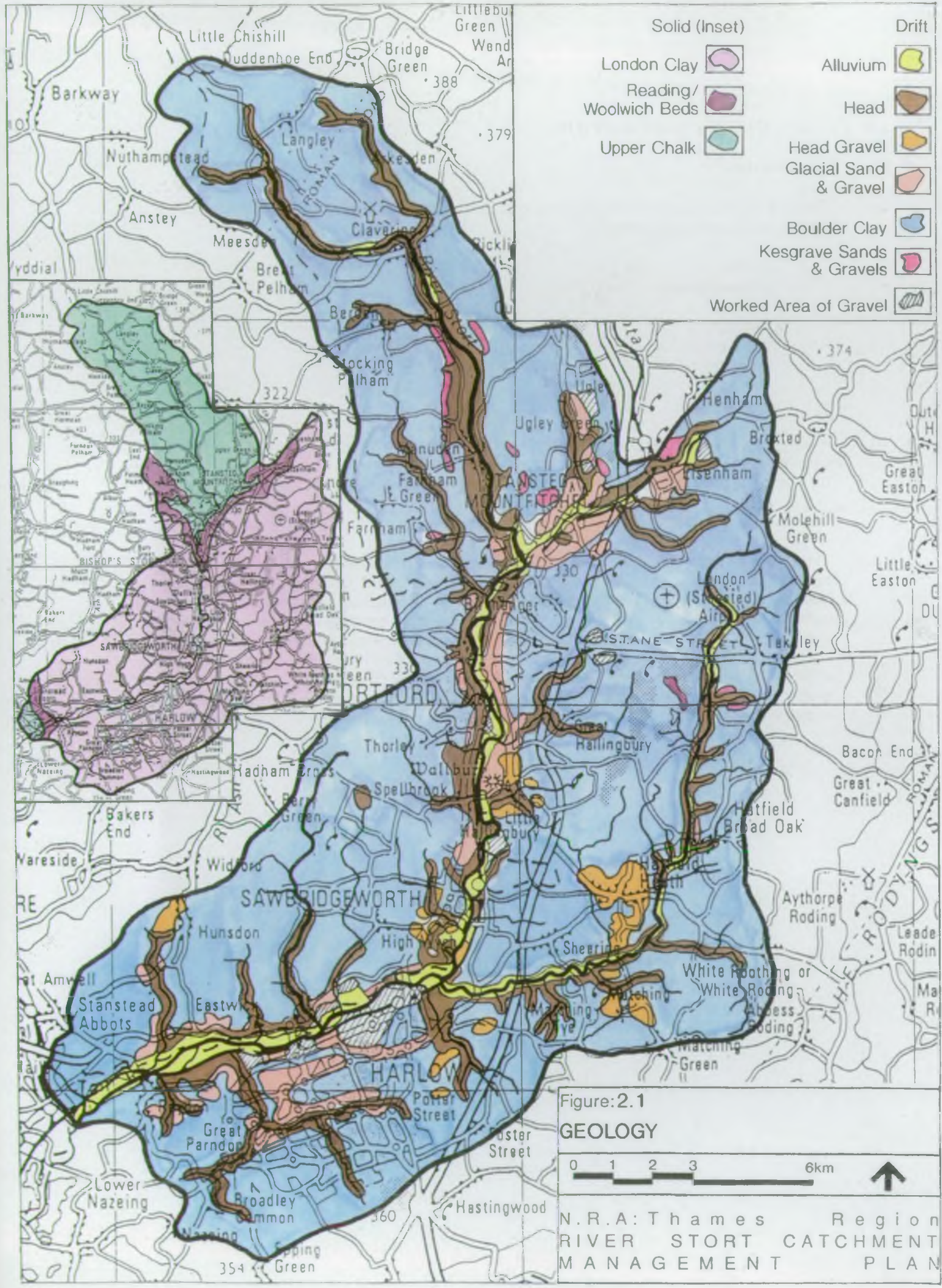


Figure: 2.1

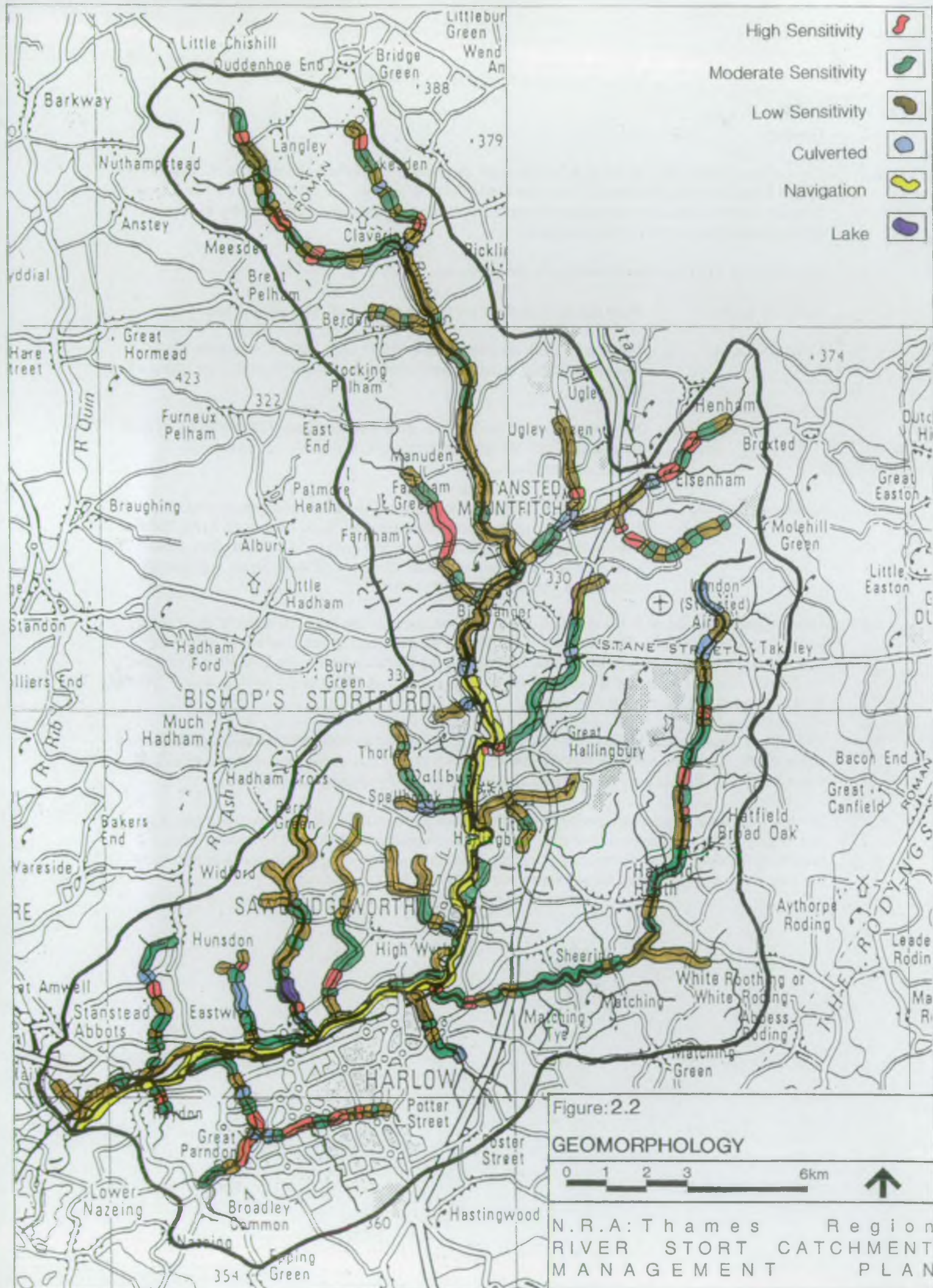
GEOLOGY



N.R.A: Thames Region
RIVER STORT CATCHMENT
MANAGEMENT PLAN

2.2 Geology

- 2.2.1 The majority of the Stort Catchment falls within the southern limits of the large expanse of boulder clay known as the East Anglian plateau. The clays overlay glacial deposits. Within the river valleys these clays are in turn overlain by post glacial deposits. Formations of Cretaceous and Tertiary age rocks outcrop in the southern part of the catchment.
- 2.2.2 The following strata have been identified in the catchment:
- | | |
|----------------------|---|
| Palaeozoic Rocks: | Strata at a fairly shallow depth forming part of the London Platform. |
| Cretaceous Rocks: | Outcrops of chalk are present in the upper Stort Valley. In boreholes the unweathered chalk is soft-to-hard white limestone with some flint and marl interbeds. |
| Tertiary Rocks: | The main outcrop in the Stort Valley is London Clay. Unweathered sections are generally stiff blue-grey to grey clays commonly laminated with windstones and shells. |
| Quaternary Deposits: | These cover the majority of the area and include boulder clay, sands and gravels. In some areas deposits are over 20m thick, often with River Terrace Deposits, Alluvium and Head concealing both solid and drift formations. The most widespread deposit is Boulder Clay, with Glacial Sands and Gravels occurring as lenses within or beneath it. |
- 2.2.3 Head deposits flank the wide alluvial plain of the Stort and occur on the floors of many of the tributary valleys including the Pincey Brook and the Todd Brook. Narrow outcrops of grey-brown sandy clay characterise the small valleys in the Roydon area such as the Eastwick Brook, the Pole Hole Brook and the Fiddler's Brook. A band of alluvium which varies in width from 150m in the north to nearly 700m at Harlow occupies the floor of the Stort Valley.
- 2.2.4 The soils of the catchment are associated with the chalky till material on the plateau land and the sloping valley flanks. The soils comprise predominantly clay with slowly permeable subsoils and many chalk fragments. They are relatively free draining and only occasionally become waterlogged.
- 2.2.5 The low lying soils of the valley bottom of the River Stort are more difficult to drain. They comprise mainly grey calcareous clayey soils in river alluvium which become waterlogged by groundwater and occasional flooding. These characteristics, coupled with the low gradients, usually result in poor field drainage if substantial modifications to watercourses have not been carried out.



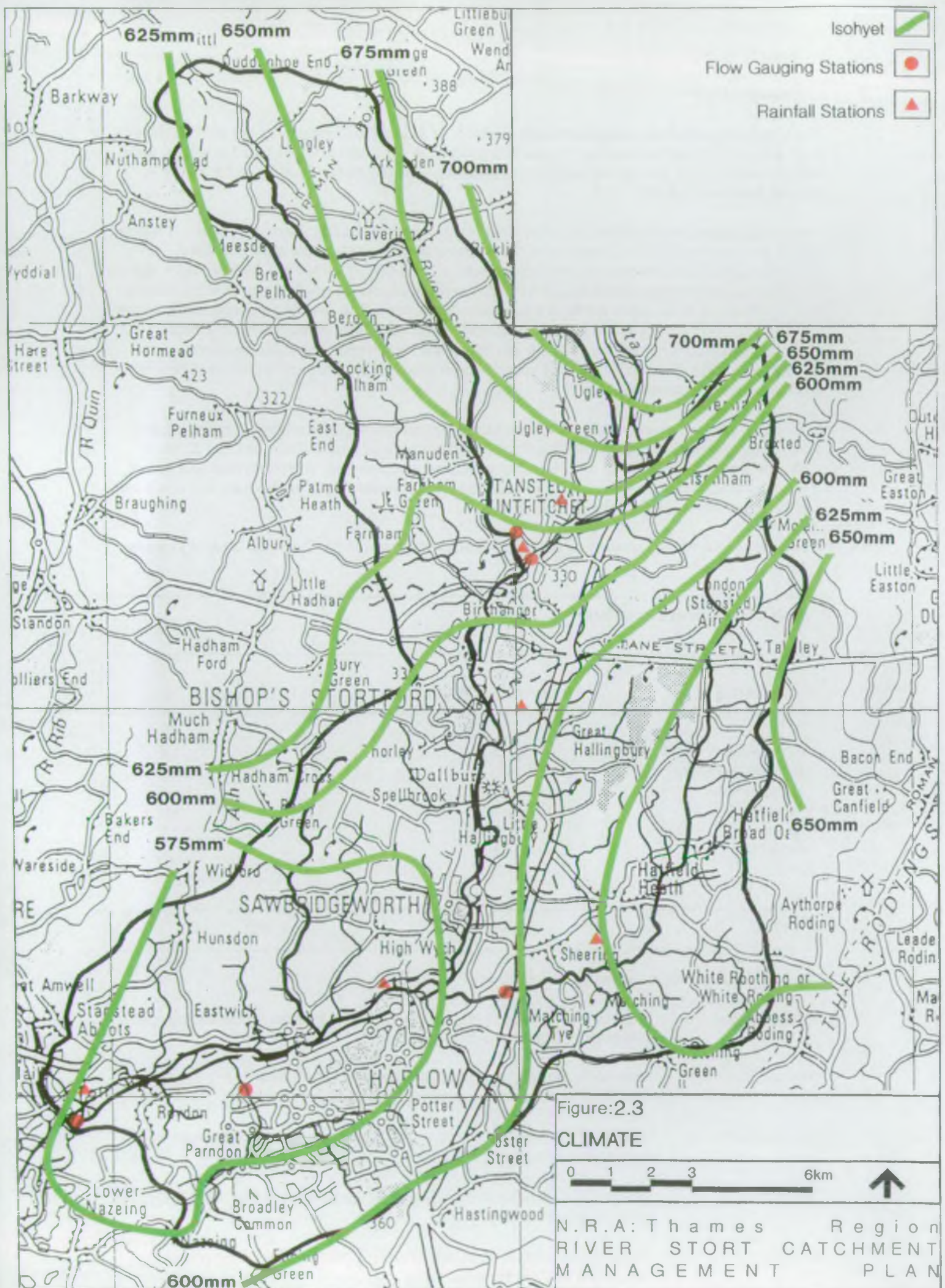
2.3 Geomorphology

- 2.3.1 The morphology of a river is dependent upon a number of natural characteristics of the river catchment, most notably the underlying geology. It is also dependent on the extent to which man has altered these natural characteristics through such activities as embanking to confine floodwaters, and dredging to increase hydraulic capacity.
- 2.3.2 A high percentage (nearly 60%) of the 'main river' watercourses in the catchment have been substantially altered from the natural form. These reaches have been altered by works associated with flood alleviation, agricultural drainage or other factors such as navigation. This has usually involved widening and deepening to increase channel capacity, creating uniform trapezoids which are quite often straight. The occurrence of pools, riffles and natural substrates is rare due to bed lowering and regrading. In some cases, reaches have been classified as being of extremely low sensitivity because they have been artificially channelized. These are usually found in urban areas and near major infrastructure developments. The channels are typically uniform-trapezoidal or u-shaped sections confined between artificial banks (eg. concrete).
- 2.3.3 Conversely, there are some remnant natural reaches of high morphological sensitivity (approximately 8%). These tend to be the reaches which are unaffected by previous land drainage or flood defence works and generally unaltered by other works or management techniques. A typical reach will have a diverse channel geometry which includes a sinuous planform, variable asymmetric cross-sections, a well-developed pool-riffle system and a natural substrate.
- 2.3.4 A summary of the varying proportions of channel sensitivities found in the Stort catchment is given in Table 2.1.

Table 2.1: Channel Classification		
Classification	'Main River' Length (km)	Percentage
High sensitivity	15	8
Moderate sensitivity	66	36
Low sensitivity	73	41
Channelized	4	2
Culverted	4	2
Navigable	18	10
Lakes	2	1
TOTAL	182	100

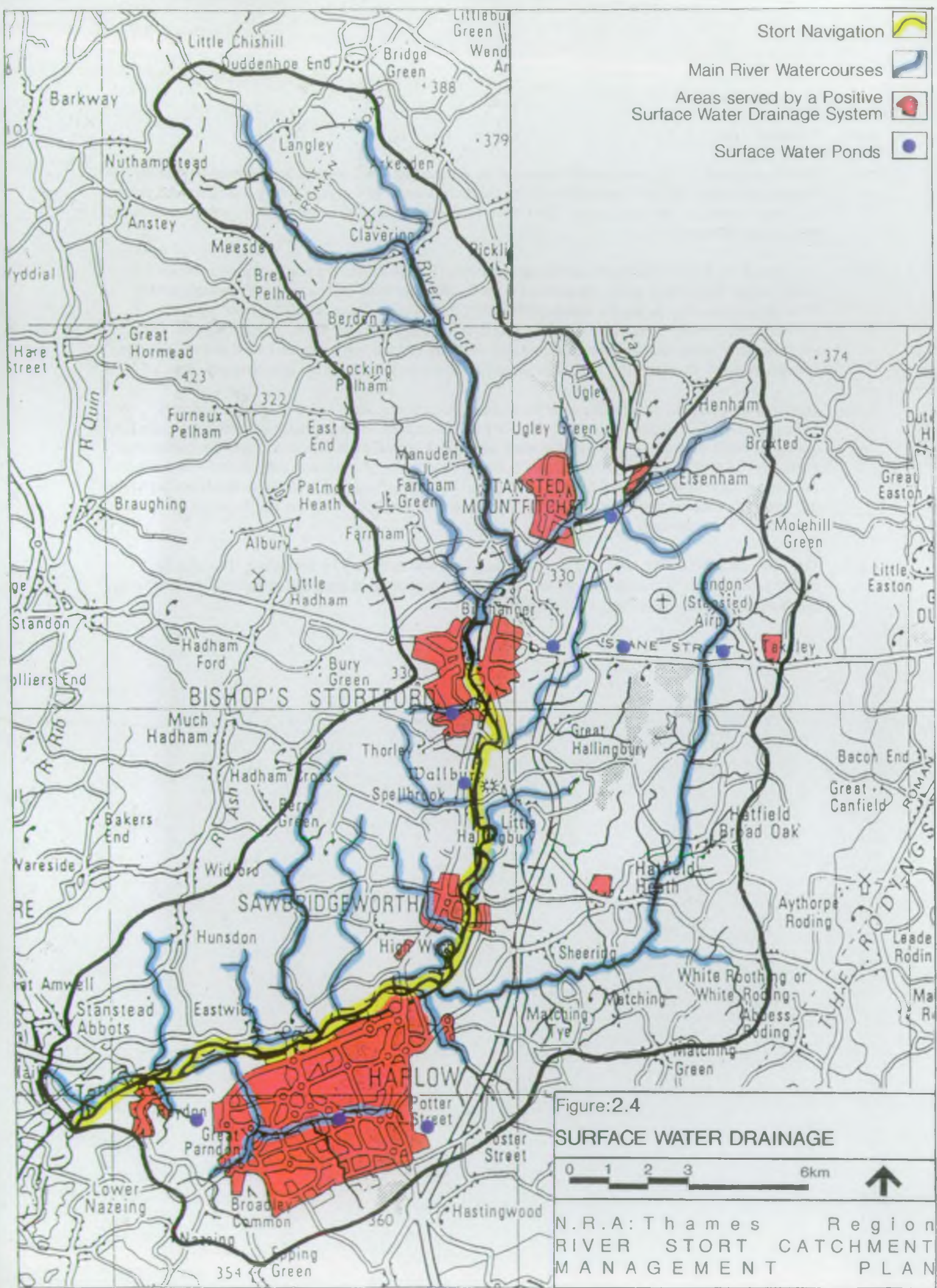
- 2.3.5 The channel classifications are defined as follows:

High Sensitivity:	reaches unaffected by flood defence works and generally unaltered by other works or management techniques.
Moderate Sensitivity:	reasonably natural channels which have undergone a limited degree of modification, often for flood defence reasons.
Low Sensitivity:	reaches which have been substantially altered by works for flood defence or agricultural drainage.
Channelized:	reaches which are almost entirely artificial and usually found in urban areas or near infrastructure development.
Navigable:	watercourses which have been substantially modified for the purposes of navigation and have regulated flows.



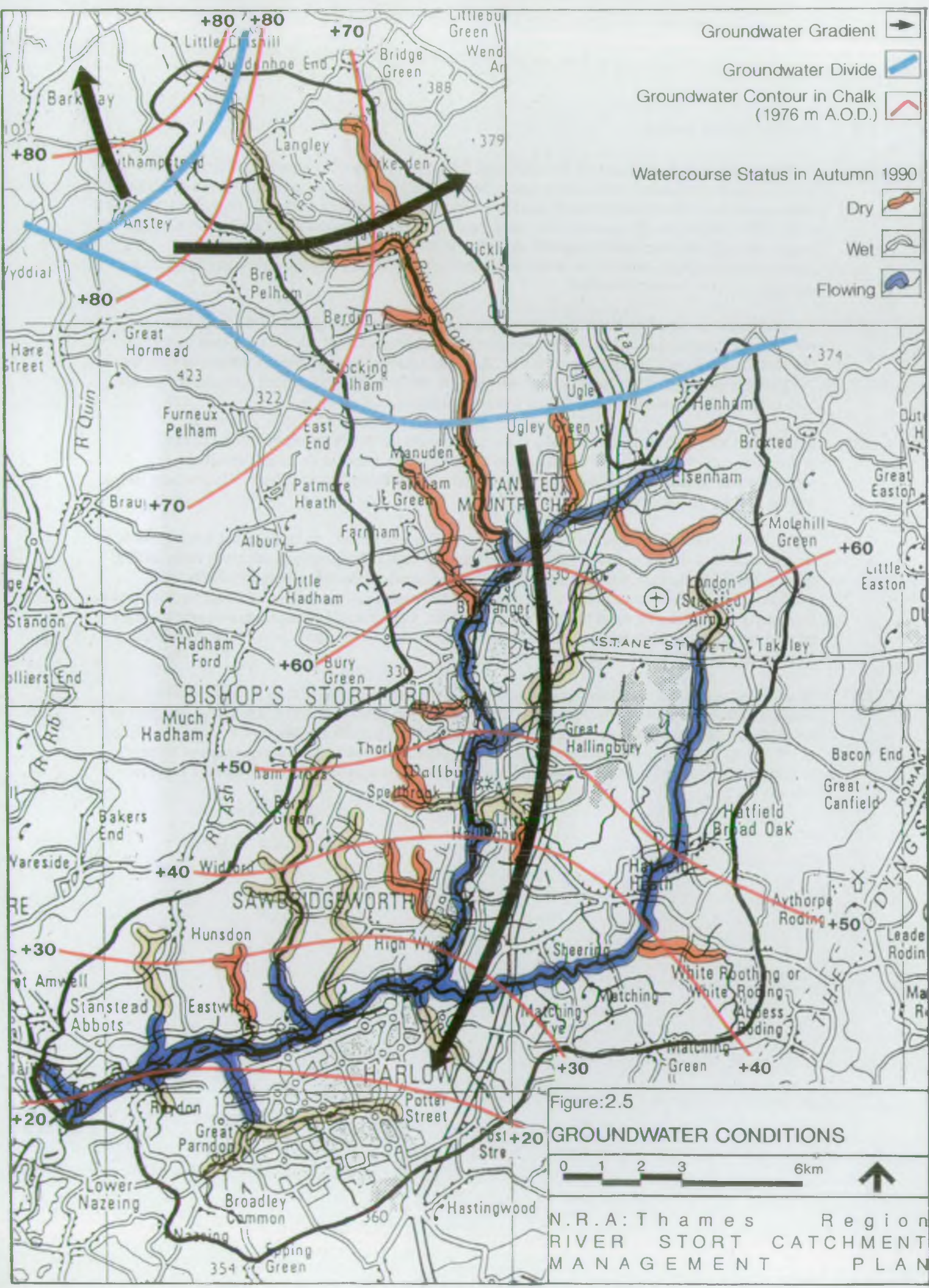
2.4 Climate

- 2.4.1 The mean annual rainfall averages 630 mm over the catchment. This is fairly low compared with the country as a whole, but is well distributed throughout the months of the year giving rise to limited rainfall on a large number of days and nights. The isohyets indicate the rainfall is heaviest towards the north and east of the catchment.
- 2.4.2 The overall south-west/north-east orientation of the Stort Valley makes it a ready-made funnel for the prevailing south-westerly winds. However, the most damaging wind is the cold north-easterly which blows down the valley during the months of February and March. These winds together with the generally calm weather conditions, usually result in cold, foggy or misty days. The warm, wet south-westerly winds and the colder, but still wet, westerly and the north-westerly tend to dominate the summer months. However, dry conditions prevail if the winds blow from the east or north-east.
- 2.4.3 Day-time temperatures drop rapidly after the month of October to a low point in January which is normally the coldest month, followed by February and December. Temperatures in the main remain low until after April when the day-time temperature accelerates several degrees into the summer conditions. Frost on open ground can be recorded for each month except July, August and September. The soils of the area are slow to warm up and equally slow to lose heat, being mainly London and Boulder Clays of a high moisture content. On the other hand, the sandy soils in the valley floor are subject to rapid fluctuations of temperature.
- 2.2.4 The NRA TR is becoming increasingly aware that global warming may be occurring. To assist in evaluating the effect of climate change, several research projects have been commissioned to identify any implications for water resources and flood defence.



