RIVER TEST CATCHMENT MANAGEMENT PLAN

FINAL PLAN

CONTENTS

INTRODUCTION

The function of Catchment Management Plans is to promote the overall vision of The National Rivers Authority for the catchment in question. They are central to the development of NRA policy assigning priorities for its own activities, providing a framework for decisions where the Authority has powers of control and guiding others towards the sustainable use of the resources of the catchment.

This Final Plan represents the second phase of planning for the Test Catchment, drawing together information and comment from the earlier consultation stage. Sufficient descriptive text is included to support the Key Issues and Management Proposals, but the reader is referred to the earlier Test Catchment Consultation Report for more detailed information.

Recommendations have been framed in the context of a ten year planning horizon but will be reviewed at intervals in the light of changing circumstances.

The NRA is consulted regularly on planning matters falling within its terms of reference, both in the preparation of statutory Plans and in connection with individual applications for planning consent. Recent guidance from the Department of the Environment has strengthened the links between the NRA and the Planning Authorities, but ultimate planning control remains with them.

Catchment Management Plans are complementary to the statutory Plans of Local Authorities; by stating clearly the NRA vision it is hoped they will make a positive input to the formal planning process, which is the responsibility of the District and County Councils.

IT IS IMPORTANT THAT THIS CATCHMENT PLAN IS READ IN THE CONTEXT OF COUNTY AND DISTRICT PLANNING POLICIES, ESPECIALLY THOSE CONCERNED WITH RECREATION AND COUNTRYSIDE MANAGEMENT.

RIVER TEST FINAL PLAN

SECTION A : STATE OF THE CATCHMENT

THE CATCHMENT

A.1 SUMMARY

The River Test is considered by many to be the finest chalk stream in the world. In the inaugural Laphroaig Lecture, Lord Crickhowell, Chairman of the National Rivers Authority, said that the Test should be ".....treated as a great work of art or music....."

Rising in the village of Ashe, near Overton, the river flows across the chalk downlands collecting spring-fed tributaries on its way to the sea at Southampton. The River Test is famous for its seclusion, crystal-clear water and excellent game fishing and although of great natural interest is, and always has been, a managed environment. The water meadow system evolved over centuries, being used to encourage an early crop of grass by flooding fields to raise the soil temperature and supply them with sediment. This process not only benefited farmers but helped to clarify the river by removing much of the silt washed from upland fields. However, water meadows were labour intensive and were abandoned as costs rose and cheap artificial fertilisers became available. Their legacy is the network of streams and carriers which characterises the valley today.

In the past the river was an important power source for milling flour, processing wool, weaving silk and tanning leather. Only a few mills have survived in working condition, but mill leats and backwaters remain a feature of the river throughout its length.

It is the high quality game fisheries that have made the River Test famous, game fishing has been a regular activity for at least 200 years. The Test is considered to be the true home of dry-fly trout fishing and the lower reaches support a salmon fishery. Substantial resources have been committed by the NRA and riparian owners to the management of salmon stocks, bailiffs patrol the catchment and estuary to combat poaching; fish passes have been built to allow the free passage of salmon and sea-trout and hatchery-reared salmon fry are regularly planted in the river.

One problem faced by salmon and trout is that much of their spawning gravel has become choked with silt. In the past river-keepers managed suitable gravel beds by raking them manually or by horse-harrow, but this became uneconomic and was discontinued. In recent years the NRA has evaluated mechanical raking, and riparian owners have reintroduced horse-harrows to improve the situation. Initial results have been encouraging.

The lower reaches of the river were deepened during the war years to enhance its value as an obstacle to a potential invader, and in the post-war drive to improve agriculture much of the Test below Stockbridge was dredged to improve drainage for the cultivation of crops. These actions changed the character of the river, removing gravel shallows, making the channel deeper and reducing the velocity of the flow. The damaging effects are still apparent today.

Evaporation and the demands of growing plants account for almost all the rainfall in summer months, but rain falling between September and May soaks through to the deeper layers of the chalk in the upper catchment, issuing later as springs in the valleys. The water is clear, hard and alkaline and its temperature varies little between seasons, making it ideal for fisheries, fish farming, cress growing and public water supply.