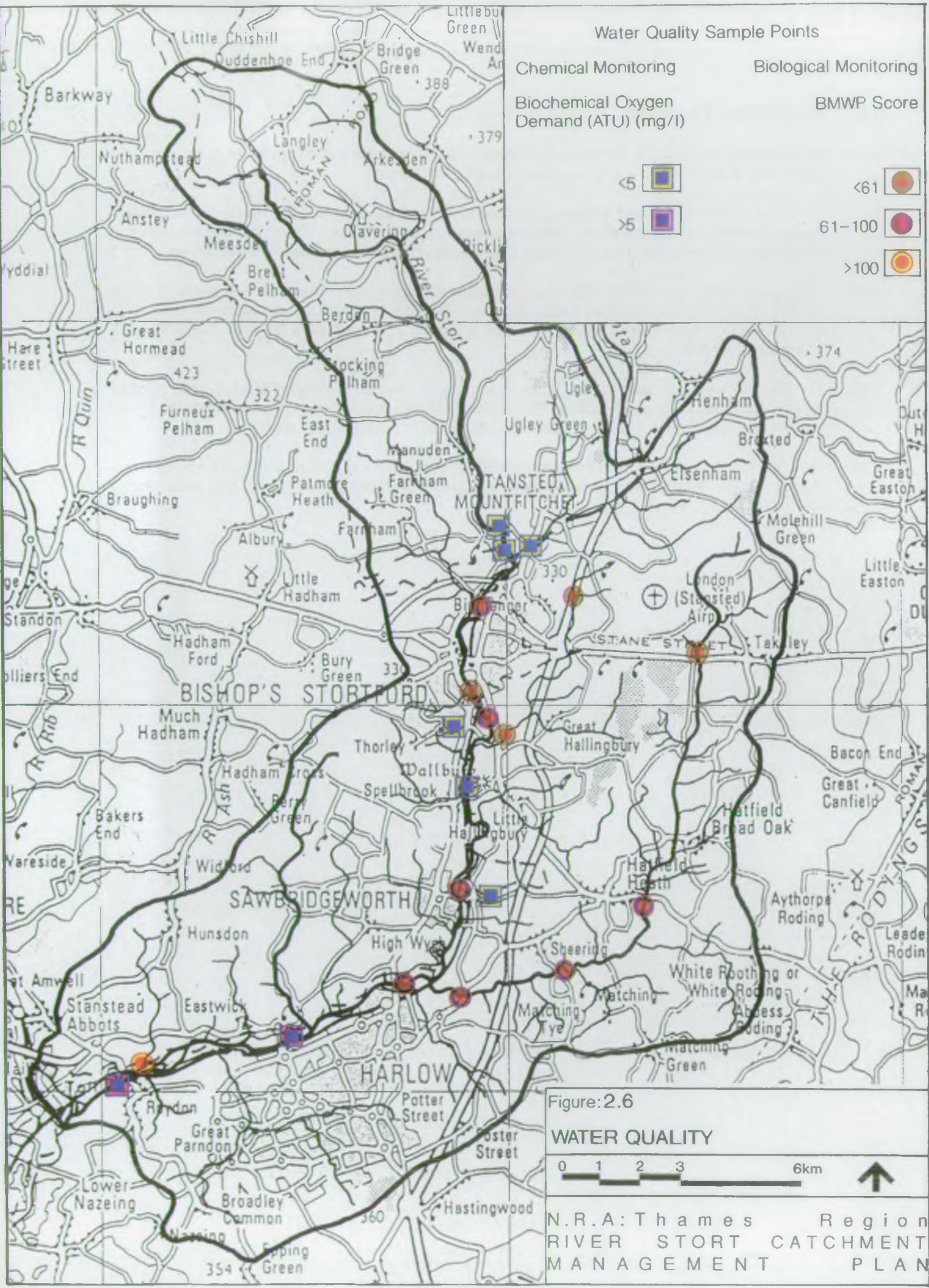
2.5 Surface Water System

- 2.5.1 The main surface drainage feature of the catchment is the Stort Navigation which flows from Bishop's Stortford to the confluence with the River Lee. The Navigation comprises a complex system of 15 locks, bifurcations, weirs and bypass channels, and has a very significant impact on the drainage characteristics of the whole catchment. For example, the operation of the locks and sluices can significantly alter the way in which the drainage system responds to particular rainfall events. Also, in spite of recent improvements, many of the lock sites have insufficient capacity to pass floodwaters safely and therefore contribute to local flooding problems.
- 2.5.2 The drainage network of the remainder of the catchment is relatively straightforward. From the upper reaches near Langley the Stort flows southwards to Stansted Mountfitchet where it is joined by the Stansted Brook, about 1 km upstream of the A120. Further downstream, numerous tributaries flow into the Stort, the most significant being Great Hallingbury Brook, Pincey Brook which accounts for almost 30% of the total catchment area, and Canon's Brook at Harlow.
- 2.5.3 Runoff rates are relatively high (especially in the east) because of the impermeable nature of the underlying geology. Also, the system has had to accommodate additional flows as a result of urbanisation of parts of the catchment. In particular, this has affected Canon's Brook, Harlowbury Brook, and the Thorley Tributaries.
- 2.5.4 To offset the potential problems caused by additional volumes of runoff, the more recent developments have incorporated storage ponds (e.g. Stansted balancing ponds). These serve to attenuate flows during times of flood. Significant storage is also provided by the meads at Hunsdon, Parndon, Eastwick, Roydon, Sawbridgeworth and Bishop's Stortford. A mead traditionally is an area of low lying land which is regularly inundated with water for agricultural purposes. Other natural storage areas include the lakes on both Hunsdon and Eastwick Brooks. Lastly, a limited amount of storage is provided by Pishiobury Broadwater and the Stort Navigation channel.
- 2.5.5 Flood alleviation works completed between 1967 and 1980 have provided Bishop's Stortford with a high standard of flood protection. The River Stort Flood Alleviation Scheme (FAS) Phase II was designed to provide urban flood protection to properties in Sawbridgeworth, Harlow and Roydon, but was abandoned in 1982, principally on environmental grounds. The Spellbrook Flood Lagoon downstream of Bishop's Stortford was, however, constructed and is designed to provide temporary off-stream storage for peak flows in the Stort.



2.6 Groundwater Conditions

- 2.6.1 The following description is included only to complete the coverage of natural resources in the catchment. No baseline survey has been undertaken for this subject.
- 2.6.2 The Upper Chalk aquifer is predominantly confined in the Stort Catchment being overlain by the Lower London Tertiaries and London Clay. There are, however, outcrops of the Upper Chalk in the valley of the Farnham Bourne and in the Upper Stort Valley between Clavering and Stansted Mountfitchet.
- 2.6.3 The regional groundwater divide is north of Manuden in the Upper Stort Valley. Flow to the north of this line is towards the River Cam in the Anglian Region of the NRA. South of this divide the direction of groundwater flow is southwards. The groundwater gradient is 1:500 and levels fall from over 60m AOD to less than 20m AOD.
- 2.6.4 The perennial source of the River Stort is Stansted Springs to the west of Stansted Mountfitchet. Springs are also found on the Stansted Brook and Pincey Brook. However, many of the watercourses are naturally dry during periods of low rainfall due to the nature of the underlying geology.
- 2.6.5 Generally there is little continuity between the confined Upper Chalk aquifer and the surface water drainage system. Nevertheless, surface deposits (e.g. glacial sands and gravels) do act as groundwater sources for watercourses.



2.7 Water Quality

- 2.7.1 The following description is included only to complete the coverage of natural resources in the catchment.

Surface Water Quality

- 2.7.2 The water quality of the Stort Catchment is generally good. The 1990 Department of Environment survey classifies the watercourses as follows:

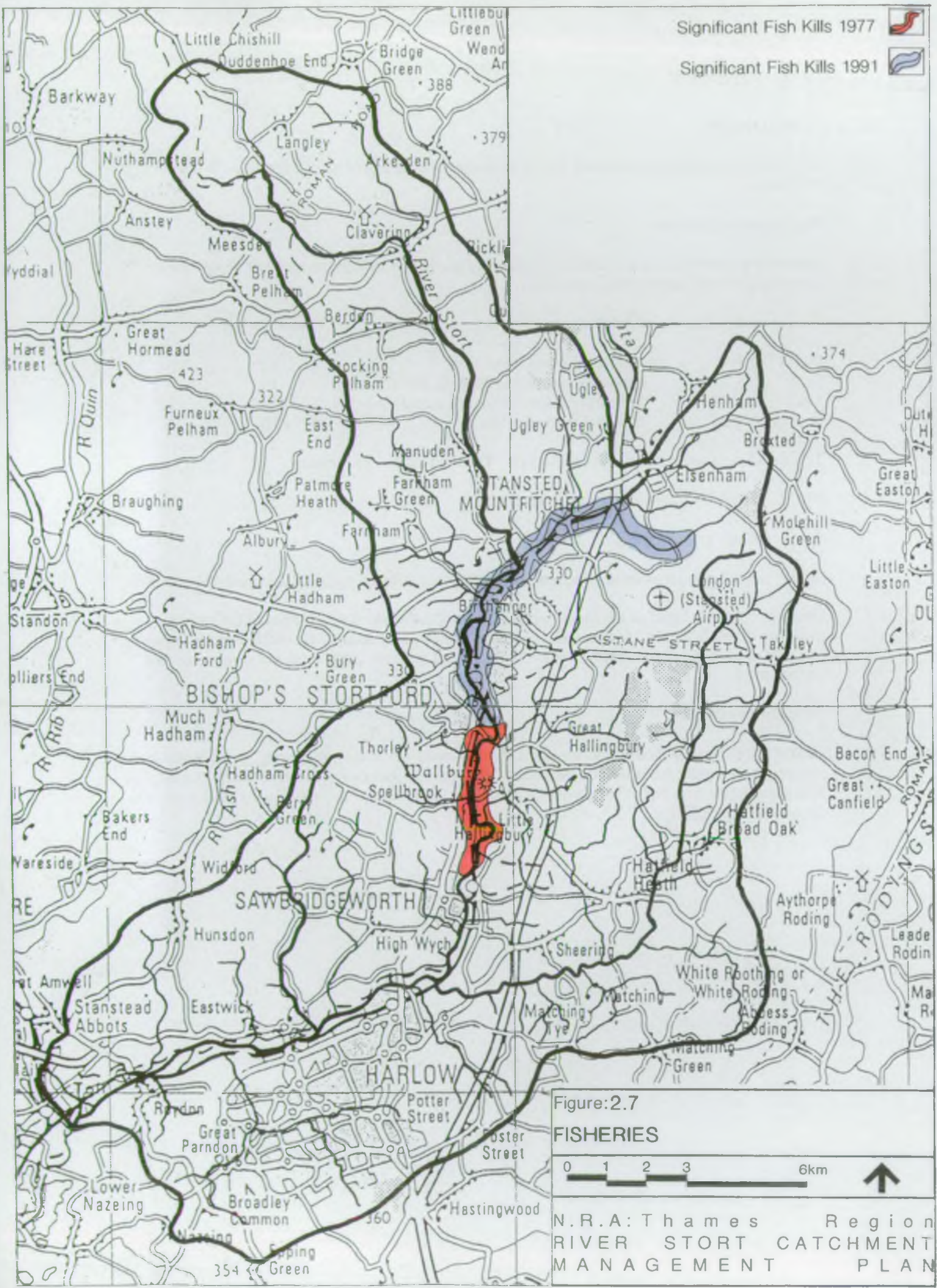
Watercourse	Location	Classification
Pincey Brook	Stansted airport to Stort	1B
Stort	Stansted Hazel End to Stansted Brook	1B
Stort	Stansted Brook to Bishops Stortford	1A
Stort Navigation	Bishops Stortford to Lee	1B

This shows most watercourses achieve class 1B. These are high quality waters:

- (i) suitable for game or other high class fisheries;
 - (ii) of high amenity value;
 - (iii) used for the transport of high proportions of sewage effluent, trade effluent, or urban run-off.
- 2.7.3 The classification is based on the routine sample results of the NRA. The locations of the sampling points are shown in Figure 2.6 Occasional pollution incidents may occur in the catchment (as anywhere in the country) causing localised, intermittent problems but these are insignificant in terms of quality classification.

Groundwater Quality

- 2.7.4 Limited information on groundwater quality in the catchment is available. However, groundwater in the confined chalk aquifer is not at risk from shallow surface water soakaways which normally discharge to the aquifers in the drift deposits of gravel and alluvium. The quality of the water in the chalk aquifer is considered to be high.



2.8 Fisheries

2.8.1 The catchment is divided into three areas for the purposes of fisheries. These are:

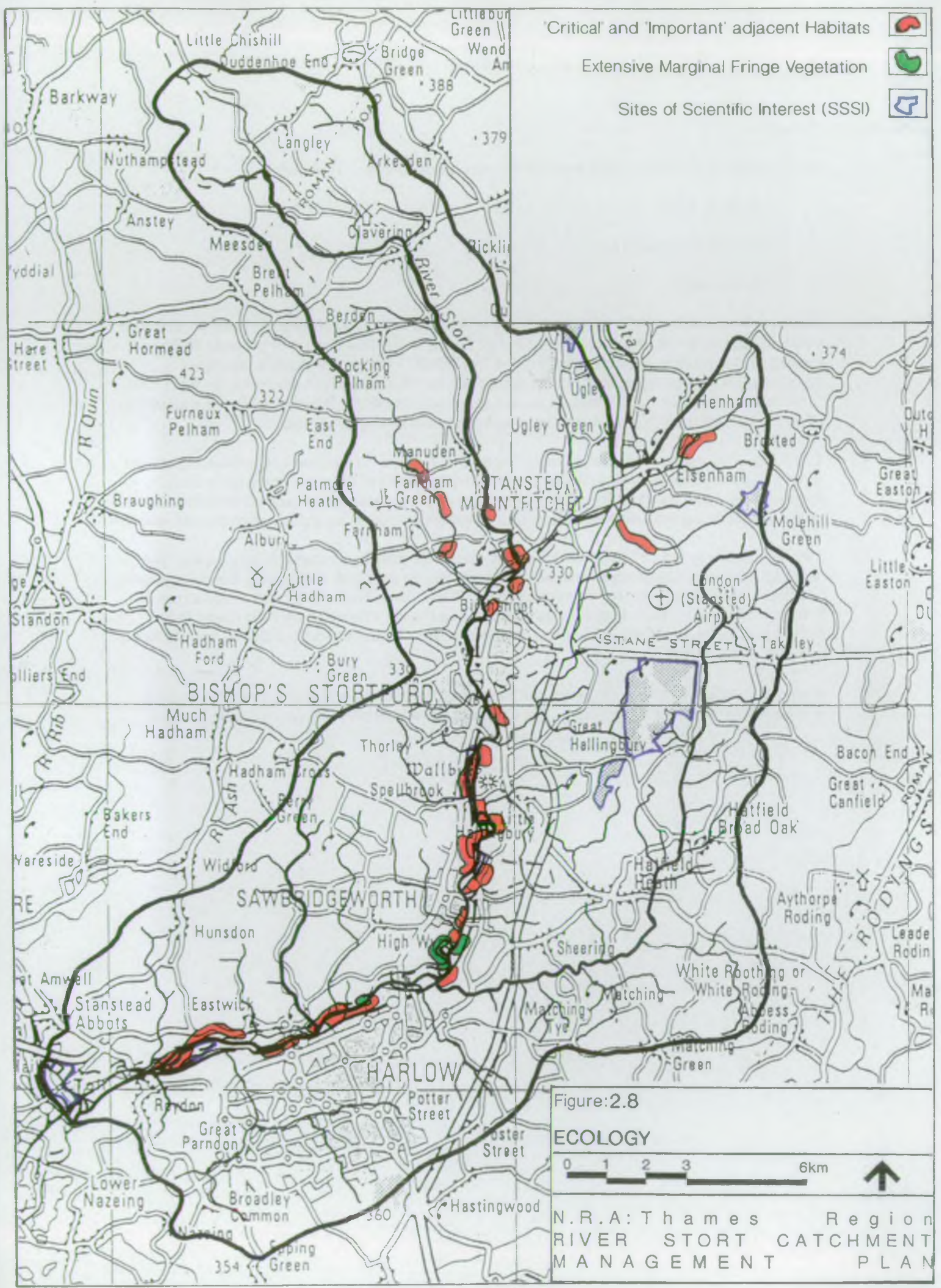
- the River Stort;
- the Stort Navigation; and
- the tributaries.

2.8.2 The River Stort and Stort Navigation downstream of Stansted Springs (excluding the reach between the Great Hallingbury Brook and Pincey Brook) and the Pincey Brook downstream of Sheering Bridge are designated as cyprinid waters under EC Directive 78/659/EEC. This means that it is capable of supporting fish such as carp or tench but not salmon or trout (ie. salmonid). Information from previous fisheries surveys and the match returns of angling clubs indicate that the fisheries hold good populations of roach, dace, chub, perch, pike, tench, bream and carp under normal conditions.

2.8.3 This information also indicates that at times of high flow, the Stort Navigation is of sufficient quality to support migrating trout up as far as Feakes Lock. Also, the quality of the water in the River Stort upstream of Bishop's Stortford is good enough to support 'put and take' trout fisheries (ie. those which cannot sustain the catch by natural breeding, the fish being bred elsewhere and transferred to the water).

2.8.4 The water quality in some of the tributaries is high enough for them to act as spawning grounds. The most important spawning grounds are to be found in the Pincey and Great Hallingbury Brooks, and those remnants of the Stort adjacent to the Stort Navigation. The aviation fuel spillage at Stansted airport in February 1991 resulted in the first major damage to the catchment's fisheries since the severe fish mortality caused by overflow from Bishop's Stortford sewage treatment works and urban run-off during a summer storm in 1977.

2.8.5 A survey of the fisheries in the catchment will be available in late 1991 and this will provide detailed information on the quality of the fishery. The CMP will be updated once this data has been assessed.



'Critical' and 'Important' adjacent Habitats

Extensive Marginal Fringe Vegetation

Sites of Scientific Interest (SSSI)

Figure:2.8

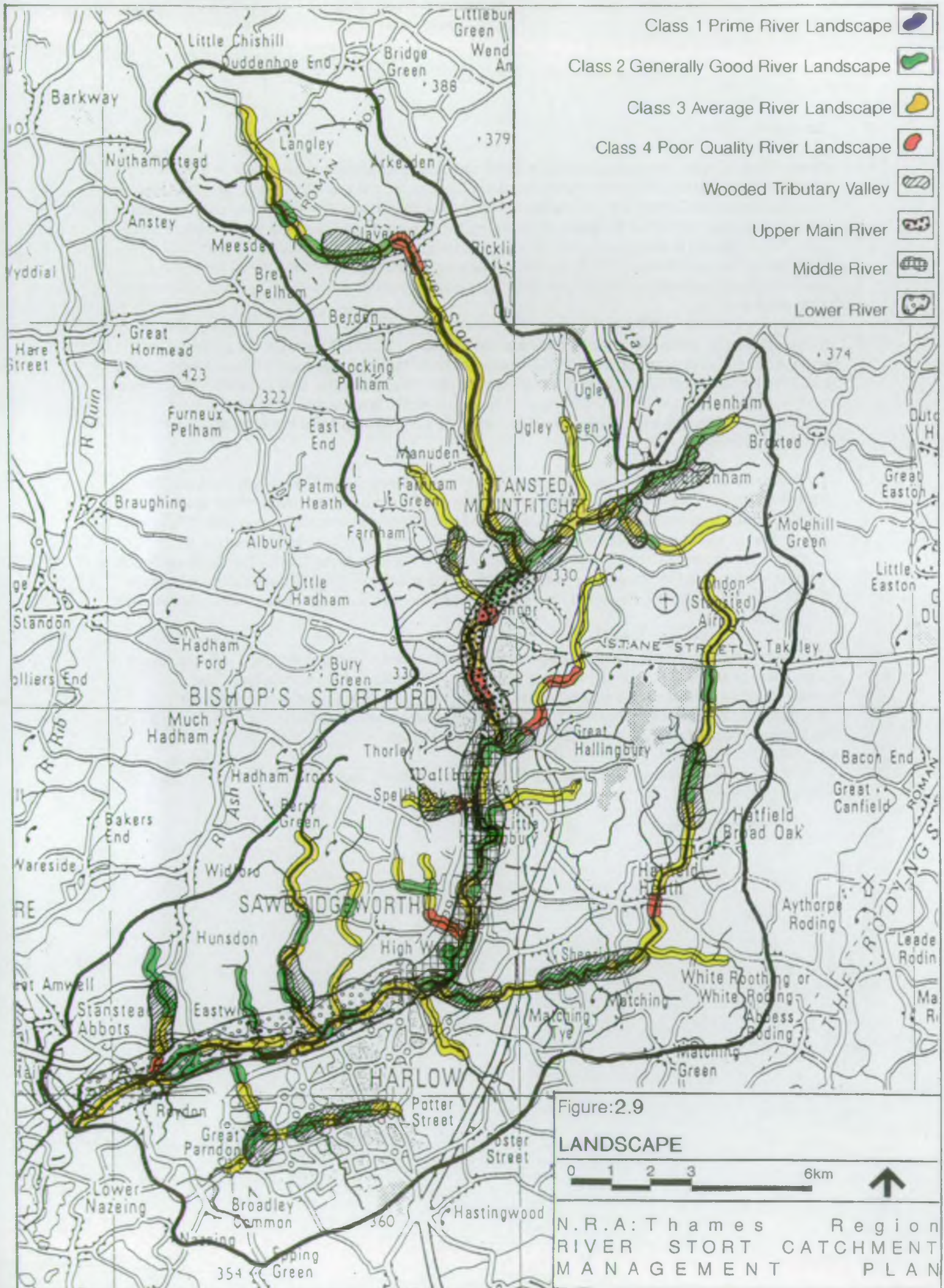
ECOLOGY

0 1 2 3 6km

N.R.A: Thames Region
RIVER STORT CATCHMENT
MANAGEMENT PLAN

2.9 Ecology

- 2.9.1 Generally, the channel of the upper Stort and its tributaries are ecologically poor largely as a result of the lack of adequate flows. Only where flows are reasonable does the channel support a range of floristic communities (eg. the section between Stansted Mountfitchet and Bishop's Stortford, and in the Stansted Brook). The areas immediately adjacent to the watercourses in the upper Stort still retain habitats of a good, important and, in some cases, critical nature. The majority of the habitats defined as critical comprise former wet grasslands that have been derelict for some time. They support tall fen species which are being overtaken by common wasteland species (e.g. rosebay willowherb, buddlia, etc.) as the areas are drying out.
- 2.9.2 In marked contrast to the upper Stort, the reaches downstream of Bishop's Stortford are generally ecologically rich. For example, the Stort Navigation supports marginal vegetation of considerable extent and diversity because of the presence of a shallow shelf along both banks for long stretches. The channel vegetation is also rich and indeed the Navigation appears to be the last remaining river in Hertfordshire/Essex with a deep water unpolluted flora. In some locations this has been adversely affected by dredging.
- 2.9.3 The ecological characteristics of the tributaries differ somewhat from those of the upper Stort and the Navigation, largely due to the fact that they are morphologically more diverse. Also where there are year round flows the flora tends to be different to that found in the deeper water of the Navigation. There are also significant variations between the ecological characteristics of the tributaries themselves, as illustrated by comparing Hunsdon Brook, Canon's Brook and Parndon Mead Ditch. The Hunsdon Brook is a relatively species-rich, small stream, choked with vegetation; the Canon's Brook is morphologically diverse but suffers from low flows; and the Parndon Mead Ditch has deep, still water with extensive plant communities.
- 2.9.4 The floodplain of the Stort supports a significant number of critical, important and good habitats. Much of this value is derived from the fact that large areas of the floodplain habitat remain intact and uninterrupted by development, a relatively rare occurrence in South-East England. Of particular importance are the areas of unimproved grassland and semi-natural woodland adjacent to the River Stort, the Stansted Brook, the Farnham Bourne and the Tye Green Brook.
- 2.9.5 Further detailed ecological surveys of the Stort's tributaries are being undertaken during 1991. The CMP will be updated once this data has been assessed.



2.10 Landscape

- 2.10.1 The landscape character of the Stort Catchment is a product of the interaction between land use and the natural resources of the catchment. The river valleys are important structural elements in a landscape which is characterised by semi-natural woodland, agriculture, urban development and communication links. There are, however, significant variations in landscape character throughout the catchment and this is illustrated by the diversion of the catchment into five broad landscape character zones, as follows:

- A - open arable landscape;
- B - lower tributary wooded valleys;
- C - upper main river (confluence of Stansted Brook and Stort to South Mill Lock);
- D - middle river (South Mill Lock to Harlow Burnt Mill);
- E - lower river (Harlow Burnt Mill to Feildes Weir).

- 2.10.2 Each landscape zone covers a very considerable area of land and includes relatively long stretches of river channel. Within each zone, therefore, there tend to be quite significant variations in the landscape quality of particular channel reaches, reflecting such factors as the presence of natural features, the extent of past improvement works and the type of adjacent land uses. Consequently the value of individual reaches has been classified as follows:

Class 1: Prime River Landscape with Natural Features: These are considered to be the most important river landscapes. They include significant natural features which are likely to be very sensitive to change (eg. flood alleviation works).

Class 2: Generally Good River Landscape: These are important riverine landscapes which have many natural features still intact. They are likely to be sensitive to change.

Class 3: Average River Landscape with Few Intrusions: These are river landscapes which have been altered as a result of such works as flood defence and agricultural improvement. The channels may still have some remnant natural features (eg. bankside trees); however they tend to be dominated by man-made features. There are likely to be opportunities for enhancement associated with any works.

Class 4: Poor Quality River Landscape: These are river landscapes which have suffered significant adverse effects resulting from past works (eg. concrete channels). There is a virtual absence of any natural features and consequently there are likely to be very significant opportunities for enhancement associated with any works.

- 2.10.3 It is important to note that a Class 1 river is an ideal model within the national context. No such reaches of the Stort Catchment were considered to be worthy of this classification and, therefore, the Class 2 rivers are the most important in landscape terms in the Stort Catchment.

3.0 CURRENT AND FUTURE USES OF THE CATCHMENT

3.0 CURRENT AND FUTURE USES OF THE CATCHMENT

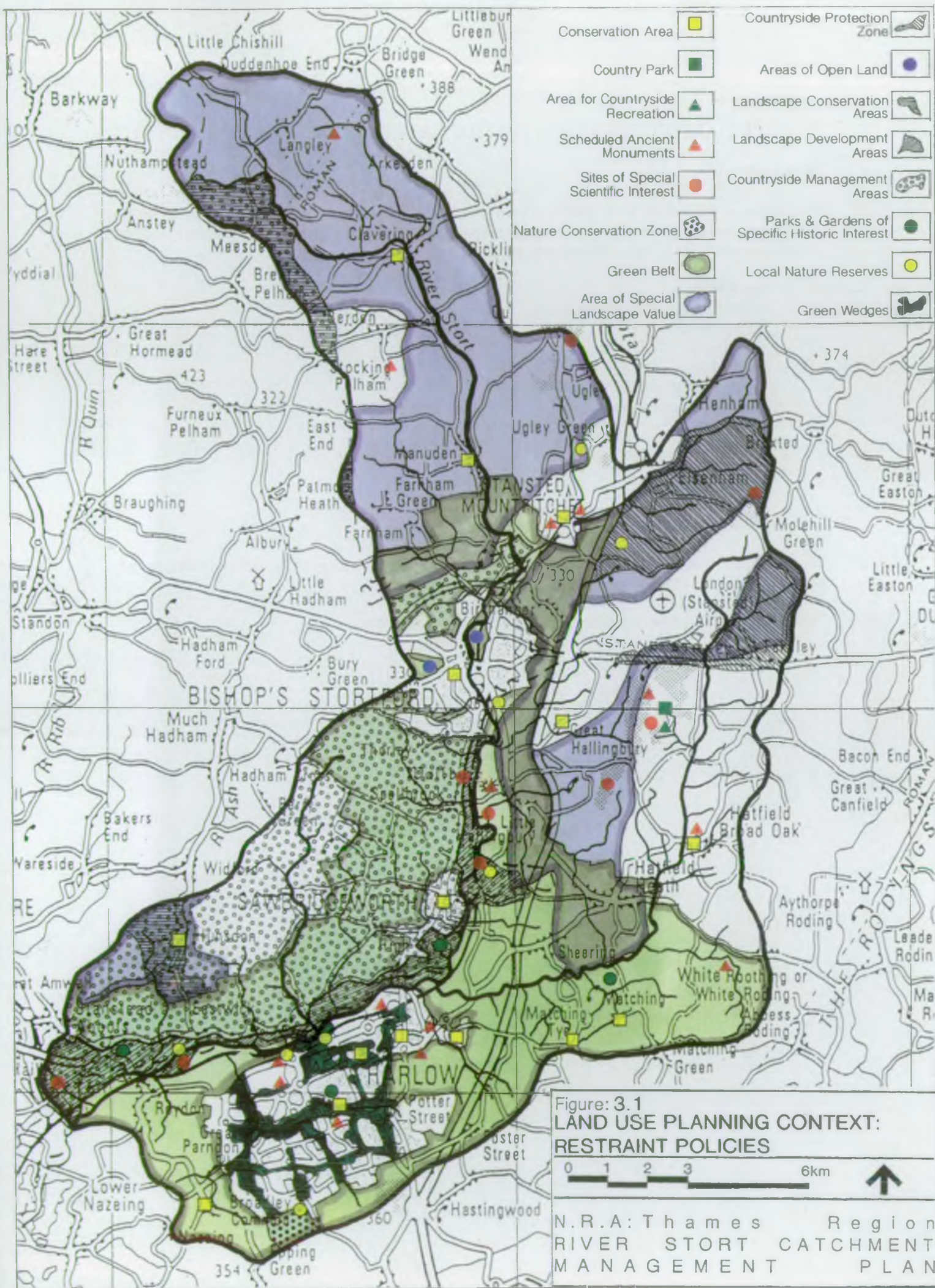
3.1 Introduction

3.1.1 The purpose of this section of the CMP is to consider the current and future uses of the catchment within the context of existing land and water management policies (e.g. land use planning, agricultural practice, river maintenance, etc.). The following uses are identified:

- agriculture;
- infrastructure and communications;
- built development;
- recreation;
- navigation;
- mineral extraction and waste disposal;
- heritage and archaeology;
- landscape;
- ecology;
- geomorphology;
- water resources;
- water quality;
- flood defence.

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

3.1.3 The section is headed by a description of the land use planning context.



3.2 Land Use Planning Context

Current Situation

- 3.2.1 The River Stort Catchment is bisected by the boundary between Hertfordshire and Essex, and it includes a small part of Cambridgeshire in the north. It comprises parts of six district councils, as follows:

East Hertfordshire DC;
North Hertfordshire DC;
Uttlesford DC;
Harlow DC;
Epping Forest DC;
South Cambridgeshire DC.

- 3.2.2 Structure and Local Plan coverage of the catchment is complete and all District Councils, with the exception of Epping Forest, already have district wide plans. Epping Forest currently has three local plans covering the district.

- 3.2.3 Essentially, the aim of the planning policies which are applicable to the catchment is to find the most appropriate balance between economic growth and the conservation and enhancement of the environment. There are, therefore, two basic types of policy:

(i) Policies seeking to restrain development:

- Green Belt;
- floodplain protection;
- built environment;
- heritage;
- landscape;
- nature conservation;
- recreation;
- agriculture.

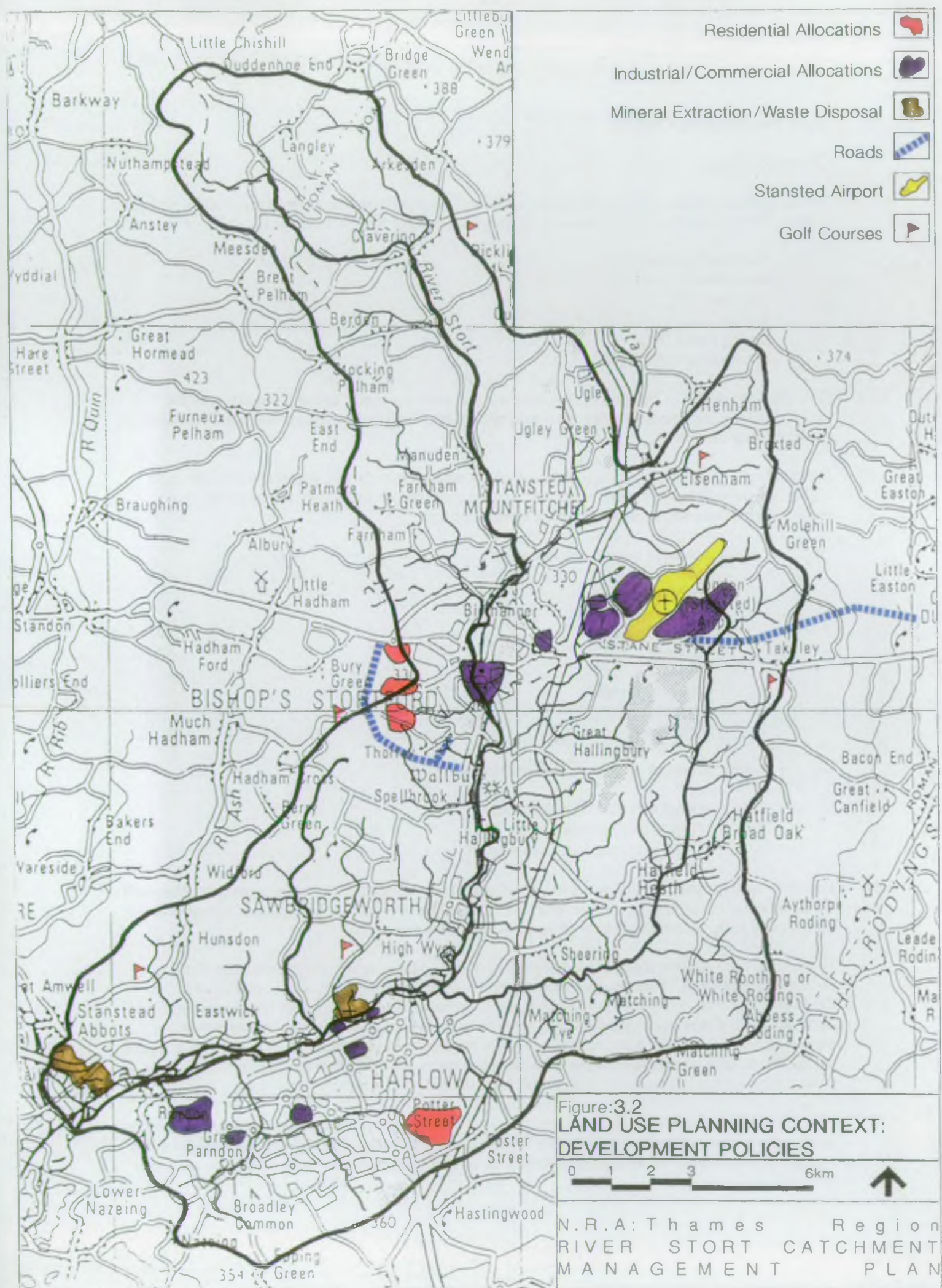
(ii) Policies seeking to accommodate development:

- land allocations for development;
- infrastructure/communications;
- mineral extraction and waste disposal.

- 3.2.4 However, the mere presence of a policy in a development plan does not necessarily mean that policy will be implemented effectively. It is useful, therefore, to consider how the four key types of policy have been applied in the past in response to particular development pressures:

Green Belt: The relevant policies have been effective in that the integrity of the Green Belt has remained largely intact. There are, however, examples where development has been permitted in the Green Belt following consideration at public inquiry. Probably the most important implication of these decisions is that Green Belt designation does not prevent development where there is a demonstrable overriding need. Given that Stansted airport is in the catchment, this particular issue is likely to be raised over and over again as developers argue that housing, industry and associated facilities are required to ensure that the economic potential of the airport is maximised.

Protection of the Floodplain: As is the case with land zoned as Green Belt, policies aimed at protecting the floodplain have been very effective. This is perhaps not surprising given that outside the main urban areas the Green Belt and the floodplain are largely coincident and, therefore, the policies have tended to complement one another.



Other Restraint Policies: The emphasis of all the statutory development plans in the catchment is on restraint in the face of considerable development pressure. In general terms the policies appear to have been effective, and they have been supported by the decisions of inspectors at public inquiries.

Development Policies: Policies dealing with major new development in the catchment have sought to concentrate it in particular locations rather than trying to lessen potential impact by scattering it throughout the area. With the exception of one or two notable development schemes, this approach appears to have been successful. In particular, the allocation of sufficient land within the perimeter of Stansted airport to cater for associated industrial and commercial development has undoubtedly reduced the pressure for development in the surrounding towns and countryside.

Future Situation

3.2.5 Planning Policy Guidance Note 9 'Regional Guidance for the South East' January 1988 (PPG 9) is the key reference document when considering the future thrust of planning policies. This is because it sets out the strategy of the Government and there is a requirement that all development plans reflect this strategy. PPG 9 is currently being reviewed by the Secretary of State for the Environment following the publication of SERPLAN's document 'A New Strategy for the South East' in September 1990.

3.2.6 Two sections of the SERPLAN document are particularly relevant to the production of development plans in the Stort Catchment. The first, and most obvious, is the reference to the region's rivers and the role of the NRA under 'Countryside'. This states:

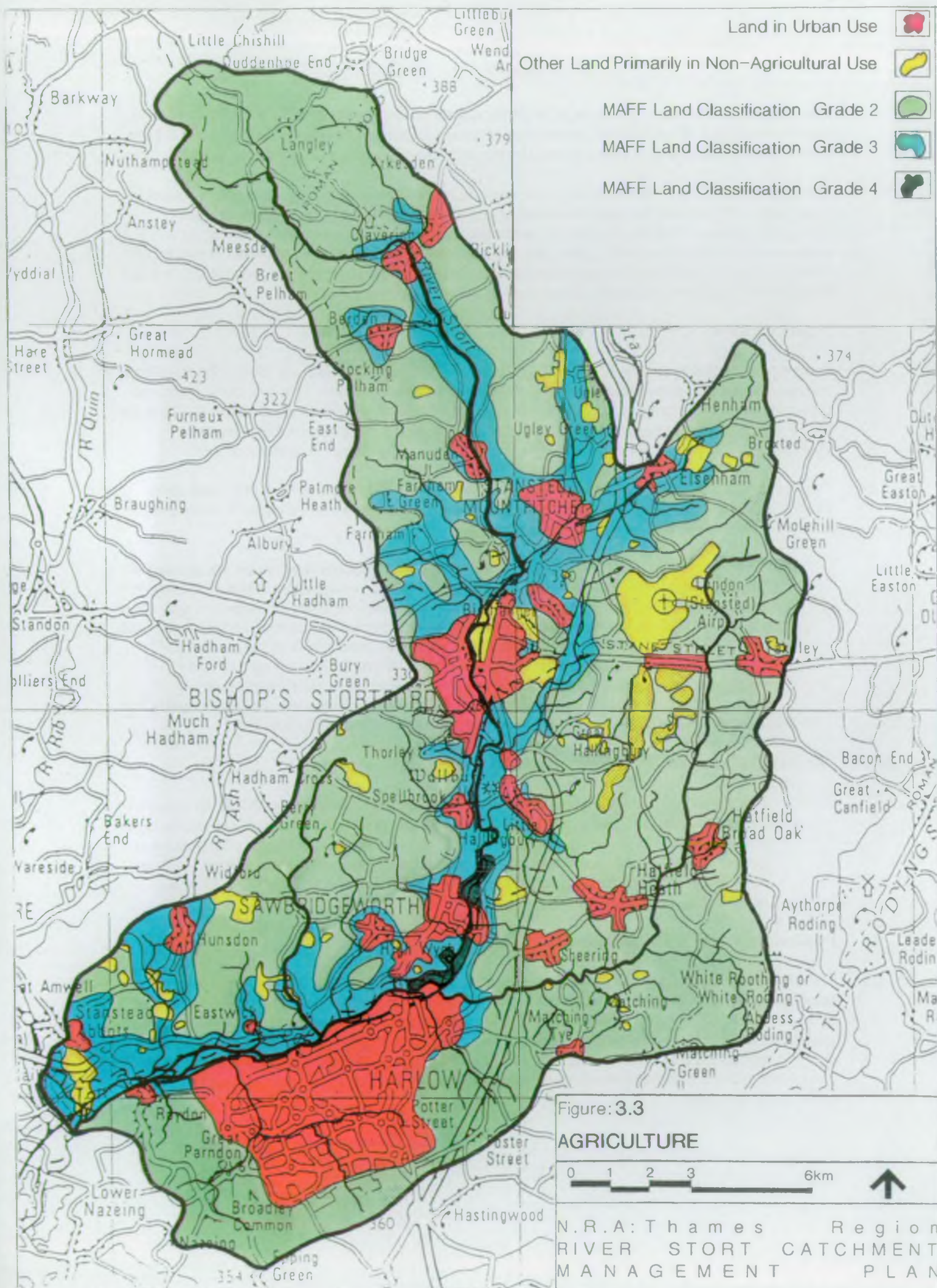
"One topic which, in the light of immediate concerns about pollution and water storage and of publicity about longer term climatic change, merits separate consideration is that of the region's rivers. Agricultural, leisure, economic and servicing demands on them are varied. If they are to contribute to the environment rather than detract from it, increasing attention and resources will have to be devoted to enhancing quality. Local authorities should work closely with the National Rivers Authority (NRA) and with the Water Companies to clean up rivers and watercourses, to improve water quality and to preserve washlands and floodplains from unacceptable development. Increased attention will need to be given to balancing demands for development and recreation against landscape and nature conservation interests."

3.2.7 The second is in Chapter 3 'The Geographical Dimension' where it is stated:

"Despite the existence of the 'opportunity areas' of London at one extreme and the dynamism of Cambridge at the other, the M11, passing as it does through valuable land and landscapes, is not seen as stimulating a growth corridor. Consideration of the continuing impact of expansion at Stansted Airport should take account of the regional strategy regarding areas of high landscape and agricultural value, the regeneration objectives for East London and that the M11 is not regarded as a development corridor".

Implications for the Water Environment

3.2.8 The implication of this for the Stort Catchment is clear. The provision of new land for development associated with the M11 and Stansted should be limited because of the landscape and agricultural value of the catchment. This policy would meet the dual objectives of protecting an area of environmental importance and channelling development to assist in the regeneration of the East Thames Corridor. It therefore appears to be an opportune time for the NRA TR, in partnership with the local authorities, to incorporate policies in all future development plans which assist in the task of conserving and enhancing the water environment.



3.3 Agriculture

Current Situation

- 3.3.1 The most significant land use in the catchment in terms of land area is agriculture, both pasture and arable. This is also the case in the river corridors; however in many areas it has had to give way to other competing uses, notably built development. The free draining soils of the East Anglian plateau and sloping land form the higher quality land (ie. Grades 2 and 3 of MAFF's Agricultural Land Classification System). These soils support intensively farmed arable crops and are high yielding. Virtually all of the watercourses draining this type of farmland have undergone some sort of drainage improvement work, many of which are probably related to agricultural expansion in the 1940's and 1950's.
- 3.3.2 The low lying soils of the flat valley bottoms are more difficult to drain. However, much of the marshland has been improved for grazing purposes and only a few remnants of unimproved grassland still exist. Improvement has usually involved alterations to field drainage to prevent land becoming waterlogged. Historically, these 'mead' areas were farmed on what is described as the 'ancient Lammas system'. This involved the farmer allowing grass to grow on the mead during spring and summer, cropping it for hay during July, and subsequently grazing cattle on it in the autumn and throughout the winter. The ground was considered unfit for arable crops because of the regular inundation of the soil. Hunsdon Mead is still managed in this way by the Herts and Middlesex Wildlife Trust and the Essex Wildlife Trust.

Future Situation

- 3.3.3 Agricultural activity in the catchment appears to be going through a very considerable period of change. This is likely to result in the continuation of two trends which are already apparent. Firstly, the better quality agricultural land (ie. the northern and eastern fringes) may be subject to further improvement as farmers attempt to increase yields and improve efficiency. Such improvements include hedgerow removal, stream canalisation, and the increased use of fertilisers and herbicides.
- 3.3.4 Secondly, the more marginal, poorer quality land may actually go out of agricultural production. This poorer quality land tends to fall within one of two types: poor quality according to the MAFF land classification; and land subject to urban fringe development pressures because of its proximity to centres of population. This trend is very much reinforced by the current emphasis of European and National policy on taking a proportion of land out of agricultural production (eg. set aside, Countryside Premium, etc.).

Implications for the Water Environment

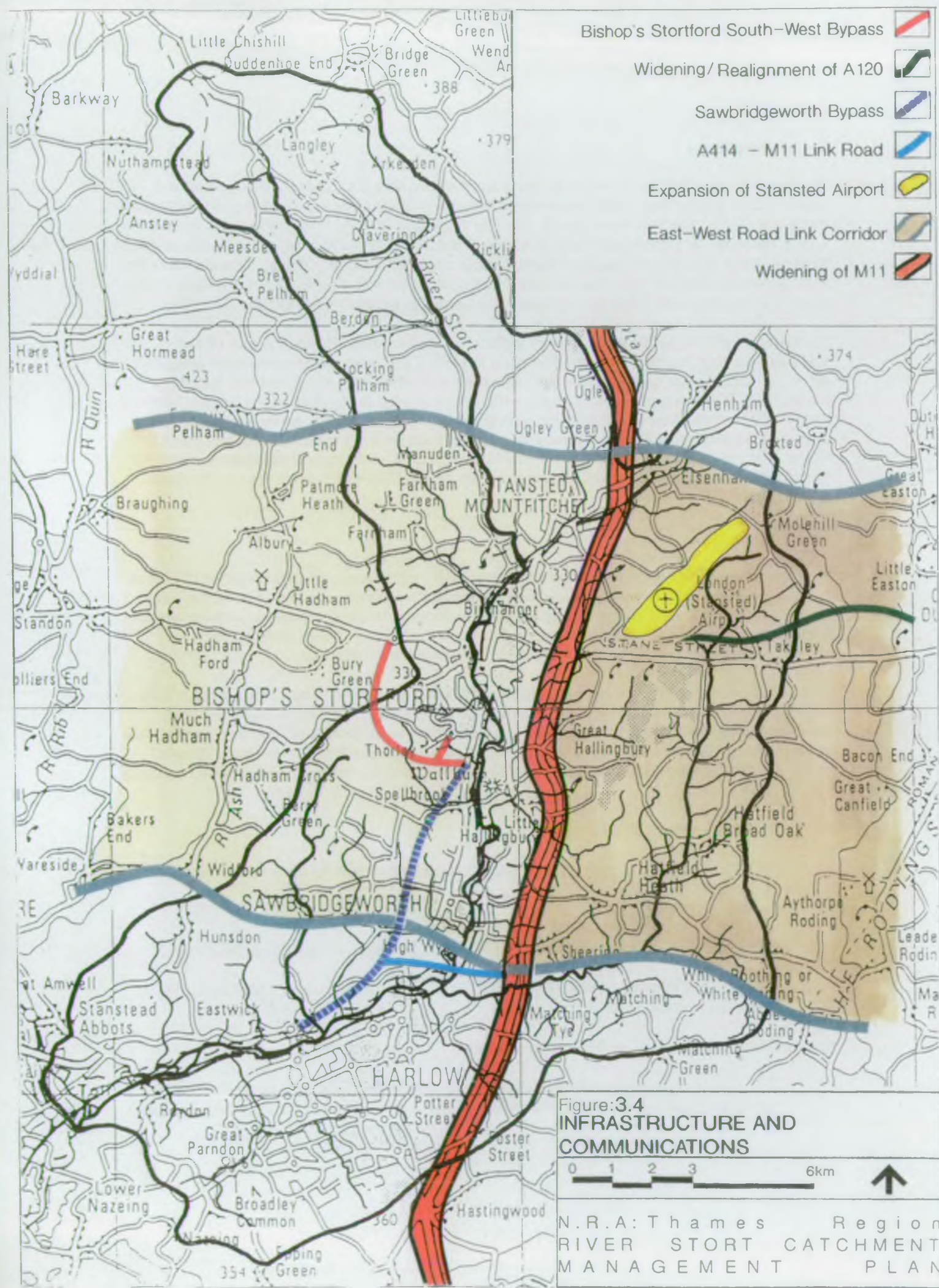
- 3.3.5 These changes in agricultural activity will have the following implications for the water environment:

Agricultural Improvement

- pressure to deepen watercourses to facilitate improved drainage of agricultural land; and
- increased risk of pollution of receiving waters as a result of greater use of chemical fertilisers, pesticides, herbicides, etc.

Taking marginal land out of agricultural production

- loss of important agriculturally maintained nature conservation habitats if further low lying agricultural land (eg. the Meads) is taken out of production; or drained for more intensive forms of agriculture (eg. arable crops).



3.4 Infrastructure and Communications

Current Situation

3.4.1 The land use structure of the River Stort Catchment has been very significantly influenced by the construction of five major infrastructure projects during the last 300 years. These are (in chronological order):

- the London to Norwich turnpike which subsequently became the A11 Trunk road (now the A1184);
- the Stort Navigation, opened for commercial traffic in 1769;
- the railway from London which reached Bishop's Stortford in 1842 and was subsequently extended to Cambridge;
- the M11 motorway from London to Cambridge, completed in 1972;
- Stansted airport, identified as London's third airport in the Airports White Paper 1985 and upgraded to handle 8 million passengers per annum (mppa) in 1991.

3.4.2 Each one of these projects has made the catchment more accessible, resulting in increased pressure for development.