South of the Chalk outcrop the Tertiary clays and sands make only a small contribution to normal river flows, but run-off from this less permeable area at times of heavy rainfall influences peak flows in the lower catchment.

The development of South Hampshire has generated a demand for water for domestic and industrial use, much of which is supplied from the lower reaches of the River Test and from boreholes in the Chalk aquifer. All abstractions must be authorised by the NRA, most licences are subject to restrictions to protect the environment and the interests of others. Licences for surface water abstractions usually forbid their use when river flows drop below a control value.

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>
> THERE IS A PRESUMPTION AGAINST FURTHER CONSUMPTIVE ABSTRACTION FROM THE CHALK.

River water quality objectives (RQOs) are set by the NRA to protect the natural environment and the uses which the river supports. The highest RQO in the NWC Classification is Class 1A representing a clean stream, free from pollution and with a diverse flora and fauna. 135 km of the River Test (97% of the total of 139 km) have this objective.

All permitted discharges are subject to volumetric and quality limits set by the NRA to ensure that RQOs are met. The population of the Test catchment is spread across small towns and villages in the rural north of the area, or concentrated in the conurbations alongside Southampton Water. Only two substantial discharges of sewage effluent are made direct to the river (at Andover and Romsey), others are allowed to soak into the chalk, but in either case the water is recycled within the catchment for re-use downstream.

The availability of high quality water and proximity to markets make the Test valley ideal for fish farming and the cultivation of watercress. These activities demand large quantities of water, which is returned to the river close to the point of abstraction. Strict controls ensure that the effect on the environment is minimised and that river water quality is not degraded.

There is little manufacturing industry on the River Test, the only significant discharge being from a paper mill at Overton.

CATCHMENT HYDROLOGY & HYDROGEOLOGY

A.2 HYDROLOGY AND RAINFALL

The River Test rises near Overton and flows south-westwards across the Upper Chalk on the southern flank of the Hampshire Downs. The river is joined at Hurstbourne Priors by the Bourne Rivulet and further downstream by the spring-fed Rivers Dever, Anton, Wallop Brook and Somborne Stream. These chalk streams have stable flows, the maximum in any one year being only 4 to 5 times the minimum.

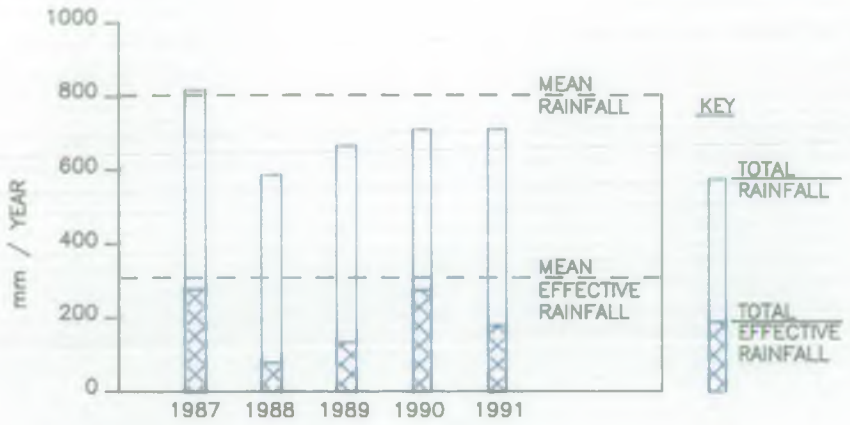
The chalk catchment is characterised by winterbournes, ephemeral streams whose existence depends on seasonal variations in groundwater levels, which can be large. Artificially reduced flows have been identified along short reaches of both the Wallop Brook and the Bourne Rivulet, caused by large abstractions which intercept spring flows. These problems are the subject of two separate NRA studies.

Downstream of Mottisfont the River Test flows off the Chalk and on to the Tertiary clay, silt and sand strata. The River Dun, a tributary which joins the River Test just south of this point, flows across the London Clay and Upper Chalk receiving both chalk baseflow and surface run-off from the clay part of the catchment. The flashy clay and sand catchments of the Blackwater and Cadnam Rivers join the Test downstream of Broadlands.