Future Situation

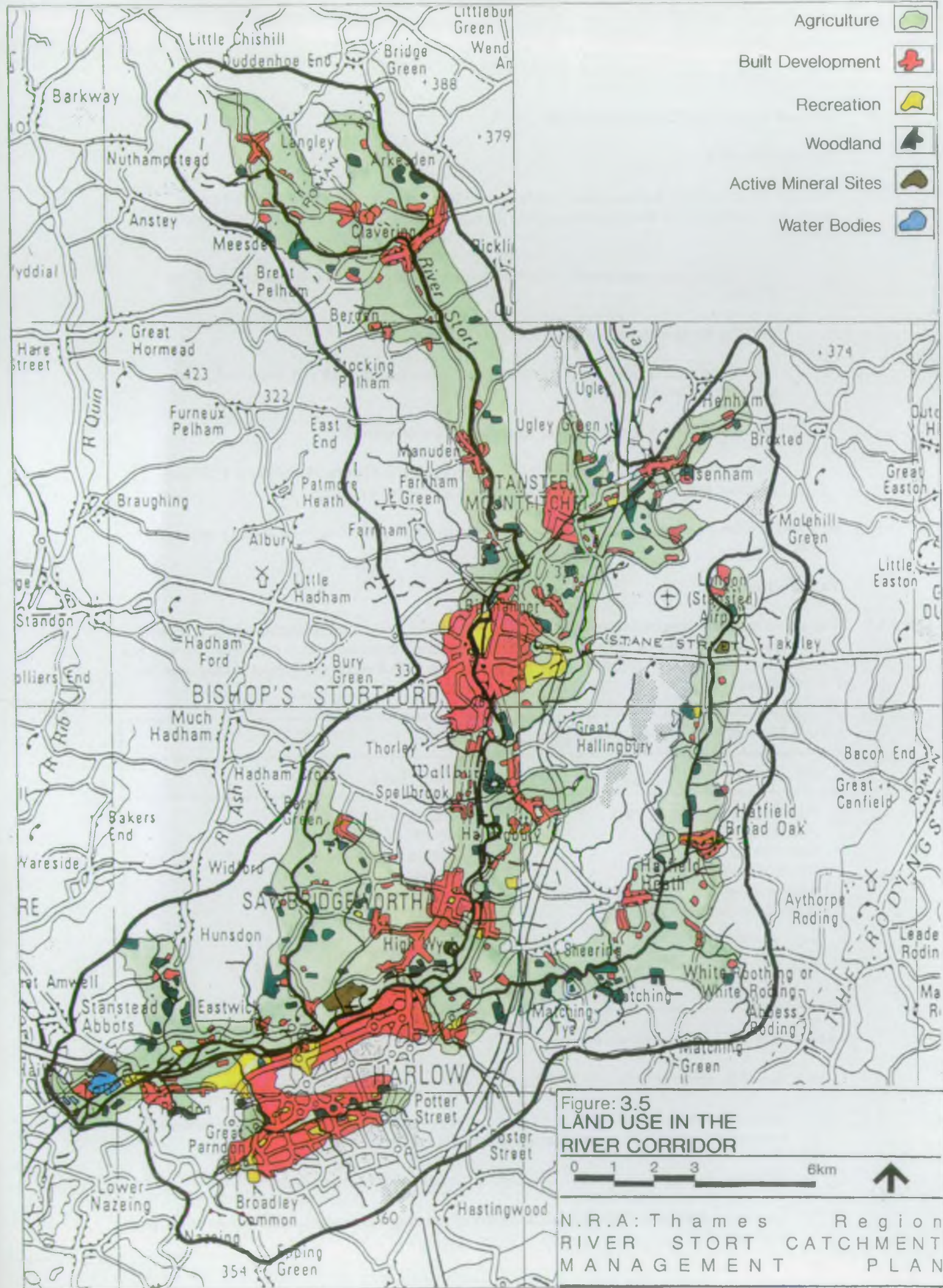
3.4.3 There are a number of current infrastructure proposals at various stages of formulation which will have a major impact on the catchment if they are constructed. These are listed in Table 3.1 according to whether they are likely to go ahead in the short to medium term (ie. up to five years) or medium to long term (ie. five years plus).

Table 3.1: Proposed Infrastructure Projects	
Short - Medium	Medium - Long
<ul style="list-style-type: none">• Widening/realignment of the A120 (at detailed design stage)• Bishop's Stortford south west bypass (at public inquiry)	<ul style="list-style-type: none">• Sawbridgeworth bypass and A414-M11 link road.• Expansion of Stansted airport to 15 mppa, and possibly 25 mppa.• East-west road link between the A1/M1 corridor and the east coast ports.• M11 widening.

Implications for the Water Environment

3.4.4 Construction of the above projects is likely to have the following implications for the water environment:

- sensitive water dependent habitats will be at risk if pollution levels rise as a result of increased volumes and rates of urban run-off entering the river system;
- additional damage to the sensitive landscape of the Stort Valley;
- increased risk of channel erosion and frequency of flooding due to additional volumes of surface water run-off.



3.5 Built Development

Current Situation

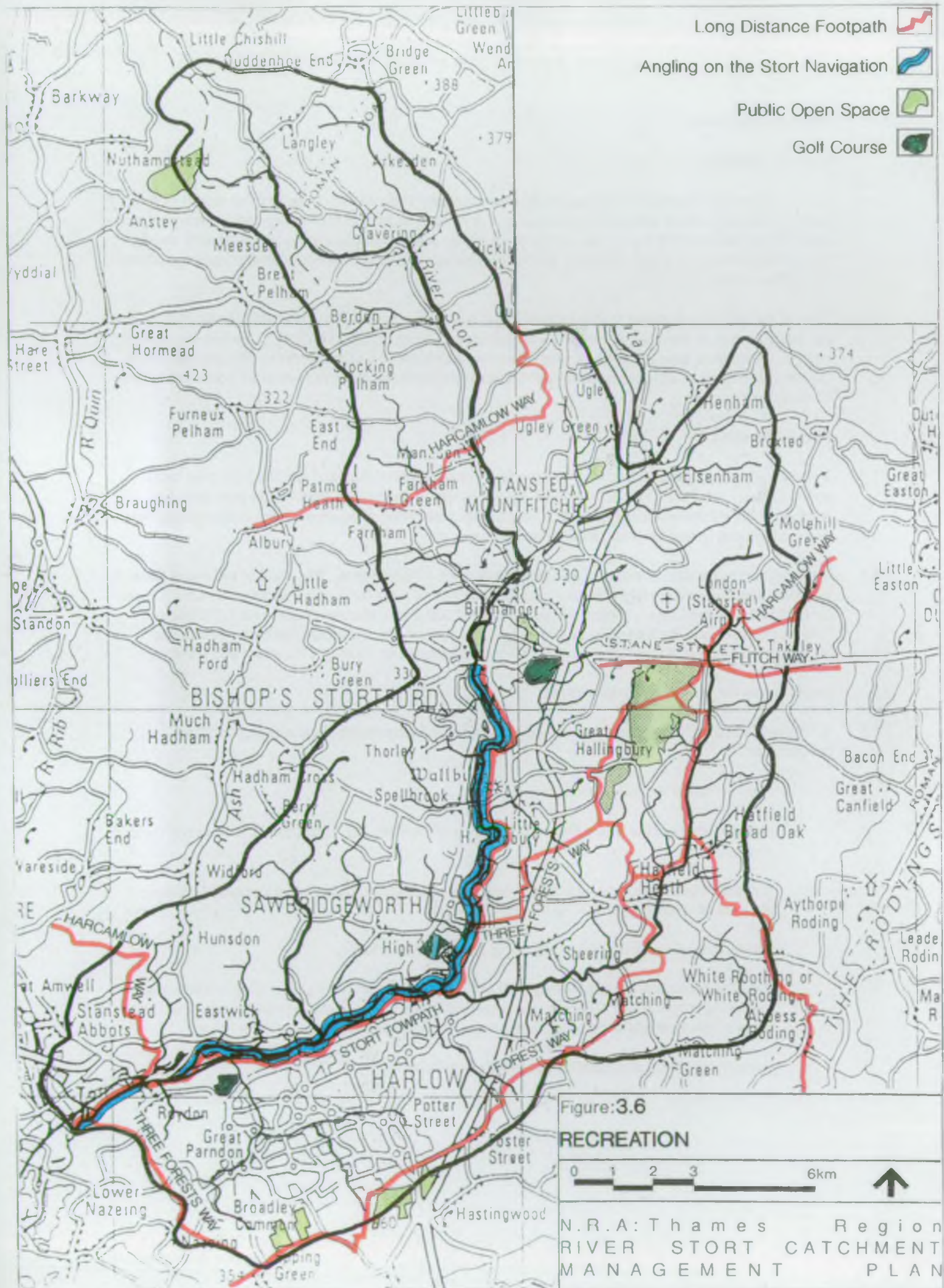
- 3.5.1 Figure 3.5 shows the pattern of land use in the river corridor. Probably the most striking aspect of this pattern is the contrast between the concentration of development in the Stort Valley and the relatively undeveloped nature of the rest of the catchment. Both the major communication routes passing through the catchment are sited in the valley (i.e. the M11 motorway and the London-Cambridge railway) as are the main centres of population.
- 3.5.2 Most of the built development is concentrated in the two main towns, Bishop's Stortford and Harlow, and the smaller towns of Sawbridgeworth and Stansted Mountfitchet. There is a fairly extensive network of villages and hamlets beyond the four towns; however, the character of these areas is derived more from the intricate mosaic of agricultural fields, open space, woodland and river valleys, than from the presence of development.

Future Situation

- 3.5.3 Very considerable pressure associated with the further expansion of Stansted and the improved local access is likely to be experienced throughout the catchment in the future. This will be primarily for residential and commercial development. These uses in turn create a requirement for increased provision of recreation and leisure facilities, community buildings, etc.
- 3.5.4 It is possible to quantify the extent of this requirement to a certain degree. The number of houses (total 17,100 units) allocated for key districts over a ten year period is set out in the respective Structure Plans for Hertfordshire and Essex. These are Epping Forest (1300 units), Harlow (3,200 units), Uttlesford (1500 units) and East Hertfordshire (11,100 units). The settlements within the catchment which are likely to accommodate a significant amount of this development are Bishop's Stortford and Harlow.

Implications for the Water Environment

- 3.5.5 Additional built development in the catchment will have the following implications for the water environment:
- loss of visually important open land;
 - increased risk of channel erosion and frequency of flooding due to additional volumes of surface water run-off;
 - sensitive water dependent habitats will be at risk if pollution levels rise as a result of increased volumes of urban runoff entering the river system;
 - loss of water dependent habitats adjoining the drainage network;
 - additional volumes of treated sewage effluent being discharged to watercourses will result in an increasing proportion of effluent in the receiving waters. This would be particularly acute at times of low flow and in the absence of adequate dilution; and
 - increased recreational pressure on the river environment.



3.6 Recreation

Current Situation

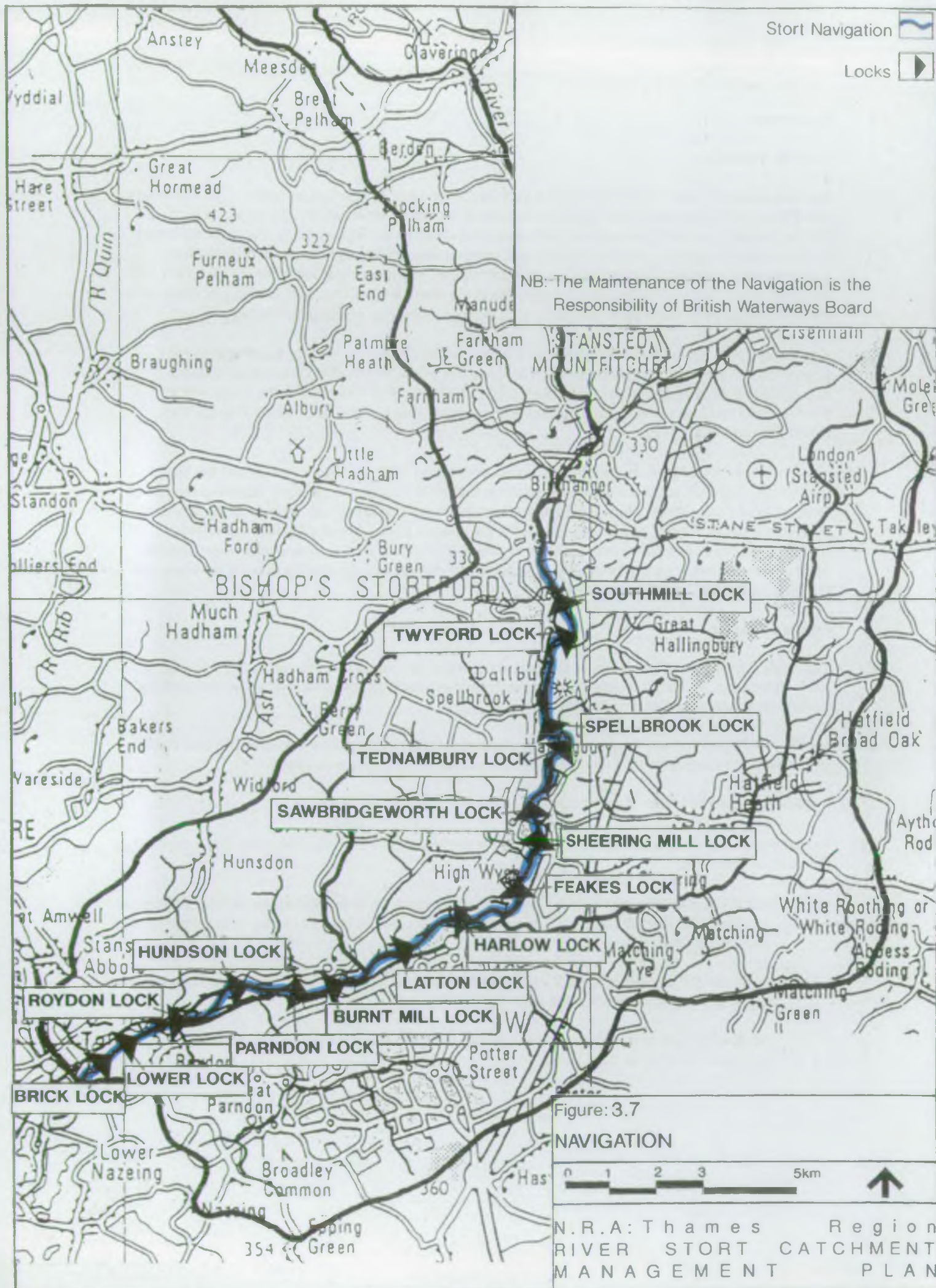
- 3.6.1 Recreation activity in the Stort Catchment is very largely of a low key, informal nature. The River Stort Navigation and the tributaries are valuable recreational resources, most notably for activities such as pleasure cruising, canoeing and angling, and associated activities such as walking. More formal water based recreation activities, such as boarding and water-skiing, are not significant in the catchment, largely because demand is met by other areas in the region. The most notable of these is the Lee Valley Regional Park. This is a major recreation provider in the South East of England, offering facilities for a considerable range of water based activities, such as sailing, angling, cruising and rowing.
- 3.6.2 Angling and walking are particularly popular activities in the catchment. Seven organisations have licences to fish the River Stort Navigation. There are also a number of other clubs which fish the tributaries and areas of open water (e.g. gravel pits). The network of footpaths in the catchment is extensive and includes parts of four long distance footpaths: Harcamlow Way, Three Forests Way, Forest Way and Flitch Way.
- 3.6.3 The low key nature of recreation activity is a reflection of two important characteristics of the Stort Catchment. Firstly, it is generally rural in character and has not on the whole been subject to the sort of large scale land use change which can facilitate intensive recreational use (eg. creation of open water areas as a result of mineral extraction). Secondly, the policies pursued by the County and District Councils, in conjunction with other interested organisations such as British Waterways Board and the Sports Council, have sought to protect the environmental character of the area by making provision for informal rather than formal recreational use.

Future Situation

- 3.6.4 The level of recreational activity in the catchment generally, and in the river corridors in particular, is likely to increase. In the short term there is already pressure for the construction of additional golfing facilities and increased access to the countryside.
- 3.6.5 Looking to the medium and longer term, the pressure to take agricultural land out of production is likely to provide opportunities for the increased provision of tourism and leisure facilities.

Implications for the Water Environment

- 3.6.6 The pressure for increased recreational activity in the catchment will have the following implications for the water environment:
- additional boat movements on the Navigation may upset the delicate deep water flora habitats in the channel, and result in insufficient water to maintain pound levels at locks during periods of low natural flow;
 - the likelihood of damage to bank and fringe habitats will increase if more people are encouraged to use the footpath network in the river corridors;
 - the development of formal recreational facilities will damage the character and ecological, and landscape value of the Stort Valley.



3.7 Navigation

Current Situation

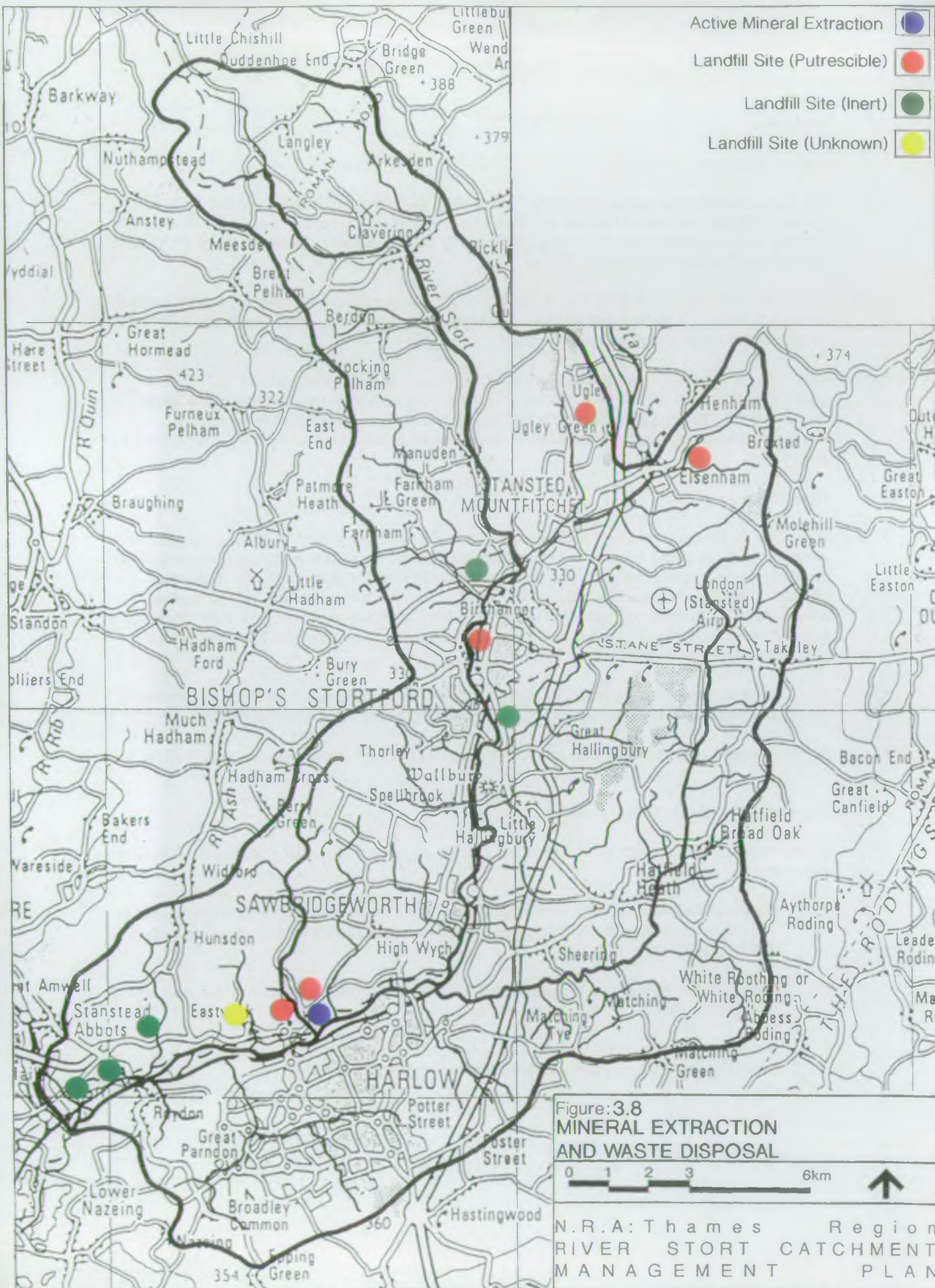
- 3.7.1 The Stort Navigation was opened in October 1769 to allow the established malting trade of the Stort Valley to compete with that of Hertford and Ware which were already served by the Lee Navigation. By 1833 the valley supported over 120 maltings, the majority being in Bishop's Stortford. Over 40,000 tons of goods were carried on the canal in 1811.
- 3.7.2 From Bishop's Stortford to Feildes Weir, a distance of 22.5 km, the canal level falls by 21.5m through a series of 15 locks. All but four of these locks (ie. Lower Lock, Brick Lock, Feakes Lock and Spellbrook Lock) were built at or around existing watermills.
- 3.7.3 In 1911 ownership of the navigation passed to the Lee Conservancy who reconstructed each of the 15 locks during the period 1913 to 1942. Commercial traffic continued to dwindle, however, and finally ceased in 1973. The navigation is currently operated by British Waterways Board as a 'cruising waterway'. Significant renovation and improvement work has been undertaken by BWB over the last 5 years.

Future Situation

- 3.7.4 Since 1989 the navigation has been marketed as the 'Lee and Stort Navigation' by BWB. The positive promotion of the waterway is linked to BWB's Business Plan and the need to maximise revenue to offset the fixed maintenance and operating costs which are currently shared with the NRA TR. Increased recreational use (eg. cruising and angling) of the facility is seen as the means of achieving this goal. BWB has a policy to double the number of moorings on the Stort Navigation from 150 to 300 as part of its wider aim of increasing recreational activity on the waterways. This is likely to bring with it an increased demand for off-river mooring facilities.
- 3.7.5 This policy is beginning to achieve success with an increased demand for moorings, the establishment of circular and linear walks based on the Stort Navigation and the setting up of a weekend waterbus.
- 3.7.6 Recent improvements to the navigation will continue with the NRA TR contributing up to 50% of the costs.

Implications for the Water Environment

- 3.7.7 The increased use of the navigation for leisure and possibly commercial activities will have the following implications:
- additional boat movements on the Navigation may upset the delicate deep water flora habitats in the channel, and result in insufficient water to maintain pound levels at locks during periods of low natural flows;
 - increased informal use may lead to demands for more formal facilities, including marinas, which may damage the ecology and landscape of the river valley;
 - future improvements to the navigation infrastructure (partially funded by the NRA TR) may cause traditional flow regimes to be altered as has happened in the recent past.



3.8 Mineral Extraction and Waste Disposal

Current Situation

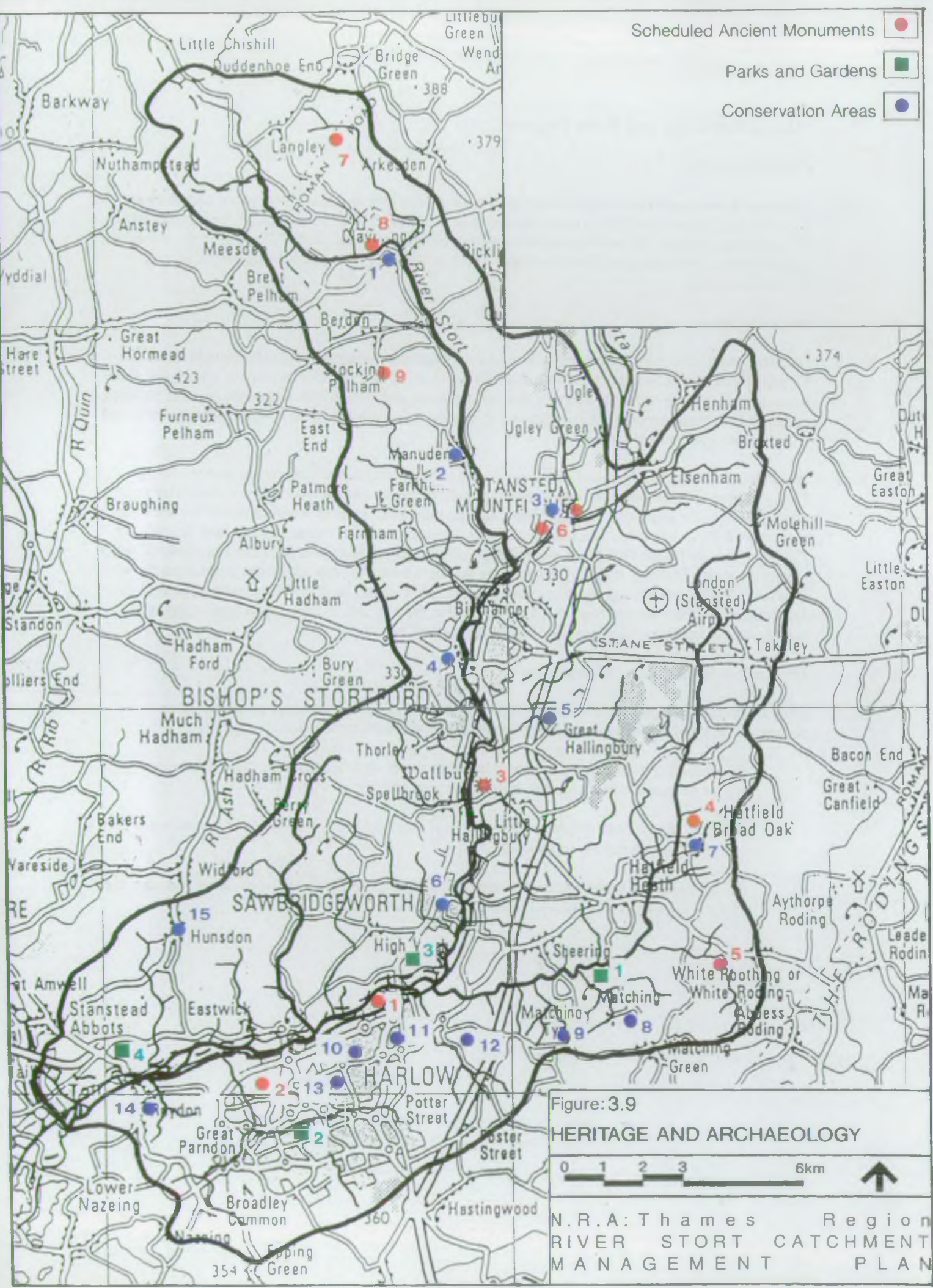
- 3.8.1 There has been a limited amount of extraction of river gravels over the past 50-60 years, and there are approximately eleven landfill sites along the length of the Stort Valley. Five of these contain inert fill, five contain putrescible fill and the contents of the remaining one is unknown. There are only two active mineral sites in the catchment: Rye Meads and Hollingson Meads (this site is being progressively worked and filled).

Future Situation

- 3.8.2 It appears that pressure for mineral extraction and subsequent landfilling in the catchment is likely to be limited and the respective Structure Plans and Minerals Local Plans do not allocate any significant areas for extraction in the foreseeable future. There are, however, one or two sites where the mineral planning authorities anticipate proposals for extraction (eg. extension to the existing Hollingson Meads works and a new working at Parndon Meads).
- 3.8.3 Nevertheless, there are three issues which may come into play should existing circumstances change. Firstly, the presence of gravel reserves in the river valleys means that pressure to work them may become much greater in the future (eg. if local demand for aggregates increases or reserves elsewhere are found to be more difficult to work). Secondly, void space created by mineral extraction and land suitable for above ground landfill are likely to be much sought after in the future as ever increasing amounts of waste require disposal. This may mean in the long term that sites within the catchment are considered for waste disposal. Thirdly, the strengthened legal provisions to deal with old landfill sites contained in the 1990 Environmental Protection Act mean that local authorities may be able to take action against those responsible for pollution risks caused by inadequate landfill practices.

Implications for the Water Environment

- 3.8.4 If the situation with regard to mineral extraction and waste disposal does change as described in paragraph 3.8.3, the following implications for the water environment will become apparent:
- the removal of gravels and subsequent landfilling may significantly alter the groundwater regime in localised areas, most notably in the river valleys;
 - pollution plumes from existing and new landfill sites could affect surface and groundwater systems if not adequately controlled;
 - the damage to the historic landscape and ecology of the Stort Valley if restoration and after-care of sites is inappropriate to the rural character of the area.



3.9 Heritage and Archaeology

Current Situation

3.9.1 There are nine scheduled ancient monuments and fifteen conservation areas in the catchment. These are:

Ancient Monuments	Conservation Areas
1. Harlow Temple;	1. Clavering
2. Mounds at Little Parndon;	2. Manuden
3. Hill fort Wallbury;	3. Stansted Mountfitchet
4. Benedictine Priory, Hatfield Broad Oak	4. Bishop's Stortford
5. White Roding	5. Great Hallingbury
6. Stansted Mountfitchet Castle	6. Sawbridgeworth Town Centre
Stansted Mountfitchet Roman Villa;	7. Hatfield Broad Oak
7. Clavering Farm	8. Matching Green
8. Clavering Castle	9. Matching Tye
9. Fortified Mount Berden	10. Mark Hall North, Harlow
	11. Market Street, High Street, Mulberry Green,
	12. Churchgate Street, Harlow
	13. Nettleswellbury
	14. Roydon
	15. Hunsdon

In addition, there are over 30 sites which have been identified as being of regional importance by the respective County Archaeologists.

3.9.2 The catchment also contains a number of historic parks and gardens. The following are listed in the Register of Parks and Gardens of Special Historic Interest compiled by English Heritage:

Essex	:	1. Down Hall (Grade 2)
	:	2. Harlow Water Gardens (Grade 2)
Hertfordshire	:	3. Pishiobury Park (Grade 2)
	:	4. Stanstedbury (Grade 2)

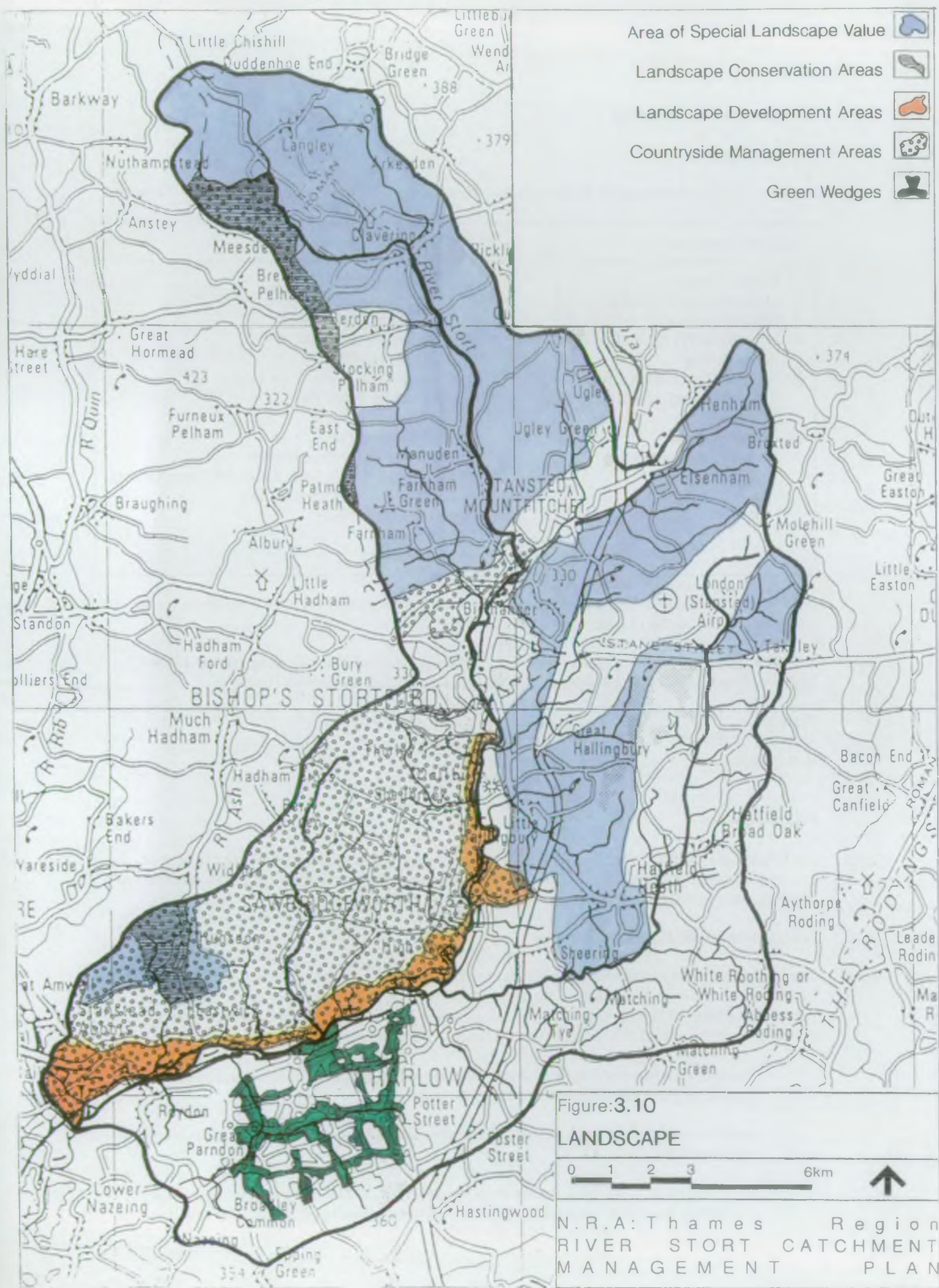
Future Situation

3.9.3 The County and District Councils all have policies in their development plans which seek to protect buildings of architectural or historic interest and their settings. These amount to a significant constraint on development given the large number of such features in the catchment.

Implications for the Water Environment

3.9.4 The presence of water makes a very significant contribution to many of the areas of architectural or historic value. For example, several of the conservation areas have a watercourse as a central feature, and much of the interest of historic parks and gardens is created by water, eg. Pishiobury Park. The emphasis placed on the protection of these features has the following implications for the water environment:

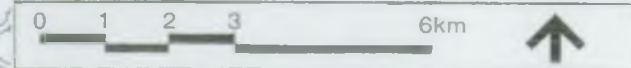
- ground and surface water regimes should be managed in such a way that water flows and levels continue to make a positive contribution to these areas;
- works to watercourses should be designed so as to enhance waterside locations of architectural or historic interest;
- the significant archaeological interest in the catchment should be taken into account when undertaking day-to-day operational activities, and in the planning of capital schemes.



- Area of Special Landscape Value 
- Landscape Conservation Areas 
- Landscape Development Areas 
- Countryside Management Areas 
- Green Wedges 

Figure:3.10

LANDSCAPE



N.R.A: Thames Region
RIVER STORT CATCHMENT
MANAGEMENT PLAN

3.10 Landscape

Current Situation

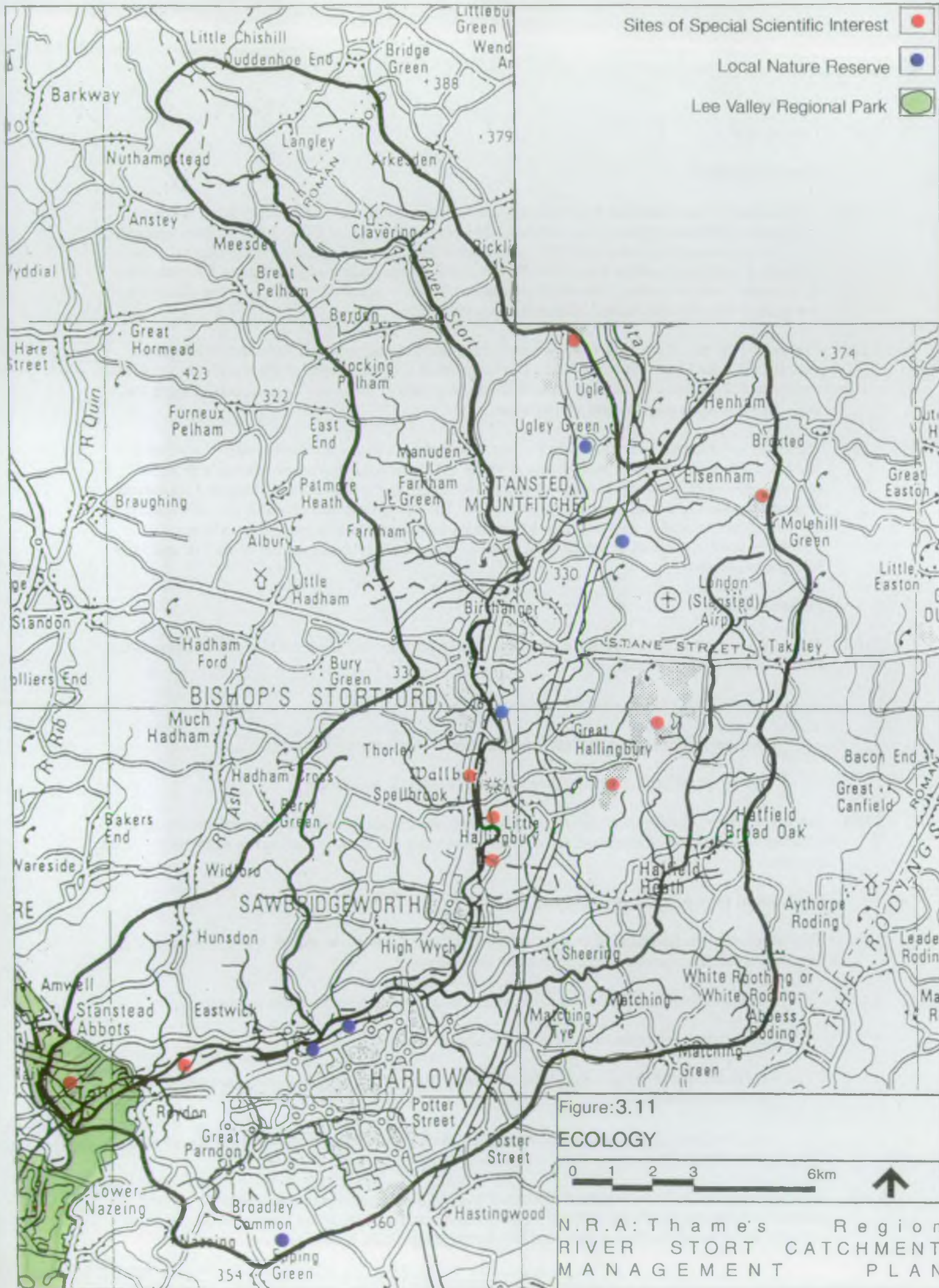
- 3.10.1 The landscape of the catchment is not considered to be important in national terms in that it is not designated as a National Park or Area of Outstanding Natural Beauty (AONB). Its value is recognised, however, at County level in that much of it is designated as a 'Special Landscape Area' (Essex). The implication of this designation is two-fold. Firstly, it provides an additional justification for restraining development, over and above Green Belt designation. Secondly, it provides a focus for the allocation of resources to conserve and enhance landscape character.
- 3.10.2 Conversely, the part of the Stort Valley within Hertfordshire is designated a Landscape Development Area (LDA) in the County Structure Plan. This designation is in recognition of the significant visual and environmental problems which are accumulating in many parts of the Green Belt, especially along the main communication corridors and urban fringes.
- 3.10.3 The landscape character of certain sections of the waterways has been considerably altered as a result of past flood alleviation and other management works (e.g. Clavering village centre, Bishop's Stortford, etc.). In some cases, these works have had an adverse impact on the natural functioning and appearance of the river system as a result of inappropriate design. The use of materials which do not harmonise with the vernacular character of the Navigation has had a particularly adverse impact. British Waterways Board has commenced work to address such problems along the Navigation as part of the Lee and Stort Navigation initiative.

Future Situation

- 3.10.4 There are a number of pressures on the landscape of the catchment and these are likely to continue in the future. In summary, there are:
- urban fringe problems around the centres of population;
 - pressures from urban coalescence and substantial interference with farming; and
 - the use of the principal river valley as a major communication route.
- 3.10.5 The policies in the development plans have been formulated to respond to these pressures by aiming to conserve valuable areas of landscape, and enhance those areas which are becoming run down and degraded.

Implications for the Water Environment

- 3.10.6 The protection of the landscape of the river valleys is of central concern to the NRA TR. The particular contribution to landscape quality is dependent on the following:
- maintenance of adequate flows in the watercourse, especially in the upper reaches;
 - the conservation of the remnant natural reaches of channel;
 - the promotion of design solutions which make a positive contribution to the character of the Stort Navigation;
 - the restoration, where appropriate, of watercourses which have been substantially altered from their natural form.
- 3.10.7 A further important point is the apparent difference in approach to managing the landscape of the valley adopted by Essex and Hertfordshire County Councils respectively. The former implies an area of value worthy of protection, whereas the latter implies a degraded landscape in need of enhancement.



3.11 Ecology

Current Situation

- 3.11.1 There are eight Sites of Special Scientific Interest (SSSI) in the catchment and all the development plans include policies aimed at conserving and enhancing sites of ecological importance. Four of the SSSIs are located on or adjacent to the River Stort Navigation (ie. Hunsdon Mead, Little Hallingbury Marsh, Rye Meads and Sawbridgeworth Marsh), and a fifth is centred on a flood storage area (ie. the Spellbrook Flood Lagoon). The SSSI designation is significant in that it is usually indicative of habitats whose characteristics are unrecratable and very sensitive to change, eg. the lowering of the groundwater levels.
- 3.11.2 In addition to those sites with SSSI status, the Stort Valley from north of Bishop's Stortford to Feildes Weir supports a remarkable number of water dependent habitats. These constitute a valuable continuous ecological resource which is of particular importance to migrating birds. Many of the sites along this corridor are protected in the local plans and some are managed as nature reserves (eg. Rushy Mead at Bishop's Stortford).

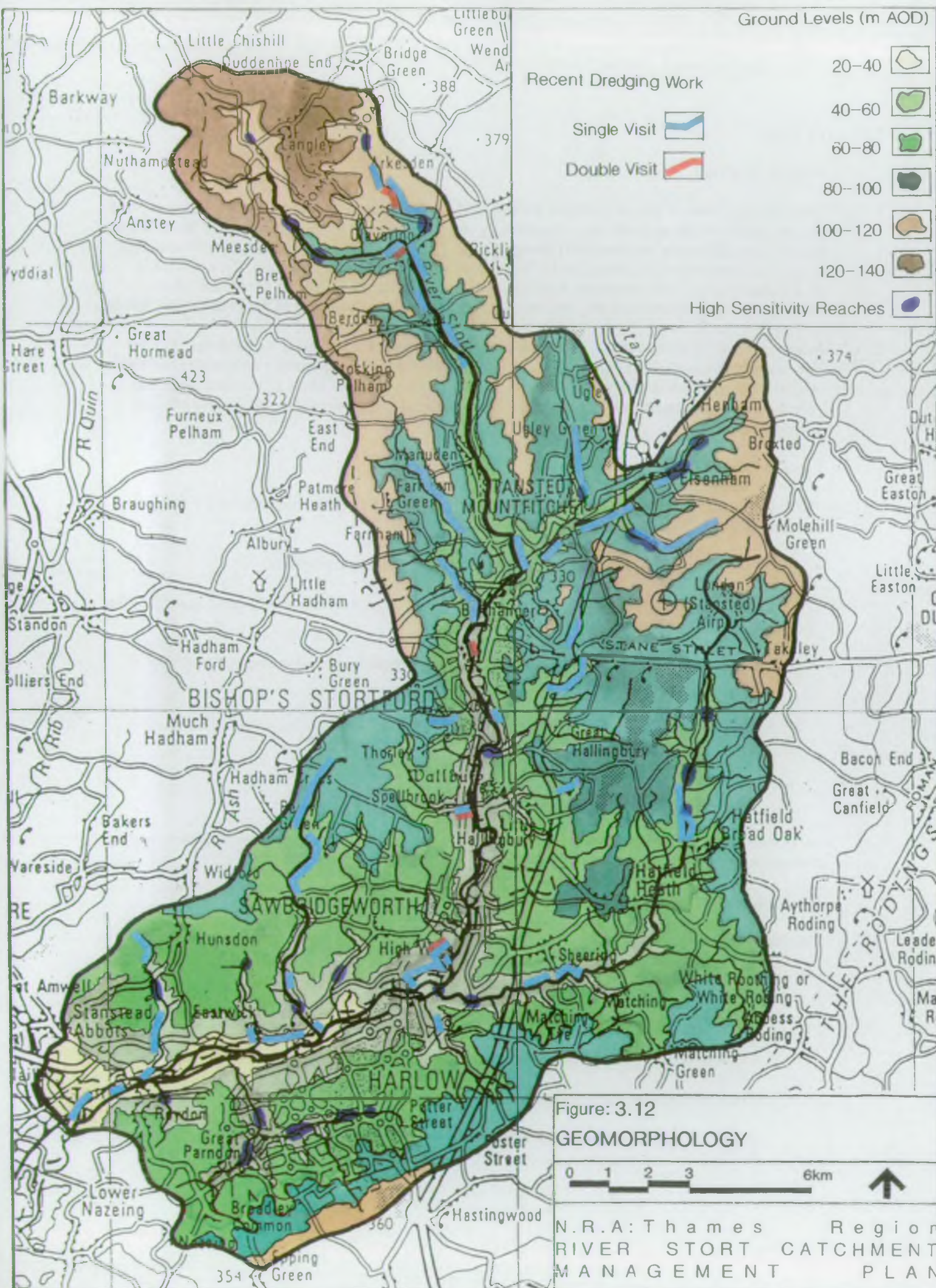
Future Situation

- 3.11.3 The delicate ecological balance of the catchment could be upset by the following activities if the necessary preventative action is not taken:
- draining of low lying wetlands (eg. the Meads) for agricultural purposes;
 - increased boating activity on the Stort Navigation and a greater number of people using the river valleys for walking and informal recreation;
 - rise in the level of pollutants from urban runoff, inadequately diluted sewage effluent and agricultural chemicals;
 - further reductions in flows, notably in the upper reaches;
 - inappropriate distribution of low and flood flows in the Stort Valley;
 - inappropriate flood defence works.

All of these activities illustrate the fundamental inter-relationship between the water environment and the management of ecological habitats.

Implications for the Water Environment

- 3.11.4 The threats to the ecology of the water environment suggest the need for the following:
- sufficient inundation of low lying land to protect existing habitats;
 - prevention of a deterioration in water quality;
 - maintenance and, where possible, enhancement of summer and winter flows;
 - review of operational activities which are damaging habitats, and
 - reassessment of the functioning of Spellbrook Flood Lagoon to prevent further deterioration of the SSSI.



3.12 Geomorphology

Current Situation

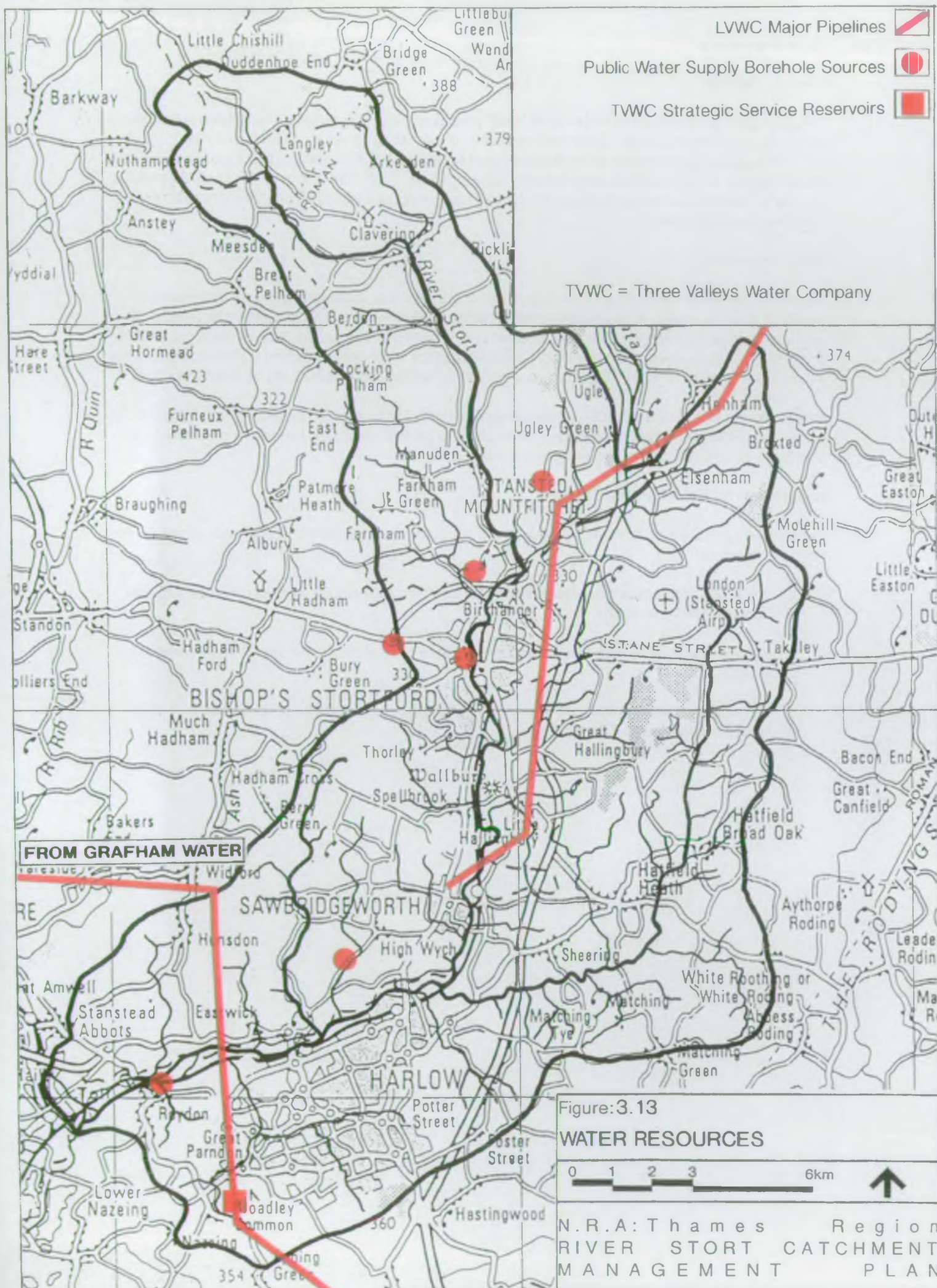
- 3.12.1 A high percentage (nearly 60%) of the 'main river' watercourses in the catchment have been substantially altered from their natural form. These reaches have been altered by works associated with flood alleviation, agricultural drainage or other factors such as navigation. Conversely, there are some remnant natural reaches of high morphological diversity (approximately 8%). These tend to be the reaches which are unaffected by previous land drainage or flood defence works and generally unaltered by other works or management techniques.

Future Situation

- 3.12.2 The alterations to the watercourses have occurred primarily because increasing demands have been placed on the river system to accommodate additional surface water runoff from new development. The works to increase the capacity of the watercourses to receive this additional water have tended to have a detrimental effect on channel morphology (e.g. channelization, over-deepening and widening, etc.). This in turn has increased the NRA TR maintenance burden in certain locations because of increased siltation.
- 3.12.3 Further development in the catchment could compound these problems if the necessary works are not appropriately designed. This threat already exists in those parts of the catchment which are likely to be developed for new housing and infrastructure in the near future.