The main gauging station for the Test is Longbridge at Broadlands, downstream of Romsey, which has operated since 1957.

Recent Meteorological Conditions

The mean annual rainfall across the catchment varies from over 900mm in the Hampshire Downs to 750mm in the Test Valley. Both the actual and effective rainfall (see glossary in Appendix 2) from 1989 to 1992 were below the long-term mean. Groundwater levels which had held up between 1986 and 1988 fell in 1989 following a winter that was significantly drier than average, and river flows followed a similar pattern. High rainfall in December 1989 led to a recovery in groundwater levels in the following January, but they fell again throughout 1990 declining below the previous minimum in November and December, showing little recovery until the last quarter of 1992.



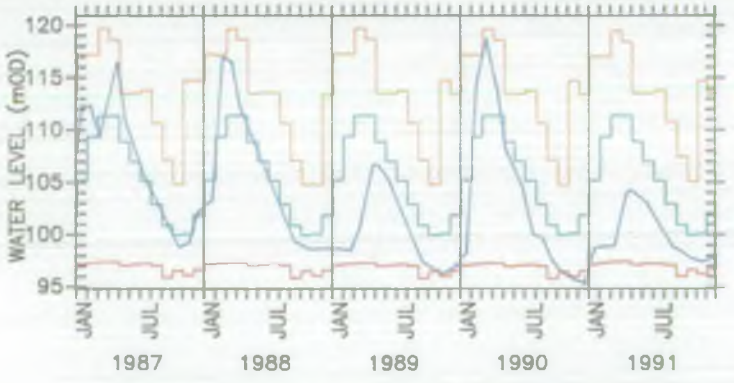
Rainfall Record from Broughton Station
Actual Evapotranspiration Data from MORECS Database

DAILY FLOW HYDROGRAPH (m^3s^{-1})

Max. and min. daily mean flows from 1957 to 1992 with an example yearly hydrograph (1991)

BROADLANDS

Site name : WOODSIDE
National grid reference : SU 3315 5645
Aquifer : CHALK AND UPPER GREENSAND
Well number : SU35/14
Measuring level : 135.15



Actual groundwater levels 1987–1991. This can be compared to the long term Max, Min and Mean values calculated from years 1963 to 1991

HYDROMETRIC DATA

PUBLIC WATER SUPPLY

A.3 WATER SUPPLY

Public Water Supply from Surface Sources

The only public water supply abstraction direct from the River Test is at Testwood, just upstream of the tidal limit. This is the preferred location for surface water abstraction from a catchment, being close to the point at which flows are lost from the fresh water system.

The river divides upstream of Testwood and the intake is located on the western Main Test, the larger of the two branches. The division of flows between this and the Little River is controlled by gates and gauging stations operated by the NRA, following the terms of a judgment under which two thirds of the flow is assigned to the main River Test.

To maintain water quality in the estuary and to protect the run of migratory fish abstraction at Testwood is prohibited when the river flow at the tidal limit falls below 91 Ml/d. In fact, actual flows exceeded this prescribed flow (PF) throughout the drought of 1989 - 1992, allowing the public water supply abstraction to continue uninterrupted. Higher PF conditions have been set upstream of Testwood to control other abstractions and to give priority to the public supply at times of low river flow.

Abstractions licensed before 1991 are subject to a PF/MRF of 409 Ml/d at Longbridge, upstream of the flow division. This has been increased for future abstraction licences to 510 Ml/d, equivalent to the Q95 flow (see glossary for definition).

Surface flows in the major branch of the river downstream of Testwood in the summers of 1989, 1990 and 1991 were so low as to discourage the migration of salmon and sea-trout from the Estuary. This problem will be taken into account in determining future applications for abstraction licenses.

The river flow recorded at Longbridge was below 510 Ml/d (Q95) for over 70 days between July and October 1989, but fell below 409 Ml/d (the earlier MRF) for only 5 days. In a more usual, wetter year the MRF conditions would limit licensed abstractions for only a few days.