Implications for the Water Environment

- 3.12.4 The morphological sensitivity of the watercourses in the catchment has the following implications for the water environment:
- the need to prevent further adverse impact on those remnant natural reaches of channel of high morphological sensitivity;
 - the opportunity to restore river channels which have been substantially altered to their natural state;
 - the need to review maintenance procedures in the light of the findings of the detailed morphological study of the catchment.



3.13 Water Resources

Current Situation

- 3.13.1 The exceptional weather conditions (i.e. the two dry summers of 1989 and 1990, and the relatively dry winter in-between), have had a significant impact on river flows in the catchment. Gauging station data indicate that river flows are significantly lower than their expected mean values for particular times of the year, especially in the upper reaches. A sample of the data is given in Table 3.2.

Table 3.2: Sample of Flow Data		
Watercourse	Long Term Sept. Mean Daily Flows (cubic metres/second)	Mean Daily Flows in Sept 1990 (cubic metres/second)
Pincey Brook	0.06	0.028
Stansted Brook	0.03	0.013
Stansted Springs (River Stort)	0.05	0.032

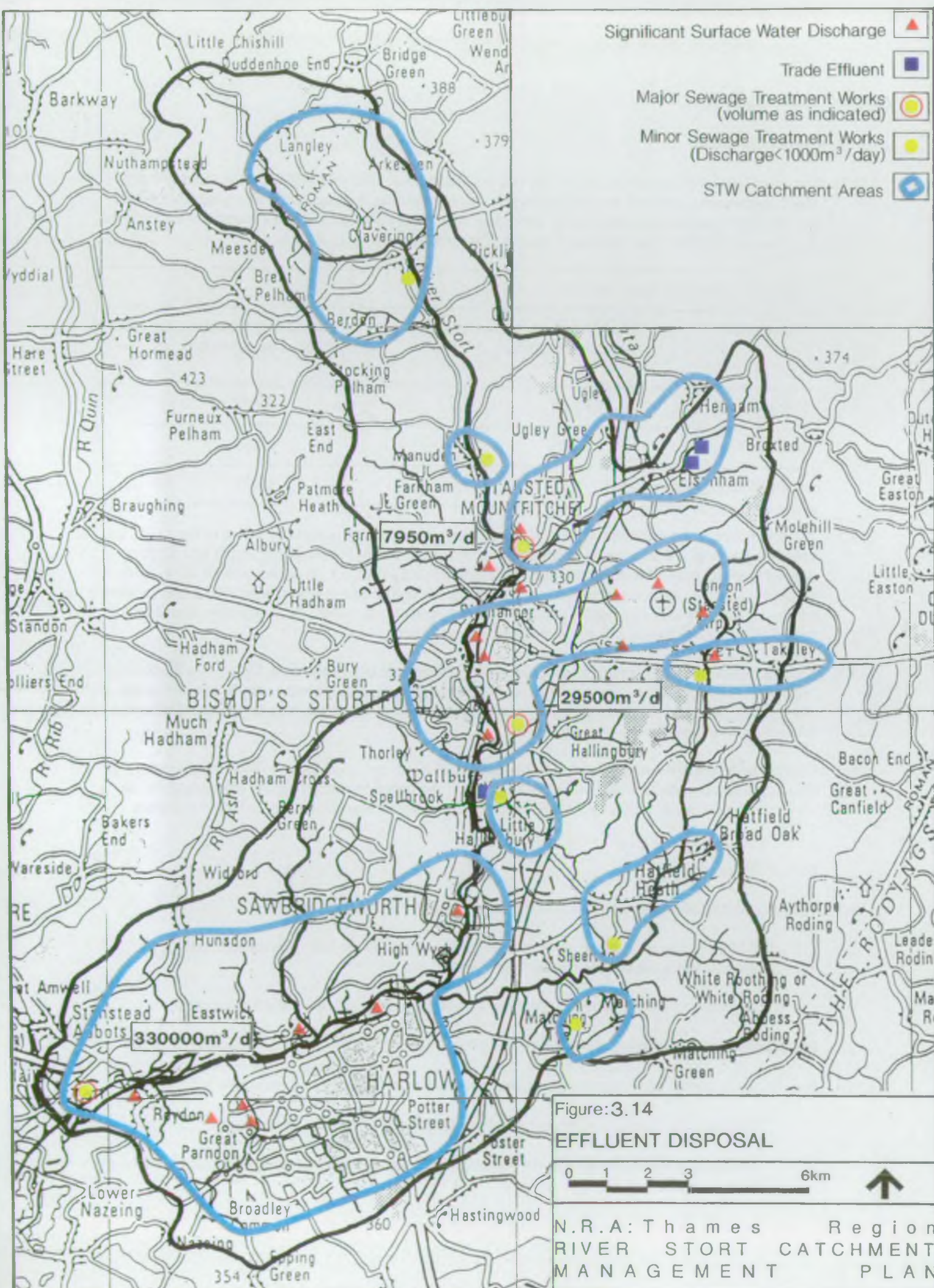
- 3.13.2 The upper third of the catchment is particularly susceptible to long dry periods by virtue of the underlying geology. Watercourses in this area (e.g. Farnham Bourne) naturally dry-up in late summer although the exceptional weather conditions have exacerbated this effect. However, the widening and deepening of some channels for land drainage purposes has produced a much enlarged bed width in some reaches. This tends to exaggerate the low flow problem, particularly where the works have breached the natural substrate and the water is able to infiltrate the underlying chalk.
- 3.13.3 The first significant flows emerge from springs situated along the boundary of the Upper Chalk/Reading Beds, and the London Clay. These springs are of considerable importance in the supply of water to the river system. However, even the most significant of these, Stansted Springs, was only flowing at two fifths of its mean flow during November 1990.
- 3.13.4 Most of the public water supply is imported into the catchment, and consequently discharged via the Rye Meads Sewage Treatment Works following treatment. The imported water which is discharged via the sewage treatment works higher up the catchment enhances dry weather flows (eg. Bishop's Stortford STW).

Future Situation

- 3.13.5 The following trends could exacerbate the low flow problems in the catchment:
- BWW's policy of doubling the number of pleasure craft on the Stort Navigation, leading to increased lock use and consequent loss of water; and
 - an increase in abstractions for agricultural purposes in the upper part of the Catchment.

Implications for the Water Environment

- 3.13.6 Periods of low rainfall and hence low flows, puts the water environment under stress and may lead to:
- continued deterioration of the ecological and landscape value of the upper Stort;
 - reduced dilution of sewage effluent resulting in damage to the important deep water flora of the Stort Navigation.



3.14 Effluent Disposal

Current Situation

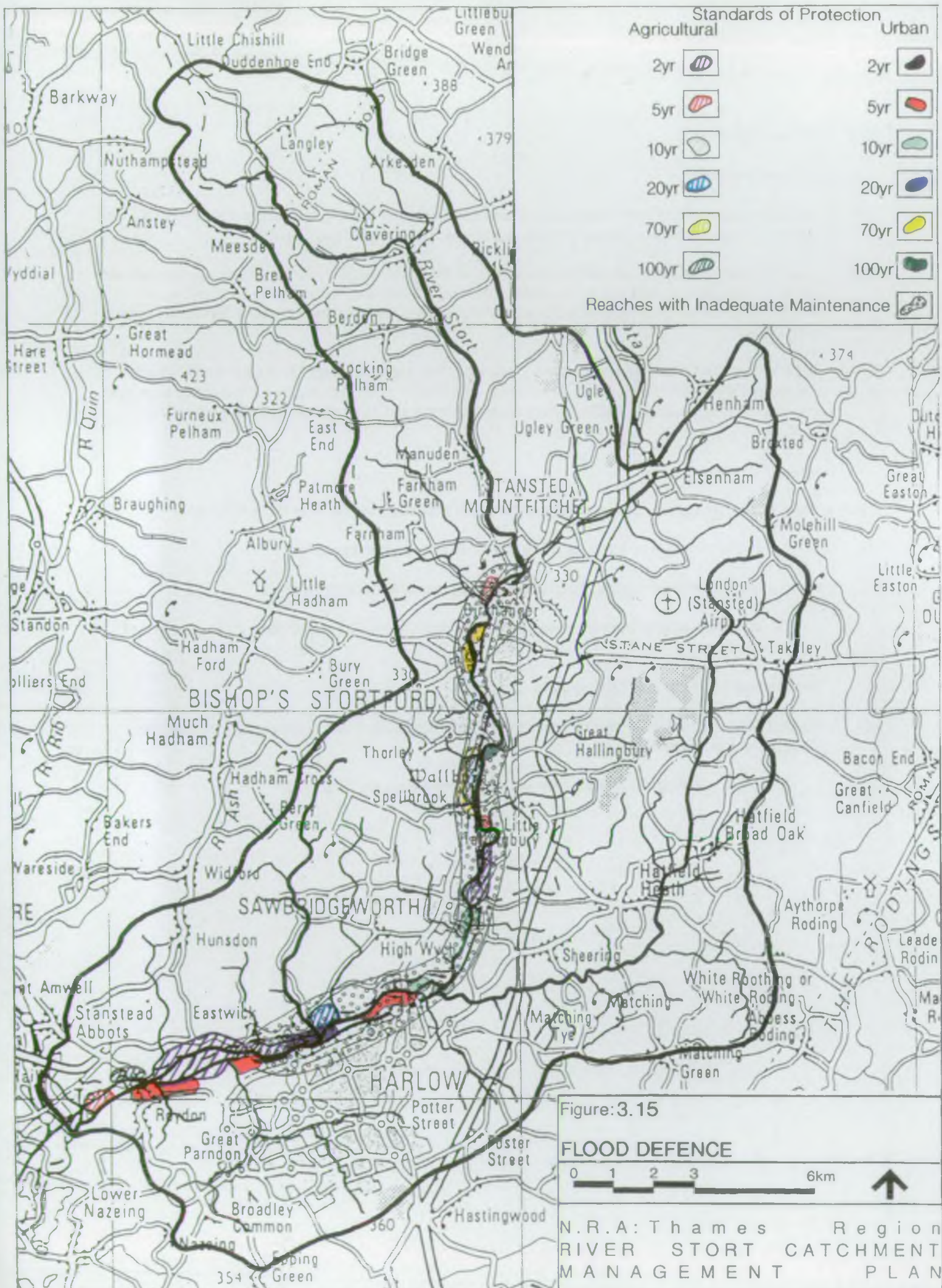
- 3.14.1 The water quality of the Stort is generally good and consequently it is predominantly classified as a Class 1B river. There are limited sections of watercourse which are classified as Class 2B.
- 3.14.2 Little information on the quality of the groundwater in the catchment is available. However, groundwater quality in the confined chalk aquifer is considered to be high and does not appear to be at risk from shallow surface water soakaways which normally discharge to the aquifers in the drift deposits of gravel and alluvium.
- 3.14.3 Effluent from Harlow and Sawbridgeworth is treated at Rye Meads Sewage Treatment Works which discharges into the River Lee, not the River Stort. The Bishop's Stortford works have recently been upgraded to cope with additional effluent from Stansted airport and development in Bishop's Stortford itself.

Future Situation

- 3.14.4 The generally high quality of water in the catchment is potentially at risk from the following:
- pollution caused by increased urban run-off from new development;
 - the increased use of agricultural chemicals (eg. use of herbicides); and
 - the increased proportion of sewage effluent in receiving waters, particularly during periods of low flow.

Implications for the Water Environment

- 3.14.5 Effluent disposal to the water environment needs to be controlled in order to achieve the river quality objectives and to ensure:
- sensitive ecological habitats, fisheries and amenity areas are preserved.



3.15 Flood Defence

Current Situation

- 3.15.1 The construction of the Navigation in 1769 considerably altered the natural regime of the river system. The combination of a system with many navigational controls and subsequent development in the floodplain of the Stort valley has resulted in several flooding problems.
- 3.15.2 In the upper Stort, floods have affected the villages of Langley, Clavering and Manuden. The last major flood event was in late 1982. Works were undertaken at Clavering in 1983, but this and the other villages mentioned are still at risk from flooding.
- 3.15.3 Works constructed between 1968 and 1980 have provided Bishop's Stortford with a very high standard of flood protection. Floods in 1968, 1974 and 1978 had caused significant damage to residential, commercial and industrial properties.
- 3.15.4 Maintenance of the Stort Navigation is undertaken by BWB although up to half their costs are recharged to the NRA TR. Over the last three years BWB have undertaken many works to alleviate the risk of locks being damaged by flood flows and pound levels being lowered by the actions of riparian owners.
- 3.15.5 Operational activities by the NRA in the rest of the catchment are limited to the removal and clearance of obstructions. Local authority staff are also involved in the maintenance of several key urban structures.
- 3.15.6 Flood warning is an important element of the NRA's activity and the Region maintains flood warning stations at Clavering and Bishop's Stortford to supplement other gauged information. Warnings are disseminated to the local police forces in accordance with national guidelines.

Future Situation

- 3.15.7 Urban areas still at risk in the main river valley include small areas of Spellbrook, Sawbridgeworth, Harlow and Roydon. In the upper catchment problems still exist at Langley, Clavering and Manuden. Standards of protection to urban areas generally exceed the one in ten years standard throughout the catchment.
- 3.15.8 Surface water runoff control has been a high priority in the catchment, especially since the publication of 'runoff control zone' information in 1986. Recent significant urban developments (e.g. Stansted airport, Brenthall Park at Harlow, Bishop's Park at Bishop's Stortford) have all incorporated storage ponds. The continued use of such measures is needed to maintain existing 'levels of service' in downstream areas.
- 3.15.9 Many past flood defence and land drainage works have had a detrimental effect on the environment of the Stort catchment's rivers and wetlands (e.g. Clavering FAS, Bishop's Stortford FAS, Spellbrook Flood Lagoon). Recent works by the BWB may also be responsible for damaging the natural water environment either directly or indirectly (e.g. reduced flooding of wetland areas). Future works will need to be assessed more rigorously, and there are considerable opportunities for enhancement of past works.

Implications for the Water Environment

- 3.15.10 The existing flooding problems have the following implications for the water environment:
- the need to undertake detailed feasibility studies of schemes to alleviate from flooding the urban areas still at risk;
 - the importance of development control in maintaining existing flood defence 'levels of service' through floodplain and surface water runoff management;
 - the need to review maintenance of the Stort Navigation in conjunction with BWB to prevent further damage to the water environment and to mitigate the adverse impacts of previous works.

4.0 NRA OBJECTIVES AND POLICIES

4.0 NRA OBJECTIVES AND 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:

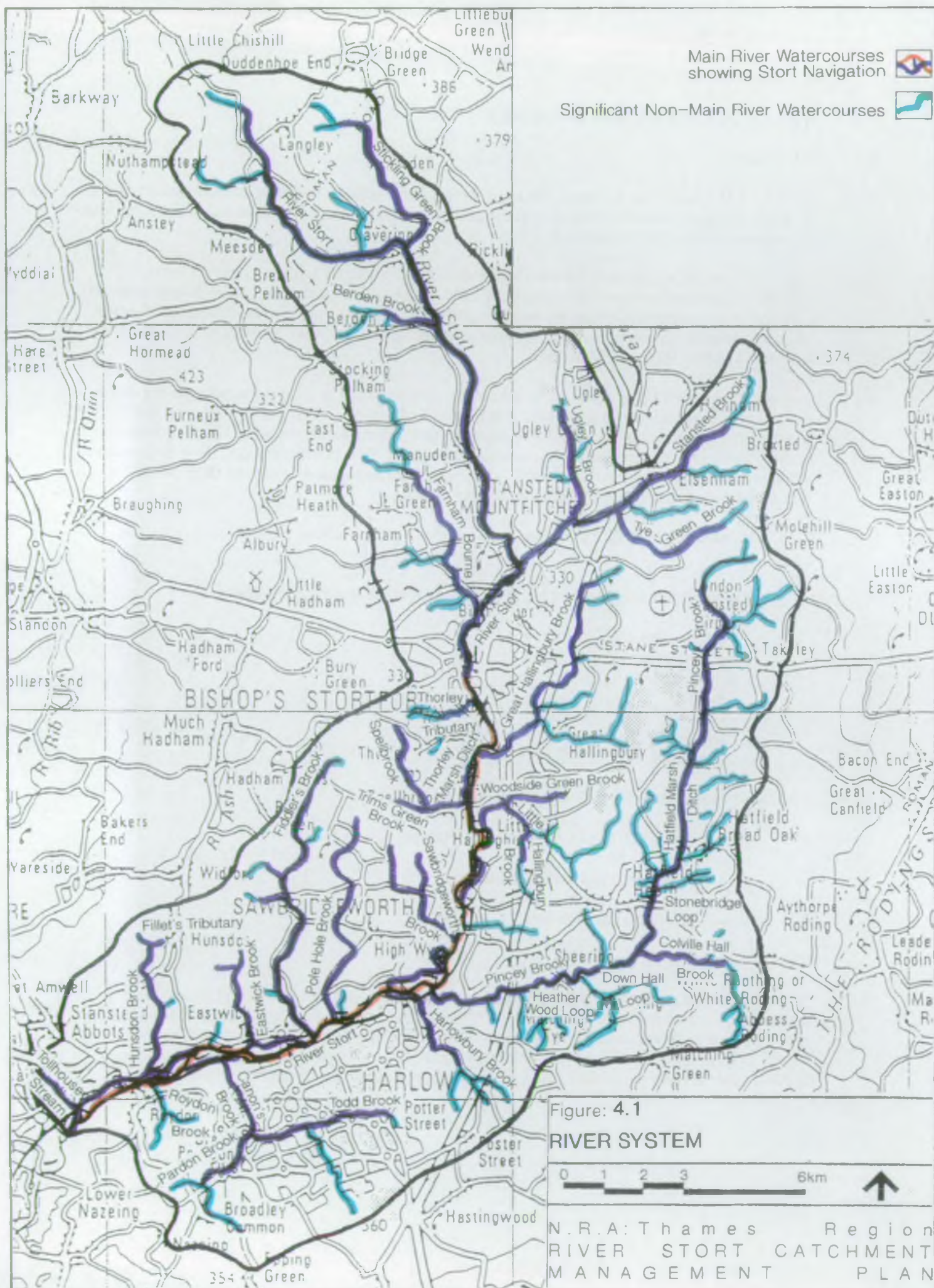
- description of the NRA Corporate Plan and the NRA TR Business Plan and their respective aims;
- outline of policies, objectives and targets for each of the seven core functions, ie.:
 - . water resources;
 - . pollution control;
 - . flood defence;
 - . fisheries;
 - . recreation;
 - . navigation;
 - . 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 relevant catchment objectives.

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 co-operation with other bodies concerned in the management of the catchment and, as an important part of that co-operation, 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 TR 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 WATER RESOURCES

Overview

- 4.2.1 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 in maintaining quality of the water resources.

National

- 4.2.2 The key corporate objectives are:

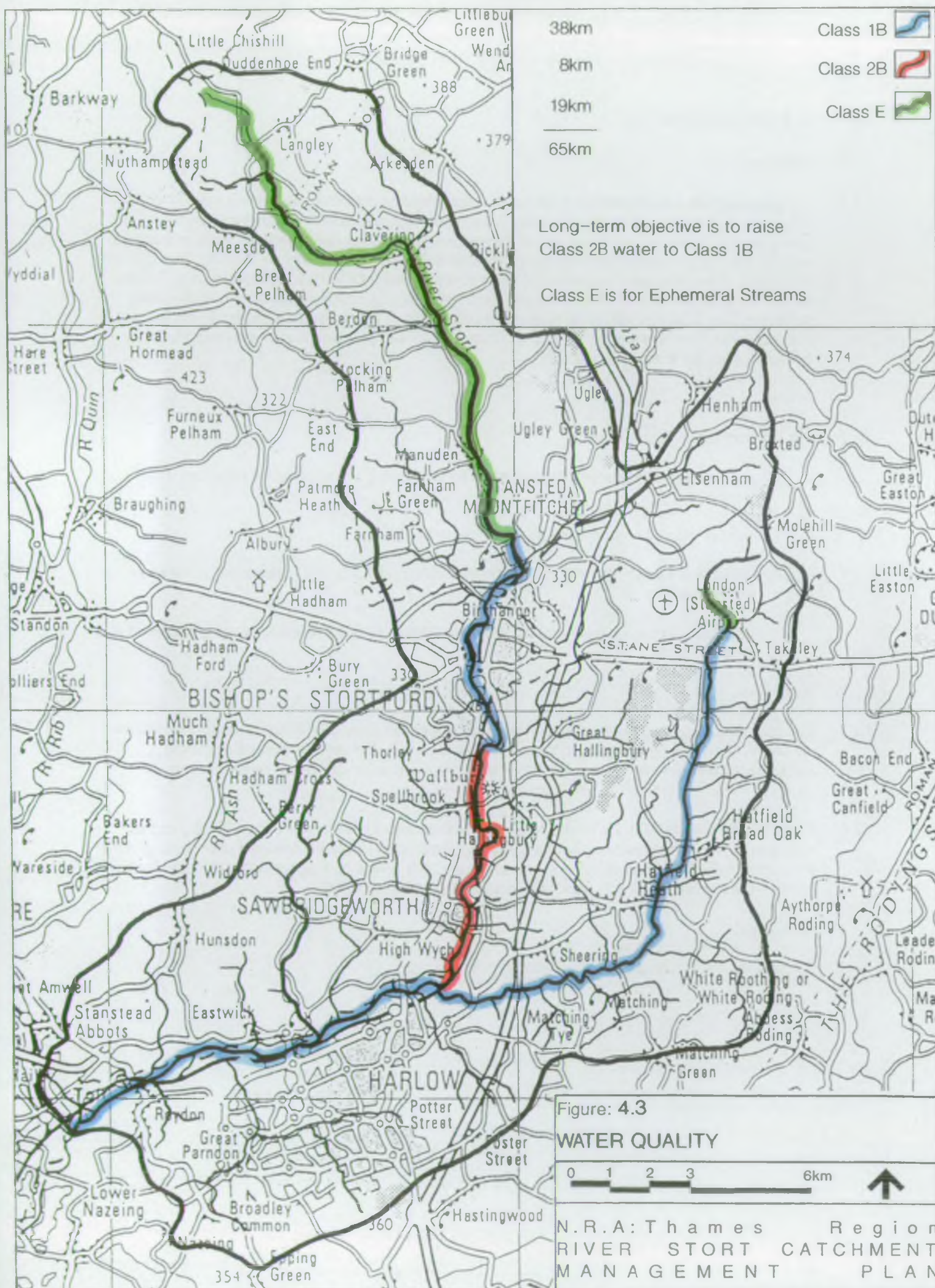
- formulating a sustainable policy and plans for developing and augmenting resources to meet demands;
- formulating and implementing an aquifer protection policy;
- developing a policy to overcome low flow problems caused by over-abstraction in various catchments;
- developing licensing, determination,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

Regional

- 4.2.3 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.
- 4.2.4 There are two parts to NRA TR's water resource planning: strategic water resources planning and the managing 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 1991 review of water resource strategic options and demand forecasts to identify work priorities and objectives to 1992/93.

Catchment

- 4.2.5 There are no catchment specific policies for water resources.



4.3 POLLUTION CONTROL

Overview

- 4.3.1 Comprehensive management of water quality has been impeded by inconsistencies in historic 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 situations are therefore essential requirements of the corporate plan.
- 4.3.2 In Thames Region the extensiveness 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

- 4.3.3 Key corporate objectives are:

- setting water quality objectives (WQOs) for controlled waters; producing appropriate water quality standards; 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.