Water abstracted from Testwood supplies parts of Southampton, Fawley oil refinery and, via a pipeline across the Solent, part of the Isle of Wight. Actual abstractions from Testwood have been significantly below the permitted maximum ever since the licence was granted in 1982. Future development options include an on-site reservoir to provide an emergency supply if the river should be polluted, and to store water against peak demands at times when the abstraction is limited by the PF/MRF.

Public Water Supply from Groundwater

There are thirteen abstraction licences covering fifteen sources for public water supply from chalk groundwater in the Test catchment. Twelve of these are operated by Southern Water Services, the other being run by Mid Southern Water Company. Six small private wells also supply potable water within the catchment. In 1989 actual abstraction from all groundwater sources was approximately 61% of the maximum licensed quantity.

Licensed groundwater abstractions for potable supply total 62 Ml/d, less than one third of the overall total within the catchment, the remaining two thirds coming from the surface source at Testwood.

Groundwater sources are distributed throughout the catchment, but are generally found in valleys and close to streams, areas which provide the highest yielding sources. However, in these circumstances there is a risk that groundwater abstraction may result in a comparable reduction in stream flows as springs discharging into the stream are intercepted or local draw-down of the water table causes water to leak away through the stream bed.

The only public water supply source within the Test catchment where this problem is potentially significant is Broughton pumping station in the Wallop Brook sub-catchment. This source is licensed to abstract 4.4 Ml/d, a relatively low volume, but recorded stream flows a kilometre downstream are reduced in phase with the abstraction (particularly during low flow periods) and the stream below the pumping station dried for a five month period in the drought of 1976.

The lower reaches of the Wallop Brook are reported to have dried naturally in the droughts of 1921 and 1933-34, before the pumping station was built. Recent investigations by the NRA suggest that geological problems may be largely responsible for leakage from the river to the groundwater at times of low flow, but the abstraction at Broughton is considered to contribute to the problem.

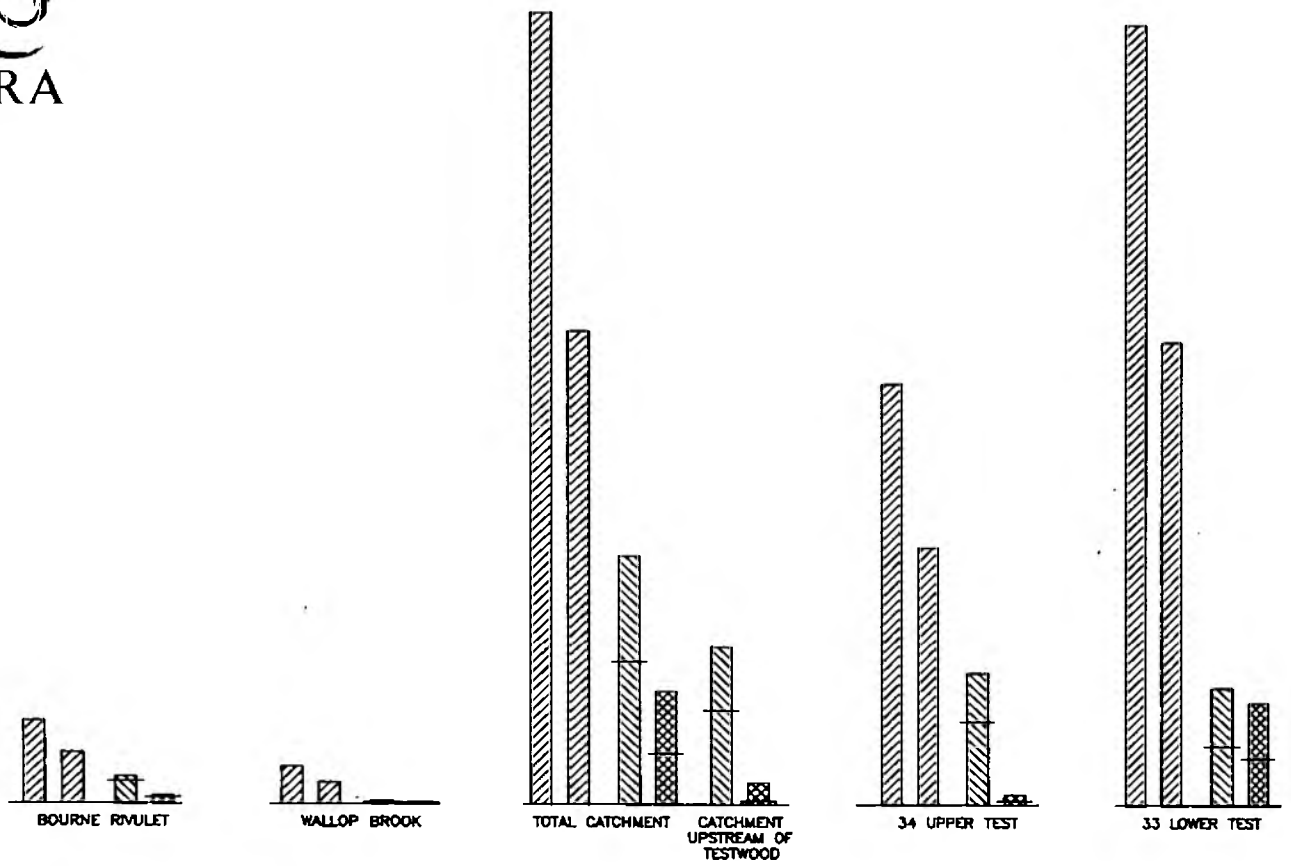
In the Andover area the chalk aquifer has been contaminated by low levels of chlorinated hydrocarbon solvents spilt from industrial premises. Southern Water Services Ltd can treat the affected water, but they would like to abandon the affected sources and transfer their licence to replacement boreholes in a more secure area.

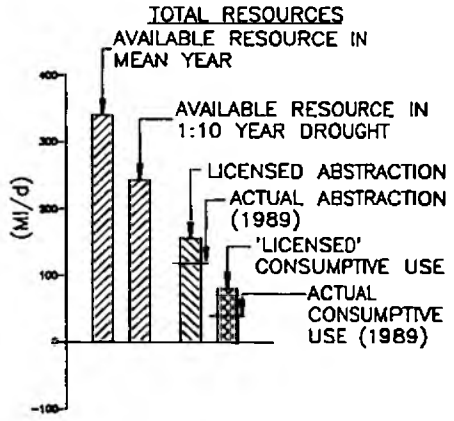
Water for Industry and Agriculture

Industry and agriculture account for over three hundred and fifty abstraction licences in the Test catchment. Two hundred and eighty of these are for small groundwater sources serving agricultural and domestic uses (farms have traditionally operated their own boreholes), but these represent only 3% of the licensed abstraction in this category. A further twenty nine surface water abstractions are licensed principally for spray irrigation, accounting for just 1% of the total.

Other than water for fish farms and cress growing (see Section A.10) the only large industrial abstraction within the catchment is that for Portals (Holdings) Ltd at Overton, accounting for 81% (16.2 Ml/d) of the total licensed industrial use of 20 Ml/d. A further 3 Ml/d (15% of the total) taken from the river is licensed for gravel washing at sites throughout the valley. All these uses are largely non-consumptive, returning water to the catchment close to the point of abstraction.

NRA





Resource Area	"Licensed" Consumptive Use (% of Resource)	
	Mean Year	1:10 Year Drought
34 UPPER TEST	3	4
33 LOWER TEST	13	24
TOTAL CATCHMENT	14	26
UPSTREAM OF TESTWOOD	3	5
Sub-catchment Area		
BOURNE RIVULET	11	18
WALLOP BROOK	8	15

USE OF THE WATER RESOURCE

A.4 DEVELOPMENT OF THE WATER RESOURCE

In a year of average rainfall over half the water resource of the catchment (equivalent to 'effective rainfall') is allocated to licensed abstractions; by contrast in a 1:10 year drought the whole of the resource is committed to abstractions, but in both cases not all of the licensed volume is normally taken by abstractors.