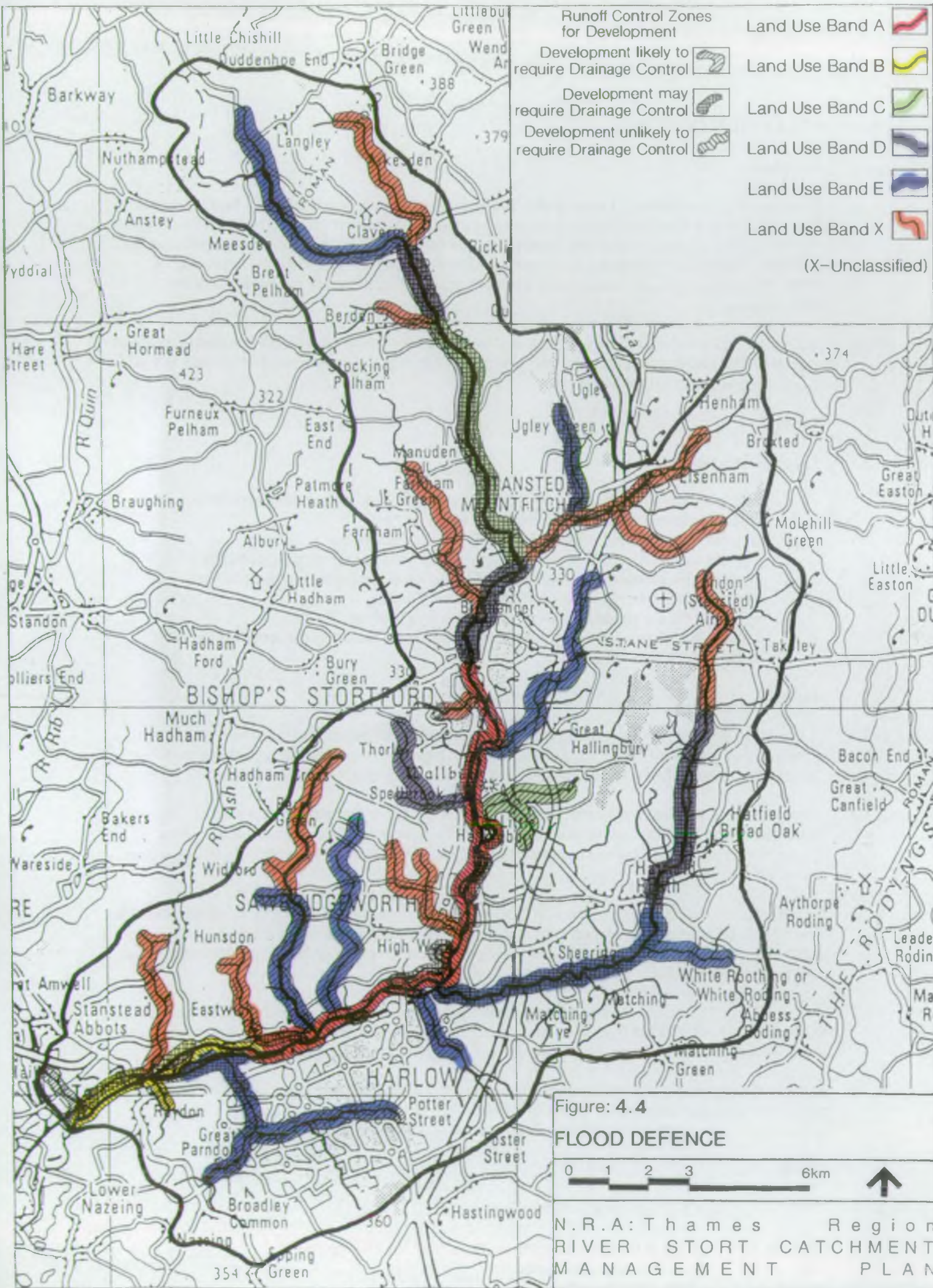
Regional

- 4.3.4 In translating this into regional level objectives, NRA TR sees the first priority being to establish the current quality position of the Region's rivers. A second objective is to demonstrate through the River Survey Programme (1990/91 to 1995/96) that water quality is being maintained and improved.
- 4.3.5 Improvements to surface water quality are essential if the 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 identifying areas of failure of quality objectives and set priorities for improvement.
- 4.3.6 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.
- 4.3.7 **Groundwater:** 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 has been suggested as one form of containment.
- 4.3.8 **Effluent Quality and Pollution Control:** All discharges need not only to comply with their consents but also to be compatible with WQOs. Particular attention will be paid to sewage discharges. Overall, pollution must be minimised and there needs to be improved response to incidents.

Catchment

- 4.3.9 The River Quality Objectives (RQO) for the catchment are:

Class 1B	38 km of the River Stort, Pincey Brook and Stort Navigation.
Class 2B	8 km of the Stort Navigation.
Class E	19 km of the River Stort.



4.4 FLOOD DEFENCE

Overview

- 4.4.1 Corporate objectives focus on flood defence and relate to the managing of fluvial, tidal and sea flood defences 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 management planning.

National

- 4.4.2 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

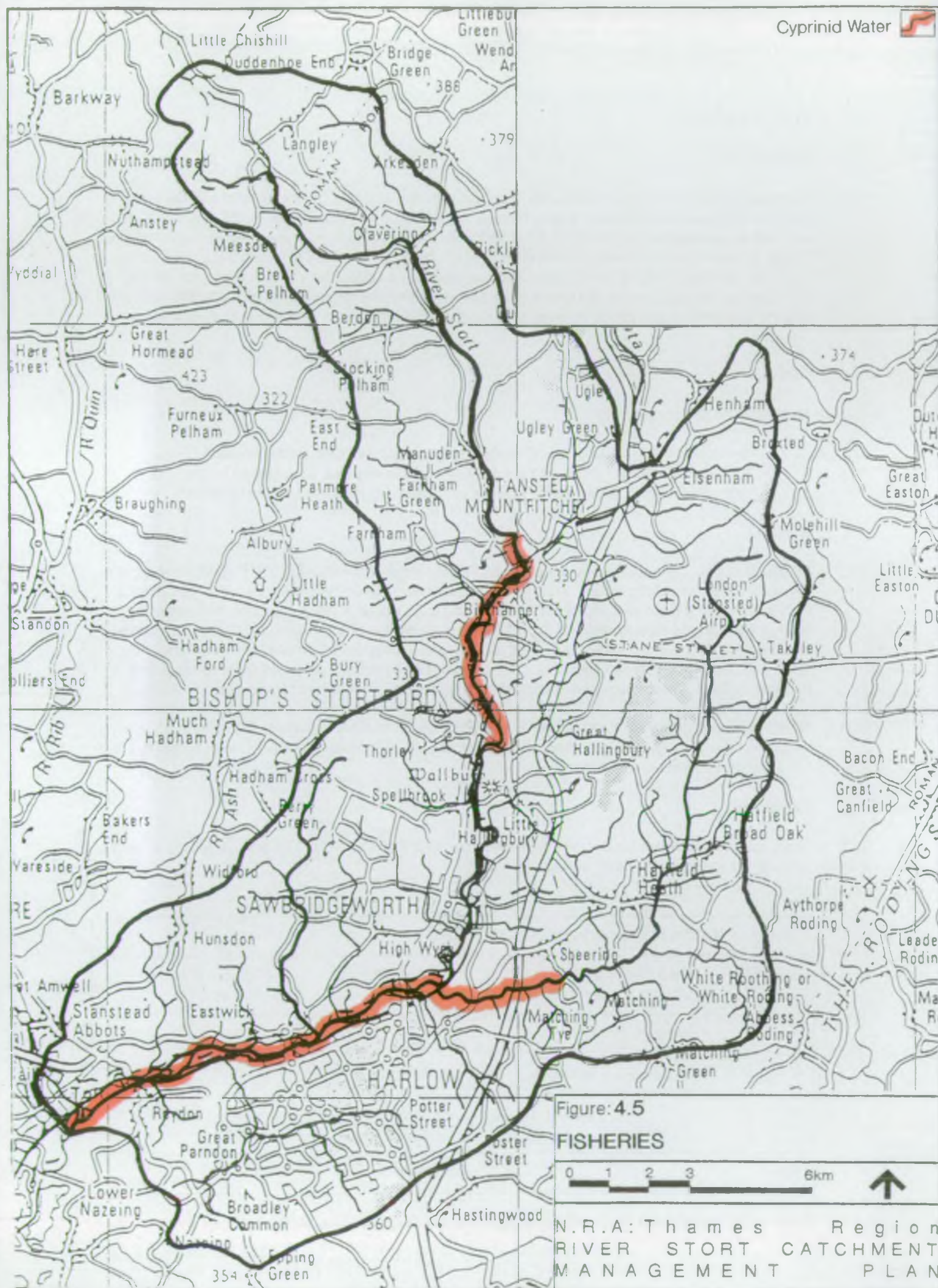
- 4.4.3 Standards of protection are to be improved in the Thames Region. It was NRA TR's objective to have target levels for flood defence/land drainage set for every reach in the catchment by 1989. The criteria used in developing these took account of the needs and influence of adjacent land use. Following the setting of the targets, maintenance and capital works planning would proceed: maintenance programmes were 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 have been protected from undue risk of flooding by 1993. Construction should start on the Maidenhead, Windsor and Eton scheme by 1994.
- 4.4.4 NRA TR intends to produce flood defence and environment catchment management plans for all major urban catchments by March 1994. Also, appropriate impact assessment procedures are to be put in place for major development proposals.

Catchment

- 4.4.5 The levels of service for the catchment are summarised in Table 4.1. Sixteen of the reaches are identified as having an inadequate level of service.

Table 4.1: Number of Reaches in Each Land Use Band				
Land Use Band	Land Use Type		Length of 'Main River' (km)	Number of Reaches
	Urban	Agriculture		
A =	intensive	-	33.1	2
B =	moderate	-	10.7	1
C =	limited	intensive	12.5	2
D =	isolated	arable	21.2	4
E =	-	grazing	55.5	12
X =	unclassified		48.9	10
Total			181.9	31

- 4.4.6 The Runoff Control Zones for Development and the major floodplains are shown in Figure 4.4.



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 either in some measure impassable to migratory fish. Corporate strategy recognises that there is a need to enhance or rehabilitate at least one stock or river in every region of the NRA and objectives focus on the assessment and improvement of stock. An important element of this is seen as being the maintaining of water quality standards. Improving emergency pollution response will alleviate fish kill problems as will increasing protection against illegal fishing. For Thames Region, the priority objective is to survey fish stocks in all watercourses, improve fishery work and enforcement.

National

- 4.5.2 The key corporate objectives are:

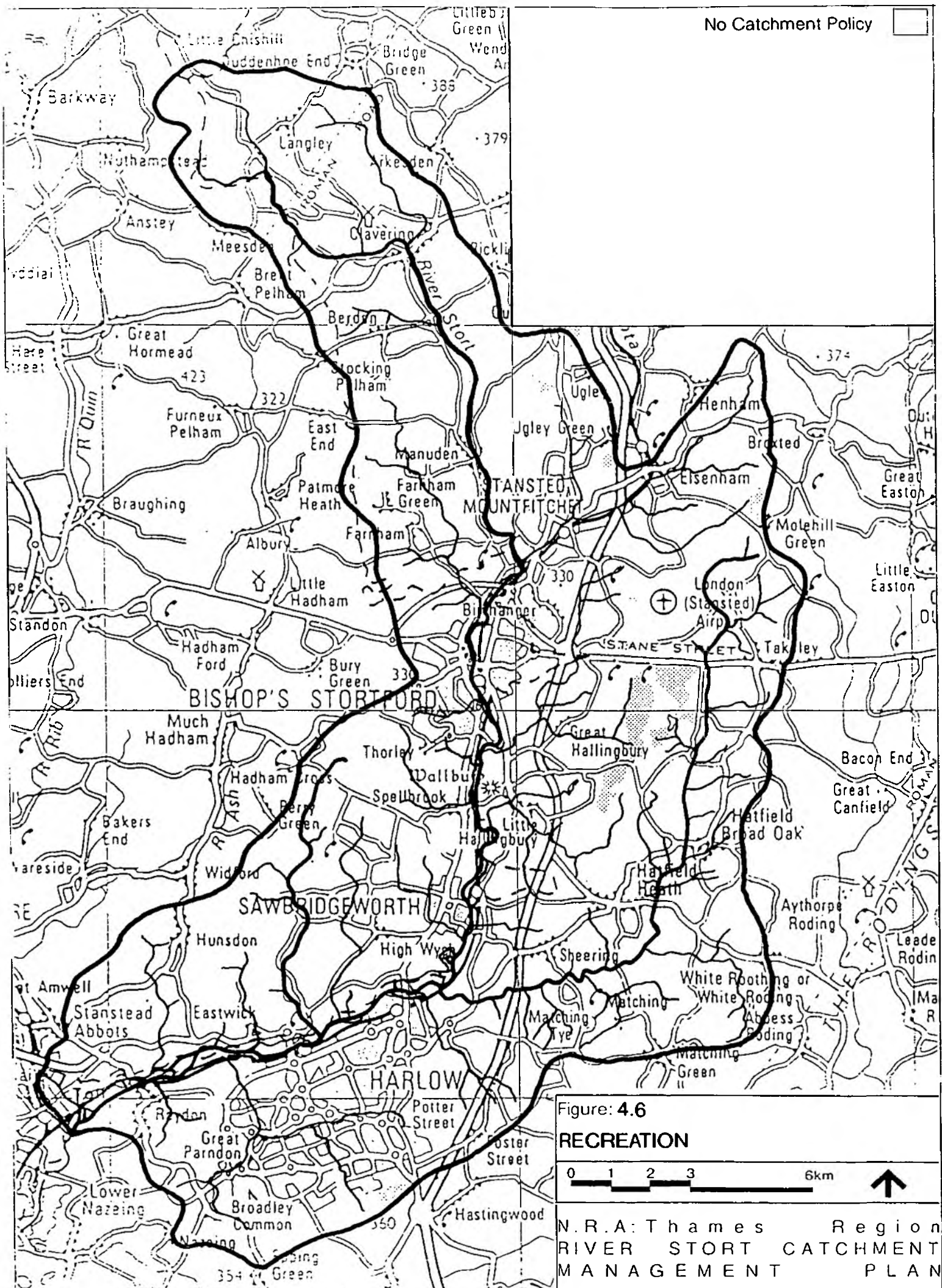
- assessing the status of fish stocks;
- formulating policies to maintain, improve, develop, restore and rehabilitate fisheries;
- review licensing, regulatory and charging policies, especially seeking additional income;
- developing response policies on actions following fish kills and disease outbreaks;
- 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 Stort Navigation is a designated water for cyprinid fisheries under EC Regulation 78/659/EEC.



4.6 RECREATION

Overview

- 4.6.1 Nationally, the agreed objective for Recreation is to promote it in terms of provision, access, Code of Practice and management. In Thames Region this is translated into a need for a recreation strategy and for 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 but at the same time to minimise sectional interest conflicts. Encouraging greater use of water and associated land facilities will be effected by adding to public amenity facilities including footpaths, camp sites, sailing, canoeing, ornithology, 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 Barrier but situated in the non tidal reaches is also a possibility.

Catchment

- 4.6.4 There are no catchment specific policies.

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 maintaining 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 of the non-tidal Thames is almost entirely by pleasure craft and is both seasonal and intensive. NRA TR will increase 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:

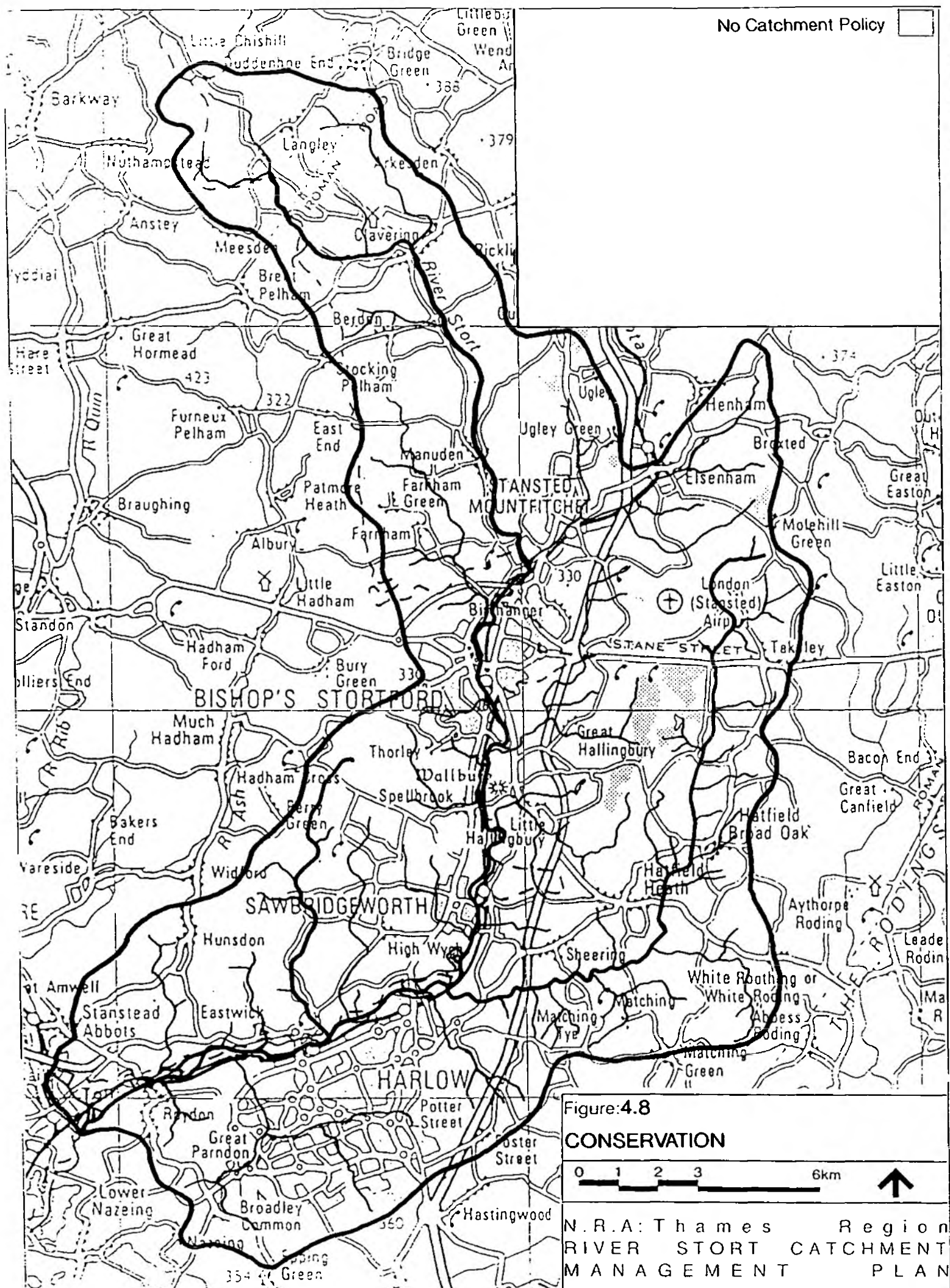
- formulating a navigation policy;
- reviewing licensing, charging and regulatory policies.

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 NRA TR has no catchment specific policies for navigation.
- 4.7.5 The maintenance of the Stort Navigation is the responsibility of British Waterways Board. The Board has a policy of promoting recreational use of the Navigation, including doubling the number of moorings from 150 to 300.



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 a conservation policy to be formulated to ensure conservation of such areas together with their associated lands, landscapes and archaeology. NRA TR attributes particular importance to conservation policy which will treat river corridors as an entity and increase 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 river corridor survey methodology for increased application to 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 on conservation and fisheries for use by its Flood Defence, Catchment Control and Statutory Planning departments.

Catchment

- 4.8.4 There are no catchment specific policies.

5.0 KEY ISSUES, STRATEGY AND ACTION PLANS

5.0 KEY ISSUES, STRATEGY AND ACTION PLANS

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 TR strategy for managing the catchment; and to prepare an action plan for the relevant NRA TR core functions.

The River Stort Catchment Context

5.1.3 The detailed baseline survey work and subsequent integration of their conclusions has made it possible to identify the most important characteristics of the catchment from the NRA TR's perspective. These form the context within which the CMP will be implemented. They are listed below:

- areas of high landscape value and sensitive ecological habitats; and areas used for low key informal recreation combine to make the catchment a very valuable environmental resource. The Stort Navigation is particularly important because there are very few similar watercourses in the region;
- this environmental value has been partly eroded as a result of insensitive works to watercourses in the past, and the threat of further damage resulting from development is very real;
- the main drainage feature of the catchment is the Stort Navigation and there is only limited scope for increasing its flood carrying capacity through more efficient operational procedures. There is, therefore, a requirement for capital works to alleviate urban flooding in the catchment, especially in the lower reaches around Harlow;
- the capability of some of the rivers to retain flows during summer months has been reduced and this has had an adverse impact on the ecological and amenity value of the watercourses, notably in the upper reaches of the catchment.

5.1.4 In short, the River Stort is an extremely important environmental resource, but it is a resource which faces many threats. Some of these are very tangible eg. the impact of major new development related to Stansted airport, whereas others tend to be less tangible eg. inappropriate maintenance regimes. The strategy has been formulated within this context.



Figure: 5.1

FLOOD DEFENCE - KEY ISSUES

0 1 2 3 6km



N.R.A: Thames Region
RIVER STORT CATCHMENT
MANAGEMENT PLAN

5.2 The Key Issues

5.2.1 The interaction between the natural resources and the current and future uses of the catchment has a number of implications for the water environment. These are listed by use in Section 3.0 of the CMP. The purpose of this section is to translate these implications into the key issues which must be addressed in the strategy.

5.2.2 The key issues are listed in Table 5.1. In each case the following information is given:

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

5.2.3 The priority attached to each is as follows:

- (1) High Priority - requiring immediate attention.
- (2) Medium Priority - requiring attention in the medium term (i.e. up to five years).
- (3) Low Priority - requiring attention in the medium to long term (i.e. five years plus)

TABLE 5.1: KEY ISSUES IN THE RIVER STORT CATCHMENT

Subject	Issue	Policy Support			Location	Priority
		Nat.	Reg.	Catch.		
Flood Defence	(i) Inadequate protection from flooding for urban areas in land use band 'A'	*	*	*	Harlow; Sawbridgeworth; Spellbrook	1/2
	(ii) Inadequate protection from flooding for urban areas in land use band 'B'	*	*	*	Roydon	2
	(iii) Inadequate protection from flooding for urban areas in land use bands 'C'-'E'	*	*	*	Langley; Clavering; Manuden;	2/3
	(iv) Inefficient functioning of flood defence structures (including safety implications, structural integrity and operational problems)	*	*		Spellbrook Flood Lagoon; riverside works Harlow; Roydon Flood Defences; Hockerill Road Bridge adjustable weir; Bishop's Stortford FAS; Manuden; and Langley.	1/2
	(v) Inappropriate past flood alleviation works resulting in environmental degradation	*	*		Clavering; Bishop's Stortford	2/3

Location of Water Resources Key Issues

Impact of Diminished Flows

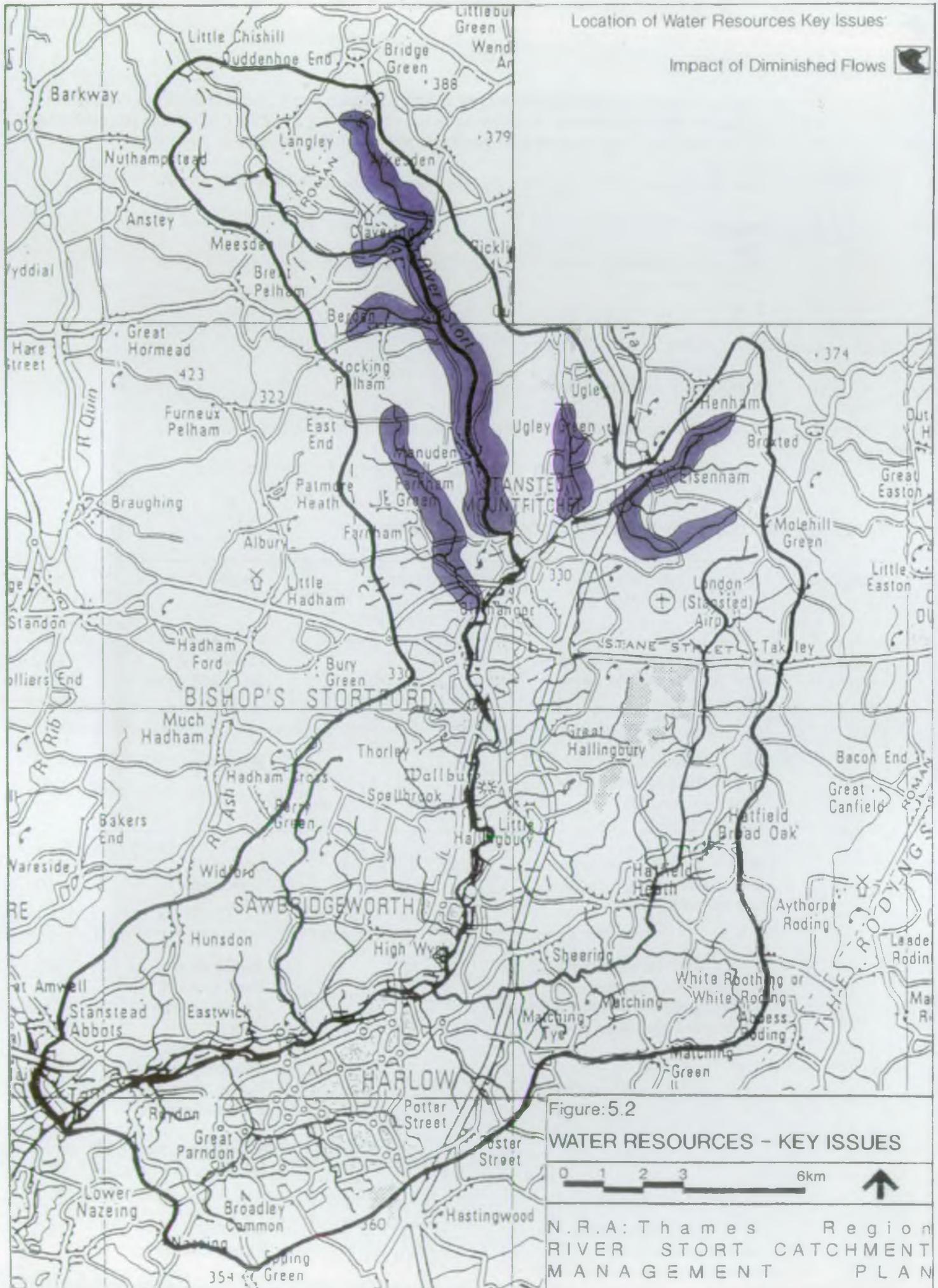


Figure: 5.2

WATER RESOURCES - KEY ISSUES

0 1 2 3 6km



N.R.A: Thames Region
RIVER STORT CATCHMENT
MANAGEMENT PLAN

Subject	Issue	Policy Support			Location	Priority
		Nat. Reg. Catch.				
	(vi) Damage to sensitive environmental areas caused by functioning of flood defence/navigation structures	*	*		Spellbrook Flood Lagoon; Hunsdon Mead	1
	(vii) Need to maintain floodplain storage capacity in the catchment	*	*		Catchment wide	1
	(viii) Surface water runoff implication of future major new development to be addressed	*	*	*	Bishop's Stortford; East-West road link.	1/2
	(ix) Damage to environmental value of main rivers through inappropriate reach specification for maintenance works (e.g. dredging)	*	*		Catchment wide	1
	(x) Effective provision of flood warning and flow measurements	*	*		Roydon/ Takeley	2/3
Water Resources	(i) Impact of diminished flows in the upper reaches on wildlife habitats and amenity, particularly during the summer months	*	*		Catchment wide, but notably in the upper reaches of the Stort	2/3
Water Quality	(i) Need to prevent damage to wildlife habitats and amenity by maintaining existing water quality and where possible improving it.	*	*	*	Catchment wide, but notably the upper reaches and down-stream from urban areas and sewage treatment works	1
Conservation and Recreation	(i) Need to conserve watercourses, floodplains and adjacent habitats of environmental value and enhance those which have been degraded	*	*		Catchment wide but notably in the Stort Valley	1

Subject	Issue	Policy Support Nat. Reg. Catch.	Location	Priority
Conservation and Recreation (contd.)	(ii) Requirement for a management plan to ensure that increased recreational activity in the Stort Valley and along the Navigation does not damage the sensitive wildlife habitats	* *	Stort Valley and Navigation	1
	(iii) Need to conserve the particular environmental value of the Stort Navigation, reflecting its historic, wildlife and amenity value	* *	Stort Navigation	1
	(iv) Need for closer consultation with BWB particularly in respect of capital works and dredging		Stort Navigation	1
	(v) Requirement for more efficient dissemination of ecological information		Essex Wildlife Trust	1/2
	(vi) Requirement for detailed design guidance for all works which have an impact on the river corridors	* *	Catchment wide, but notably in the Stort Valley south of Bishop's Stortford	1/2
	(vii) Requirement for guidelines to reduce the impact of certain types of agricultural practice on sensitive wildlife habitats	* *	Catchment wide	2
	(viii) Need to maintain and, where appropriate increase the existing use of the river valleys for low key informal recreation, notably the footpath network and provision for angling	* *	Catchment wide, but notably the Stort Valley, the Navigation and the long distance footpaths	2
	(ix) Need to work closely with local authorities and British Waterways Board (Lee and Stort Navigation) to ensure that policies for land use planning, including landscape and recreation in particular, are complementary		Catchment wide, but notably the Stort Navigation	1

Subject	Issue	Policy Support		Location	Priority
		Nat.	Reg. Catch.		
Consultation and Liaison	(i) Ineffective protection of water environment through assessment of planning applications	*		Catchment wide	1
	(ii) Ineffective protection of flood defence levels of service through assessment of planning applications	*	*	Catchment wide	1
	(iii) Local authority requirement for guidance on dealing with water environment related issues in statutory development plans	*	*	Catchment wide but prioritised according to the anticipated timetables for reviewing development plans	1
	(iv) Need for closer consultation with BWB particularly with regard to capital works and dredging			Stort Navigation	1

5.3 The River Stort Strategy for Flood Defence and the Environment

The Vision

A VISION FOR THE RIVER STORT CATCHMENT

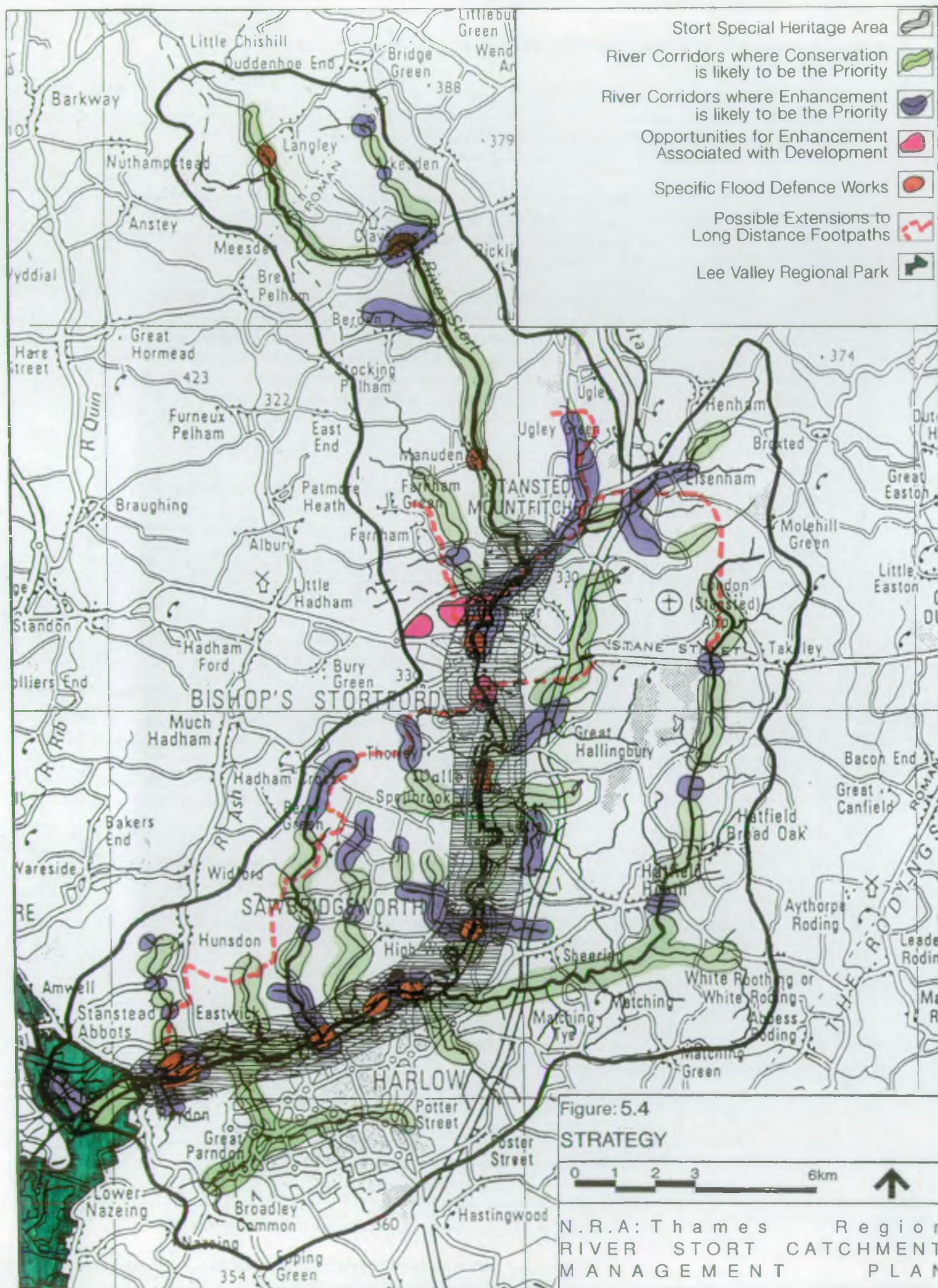
The river corridors of the Stort Catchment are a valuable natural resource, comprising sensitive ecological habitats, a landscape of considerable diversity and value, and areas which are popular for informal recreation. The Stort Navigation is of particular historical significance and its characteristics make it unique in the Thames Region.

The objective of the NRA TR is to conserve and, wherever possible, enhance the value of this resource. This will be achieved through appropriate direct management of the water environment, including the provision of appropriate standards of urban flood protection, and partnership with the riparian local authorities, British Waterways Board and other interested organisations. A central part of this objective is to secure the designation of the corridor of the Lower Stort Valley and the Stort Navigation as a 'Special Heritage Area' in the statutory development plans.

Turning the Vision into Reality

- 5.3.1 Turning the vision for the Stort Catchment into reality will depend on having a robust strategy which is based on comprehensive information and is supported by all of the key actors involved in managing future changes in the catchment. The strategy is summarised in Figure 5.4 and comprises the following basic components:

Strategy	Key Actions
(i) Designation of the Lower Stort Valley/Stort Navigation as a Special Heritage Area	<ul style="list-style-type: none">- conservation and enhancement of sensitive ecological habitats and landscapes in the river corridor- long term management of the physical structure of the river system and navigational integrity through appropriate NRA/BWB works, land drainage consents and planning control- review of maintenance and operational procedures, notably dredging- promotion of recreational use of the river valley in accordance with an agreed management plan.
(ii) Appropriate management of flood defence and the environment in the catchment as a whole	<ul style="list-style-type: none">- undertake capital works in urban locations to achieve the required 'levels of service' for flood protection- integration of environmental criteria with flood defence/navigation, maintenance and operational procedures undertaken by NRA and BWB- conservation and enhancement of sensitive ecological habitats and landscapes in the river corridor- control volumes of surface water runoff entering the river system from new development/redevelopment areas- maintain the floodplain areas free from development- ensure all development contributes to the enhancement of the river corridors.

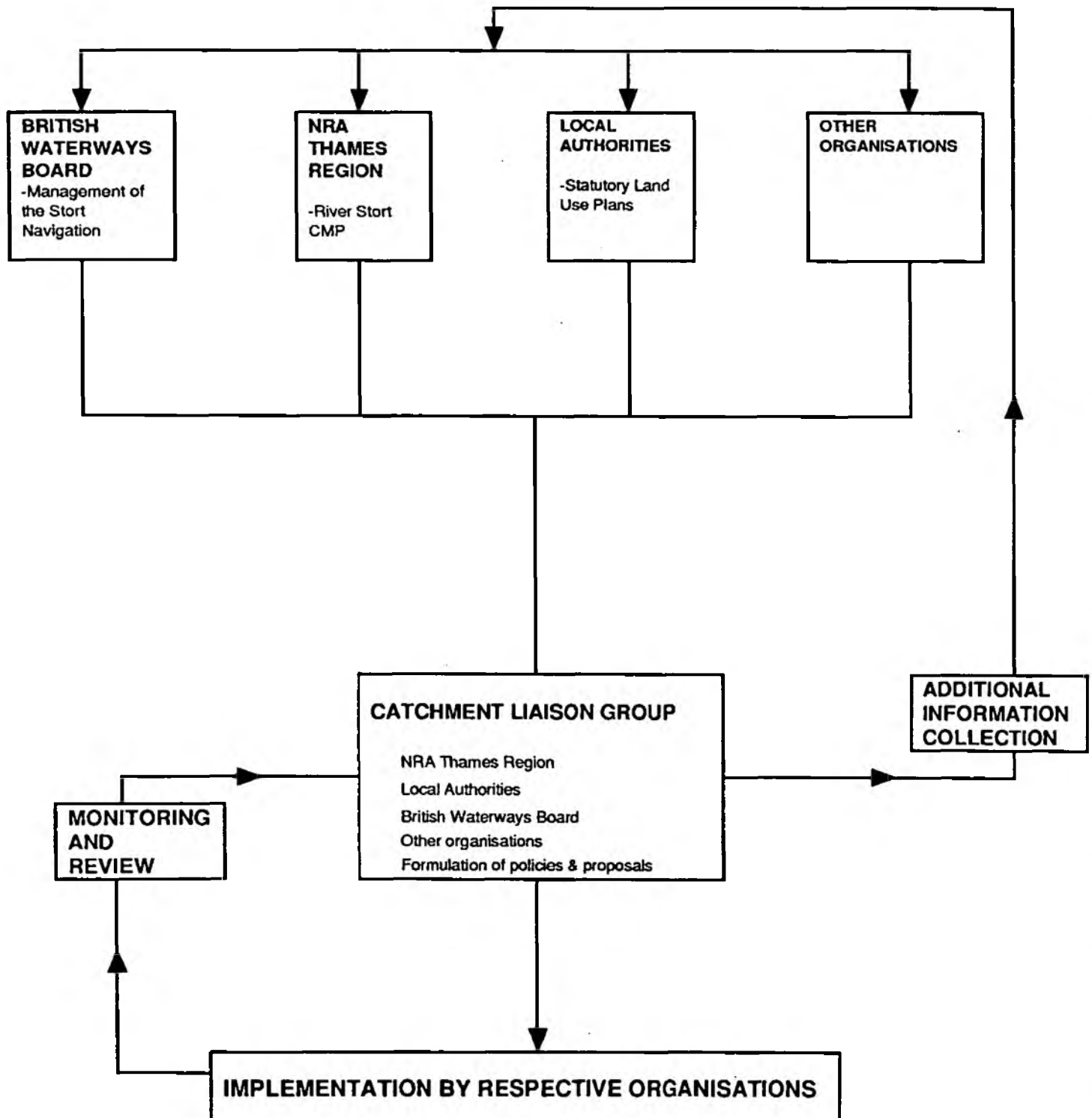


Implementing the Strategy

- 5.3.2 Clearly, the successful implementation of much of the strategy will depend on organisations other than the NRA TR. The riparian local authorities will be particularly important in this regard because of the control they exercise over land use change throughout the catchment. A key element of the strategy, therefore, is to provide these organisations with a robust rationale for promoting conservation and enhancement of the river environment.
- 5.3.3 This rationale is based on a clear understanding of the links between land use change throughout the catchment and the physical characteristics of the river corridors (ie. the river and the continuous area of land which is visually and physically linked to it). The CMP provides sufficient information to explain these linkages and, importantly, how these linkages could change given the predicted development pressures on the catchment.
- 5.3.4 The NRA TR is keen to ensure that this information is now translated into policies in the development plans covering the catchment. The final element of the strategy, therefore, is to set up a Catchment Liaison Group. This will comprise representatives from the NRA TR; the riparian local authorities; and other interested organisations (eg. British Waterways Board). The brief of the group would be to implement the catchment strategy as follows:
- disseminate the information in the CMP;
 - formulate policies for inclusion in development plans;
 - identify ongoing opportunities to implement the strategy;
 - monitor implementation, and review when necessary.
- 5.3.5 The role of the Catchment Liaison Group is summarised in Figure 5.5.

Figure: 5.5

IMPLEMENTING THE STRATEGY



5.4 The Summary Action Plans

Introduction

5.4.1 The strategy for the River Stort Catchment is the framework within which all flood defence and environmental activities should be assessed and implemented. Although driven primarily by the need to provide and maintain adequate flood protection for the population of the catchment, it also has implications for the other core functions of the NRA TR. The purpose of the Summary Action Plans is to identify the nature and scope of these actions. There is a Summary Action Plan for the following functions:

- Flood Defence;
- Recreation and Conservation ;
- Fisheries;
- Consultation and Liaison.

5.4.2 Guidance is also given on supporting actions for Pollution Control and Water Resources. These will help ensure that the flood defence and environmental Action Plans can be properly implemented.

5.4.3 Each Summary Action Plan contains:

- a list of proposed activities;
- comments on the timing and scale of each activity.

The Summary Action Plans are based on more detailed justifications undertaken as part of the CMP process.

The capital programme and revenue implications of the recommended action plans are summarised in Tables 5.2 and 5.3.

FLOOD DEFENCE SUMMARY ACTION PLAN

Ref.	Activity	Comment
S/FD/1	<p><u>Upper Stort Valley</u> (i.e. Langley (L), Clavering (C), Manuden (M))</p> <p>Appraisal study resulting in FD capital investment to:</p> <ul style="list-style-type: none"> - overcome Levels of Service deficiencies at L/C/M - overcome operational problems at L/M - remedy detrimental past flood defence work at C - stabilise river bed at C flood warning station. - review flood warning station setting at C. 	Capital scheme 2007 (94/95) covers part of this area of work. Scope to be increased.
S/FD/2	<p><u>Bishop's Stortford</u></p> <p>Appraisal study resulting in FD capital investment to:</p> <ul style="list-style-type: none"> - rehabilitate 1968 flood channel upstream of Hockerill Bridge - replace sluice at Hockerill Bridge - reduce maintenance (ie dredging) burden upstream of Hockerill Bridge - repair abutments at flood warning station weir at Grange Paddocks. 	Capital scheme 2003 (93/94) should be brought forward to 92/93. Scope to be increased.
S/FD/3	<p><u>Spellbrook Flood Lagoon</u></p> <p>Appraisal study resulting in FD capital investment to:</p> <ul style="list-style-type: none"> - optimise use of flood storage capacity - improve flooding regime for ecological purposes - liaise with BWB/English Nature over management of SSSI. 	New capital scheme should be put into 92/93.
S/FD/4	<p><u>Lower Stort Valley</u> (ie Sawbridgeworth (S), Harlow (H), Roydon (R))</p> <p>Appraisal study resulting in FD capital investment to:</p> <ul style="list-style-type: none"> - overcome levels of service deficiencies in S/H/R - overcome detrimental impact of NRA TR approved works at Hunsdon Mead and elsewhere - enhance riverine habitats in S/H. 	New capital scheme should be put into 93/94.
S/FD/5	<p><u>ONDA Hydraulic Model Development</u></p> <p>On-going NRA TR work to enhance existing computational model:</p> <ul style="list-style-type: none"> - retain temporary level gauges to provide calibration data - prepare area liable to flood maps using topographical survey results (due May 1991) - continue assessment of structure blockage risks 	Progress during 91/92 in Technical Support
S/FD/6	<p><u>Operational Guidelines/Levels of Service</u></p> <p>Prepare environmental guidance (by operational reach) for use by Lee Area Flood Defence Group. Take into account geomorphology, ecology, landscape and fisheries survey data.</p>	New capital scheme should be initiated in 91/92. Extensive support from NRA TR staff.

S/FD/7

Flood Warning/Measurement

Appraisal study resulting in FD capital investment to:

- construct ultrasonic gauging station on the River Stort at Roydon
- construct flood warning station on the Pincey Brook at Takeley

New capital schemes should be initiated in 92/93

S/FD/8

Ugley Brook

Culvert improvements

Capital scheme 2021

RECREATION AND CONSERVATION SUMMARY ACTION PLAN

Ref.	Activity	Comment
S/RC/1	<u>Landscape Detailing Guidelines</u> NRA TR/BWB jointly to prepare guidelines for the design of works associated with the Stort Navigation. For use by NRA TR, BWB and third parties.	New capital scheme in 92/93.
S/RC/2	<u>Ecology Survey</u> Extend corridor survey to the remainder of the catchment.	In progress. No extra money required.
S/RC/3	<u>River Enhancement Schemes</u> (General) Prioritise enhancement opportunities identified in CMP baseline studies for implementation as operational/capital schemes	NRA TR Conservation Officer to progress

FISHERIES SUMMARY ACTION PLAN

Ref.	Activity	Comment
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	To be prepared once Fisheries Survey is available (late 1991)	
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CONSULTATION AND LIAISON SUMMARY ACTION PLAN

Ref.	Activity	Comment
S/CL/1	<u>Catchment Liaison Group</u> Initiate above group to promote and implement CMP	Technical Planning Team in 91/92
S/CL/2	<u>Development Plans</u> Continue to ensure such plans reflect not only NRA TR model policies but also catchment specific planning objectives	Forward Planning Team in 91/92
S/CL/3	<u>Development Control</u> Prepare and promote catchment development objectives for use by NRA TR planning liaison/development control functions	Forward Planning Team in 91/92
S/CL/4	<u>Planning Liaison</u> Prepare environmental 'sieving' maps for use by planning liaison to evaluate planning applications	Forward Planning Team in 91/92
S/CL/5	<u>British Waterways Board</u> Initiate the following activities: - annual maintenance programme to be reviewed by environmental co-ordinator at Waltham Cross prior to its approval. Works affecting flow distribution to be evaluated using Stort model - dredging operations to be subject to similar assessments to NRA TR work.	Forward Planning Team Conservation Officer
S/CL/6	<u>Stort Heritage Area</u> Develop and implement concept of Stort Heritage Area through all appropriate bodies via the catchment Liaison Group (S/CL/1): English Nature British Waterways Countryside Commission Local Authorities Farming interests MAFF/DOE	Forward Planning Team in 91/92 and beyond
S/CL/7	<u>Implementation, Monitoring and Updating of CMP</u> Promote strategy and monitor up-take of action plans:	Forward Planning Team

POLLUTION CONTROL/WATER QUALITY SUPPORTING ACTIONS

Ref.	Activity	Comment
S/QR/1	<u>Diminished Flows - Upper Stort Valley</u>	
	To investigate and report on the reasons for flow reductions in the Stort between Clavering and Stansted Springs	During 91/92
S/QR/2	<u>Low Flows - Navigation</u>	
	To assess the potential impact of BWB's proposal to increase boat movements on the Stort Navigation. (In response to BWB submission)	During 91/92
S/QR/3	<u>Water Quality</u>	
	To advise on the dual role of flood storage ponds in flood defence and water quality protection in relation to proposals for development at Bishop's Stortford, the East-West link, and the A414 - M11 link.	During 91/92

TABLE 5.2: CAPITAL PROGRAMME IMPLICATIONS OF RECOMMENDED ACTION PLANS

Action Plan Ref.	Title	Total	Cost (£'000)						Comments
			91/92	92/93	93/94	94/95	95/96	96/97	
S/FD/1	Upper Stort Valley	175	0	0	0	25	150	0	Upgraded scheme 2007
S/FD/2	Bishop's Stortford	250	0	50	100	100	0	0	Upgraded scheme 2003
S/FD/3	Spellbrook Flood Lagoon	75	0	75	0	0	0	0	
S/FD/4	Lower Stort Valley	1000	0	50	150	300	300	200	
S/FD/5	ONDA Hydraulic Model	35	25	10	0	0	0	0	
S/FD/6	Operational Guidelines	20	20	0	0	0	0	0	
S/FD/7	Flood Warning/Measurement	60	0	10	0	50	0	0	
S/FD/8	Ugley Brook	60	0	0	0	0	60	0	Scheme 2021
S/RC/1	Landscape Detailing	15	0	15	0	0	0	0	
S/RC/2	Ecology Survey	0	0	0	0	0	0	0	Underway
S/RC/3	River Enhancement	0	0	0	0	0	0	0	
S/CL/1	Catchment Liaison Group	0	0	0	0	0	0	0	
S/CL/2	Development Plans	0	0	0	0	0	0	0	
S/CL/3	Development Control	0	0	0	0	0	0	0	
S/CL/4	Planning Liaison	0	0	0	0	0	0	0	
S/CL/5	British Waterways Board	0	0	0	0	0	0	0	
S/CL/6	Stort Heritage Area	20	5	15	0	0	0	0	
S/CL/7	Implementation and Monitoring	50	0	0	0	0	0	50	
Recommended profile		1760	50	225	250	475	510	250	
Existing Profile (April 1991 Programme)		275	0	0	10	115	160	0	

TABLE 5.3: REVENUE IMPLICATIONS OF RECOMMENDED ACTION PLANS

Action Plan Ref.	Title	Total	Cost (£'000)						Comments
			91/92	92/93	93/94	94/95	95/96	96/97	
S/FD/1	Upper Stort Valley	0	0	0	0	0	0	0	FD Capital scheme
S/FD/2	Bishop's Stortford	0	0	0	0	0	0	0	FD Capital scheme
S/FD/3	Spellbrook Flood Lagoon	0	0	0	0	0	0	0	FD Capital scheme
S/FD/4	Lower Stort Valley	0	0	0	0	0	0	0	FD Capital scheme
S/FD/5	ONDA Hydraulic Model	0	0	0	0	0	0	0	FD Capital scheme
S/FD/6	Operational Guidelines	24	12	8	1	1	1	1	FRC/FD/TS Revenue
S/FD/7	Flood Warning/Measurement	0	0	0	0	0	0	0	FRC/FD/TS Revenue
S/FD/8	Ugley Brook	0	0	0	0	0	0	0	FRC Revenue
S/RC/1	Landscape Detailing	4	0	4	0	0	0	0	FRC Capital scheme
S/RC/2	Ecology Survey	0	0	0	0	0	0	0	FRC Revenue
S/RC/3	River Enhancement	3	3	0	0	0	0	0	TS Revenue
S/CL/1	Catchment Liaison Group	3	2	1	0	0	0	0	TS Revenue
S/CL/2	Development Plans	0	0	0	0	0	0	0	TS Revenue
S/CL/3	Development Control	3	2	1	0	0	0	0	TS Revenue
S/CL/4	Planning Liaison	3	3	0	0	0	0	0	TS Revenue
S/CL/5	British Waterways Board	6	1	1	1	1	1	1	TS Revenue
S/CL/6	Stort Heritage Area	3	2	1	0	0	0	0	TS Revenue
S/CL/7	Implementation and Monitoring	14	4	2	2	2	2	2	TS Revenue
Recommended profile		63	29	18	4	4	4	4	

1. It is expected that the net revenue effect of preparing the reach specifications on the FD maintenance activities will be zero.
2. The revenue profile is based on a monthly staff cost of £3,000.00

APPENDIX

BACKGROUND REPORTS

Key to References Quoted in the Action Plan

Report

Engineering, Operations and Management of the River Stort.

Report on Hydraulic Modelling (ONDA) of River Stort.

Planning and Development Baseline Survey

Recreation Baseline Survey.

Landscape Assessment Baseline Survey.

Water Quality Baseline Survey

Archaeology Baseline Survey.

Ecology Baseline Survey.

Stort Catchment Morphological Survey.

Technical Planning Contract 6: River Stort CMP Technical Report

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