Half the water abstracted is returned to the catchment as effluent but 15% of the total resource in an average year is assigned to consumptive uses, the proportion rising to 25% in a 1:10 drought year. (See Table 1)

Table 1. Use of the Water Resource

Resource Statistics (indicative data)		Average Year	1:10 Year Drought
Rainfall	(mm/yr)	820	640
Effective Rainfall (ER)	(mm/yr)	350	200
Licensed Abstraction	1) Ml/d	370	370
	2) mm/yr	110	110
	3) % of ER	31	55
Consumptive Abstraction	1) Ml/d	170	170
	2) mm/yr	50	50
	3) % ER	14	25

The river abstraction at Testwood, near the tidal limit, represents some 35% of the licensed quantity taken from the catchment and most of this water is exported for use elsewhere. Upstream of Testwood 96% of abstracted water is returned to the catchment.

For a significant part of a year with average river flows there is more water available at Testwood than is allocated to the abstraction, even allowing for the need for a residual river flow to maintain water quality in the estuary and safeguard the upstream passage of salmon. Southern Water Services Ltd are developing the Testwood Lakes scheme to store water when the river flow is high, improving their operational flexibility and enabling them to supply peak demands at times of low flow.

At times of drought and in normal years when river flows fall to their annual minimum (typically in late Summer or early Autumn) there is very little surplus water at Testwood to support increased abstraction for public supply. Further development of this resource will depend on augmenting river flows at critical periods and it is for this reason that the NRA is investigating river regulation schemes using groundwater pumped from boreholes in the upper part of the catchment.

WITH REGARD TO THE FUTURE, NRA POLICY IS THAT INCREASED DEMAND FOR WATER FROM THE CATCHMENT SHOULD BE MET BY TRANSFER NORTHWARDS FROM TESTWOOD, WITH EFFLUENT BEING RETURNED TO THE UPPER CATCHMENT AS NEAR AS POSSIBLE TO THE POINT WHERE WATER IS USED.

CONSERVATION

A.5 LANDSCAPE AND CONSERVATION

With few urban reaches and a high diversity of landscape the environmental quality of the Test catchment is high. This is particularly true of the river corridor, much of which has uncultivated bankside vegetation and natural river features providing the shade and cover required by fisheries.

Agriculture in the catchment is mixed arable/pasture and is often managed to leave a strip of permanent grassland separating the river from arable land on adjacent higher ground. This is especially so to the south and east of Andover, where long reaches are bordered by permanent pasture with associated pockets of fen and carr. The river channels and carriers in these areas are a relic of the earlier water meadow system but are now managed as fisheries. Arable farming predominates around Romsey, where the chalk gives way to sands and gravels.

The numerous villages along the river add another land-use type of "garden and parkland"; however, these rarely constrict the green riparian corridor and for most of the main river and its tributaries there is continuity of open land from source to sea.

With the River Test and five of its six principal tributaries supplied from chalk springs temperature and flow rates tend to be stable, and the water is rich in base nutrients promoting strong growths of water weeds. This is in contrast to the River Blackwater, a tributary in the south west of the catchment which drains the Eocene sands and clays of the New Forest. Here the landscape comprises damp acid pastures and occasional heath, woodland and scrub; flows are flashy and the water is acidic and peaty.

Aquatic weeds such as water crowfoot (*Ranunculus spp.*) provide a feature of the river channel which needs to be managed. Weed cutting is necessary in the summer months to maintain the drainage of agricultural land and improve game fishing, but an additional Autumn weed cut can be locally important for the good of the river, checking early growth in the following Spring and protecting the weed against erosion by high winter flows. Once removed it is difficult to re-establish.

Recently, concern has been voiced over the increased growth of algal blanket weeds throughout the catchment, often at the expense of more desirable water plants. The algae generally thrive in warm, slow moving water and strong sunlight, and can rapidly colonise areas where rooted weeds have been washed away.

In the period following 1945 some river reaches were deepened to improve agricultural drainage and flood-flow capacity. Such drastic action is now recognised as having been in conflict with other objectives of river management and will not be repeated, but problems for fisheries, amenity and conservation interests still arise as a consequence of the earlier work.

In parts of the river system banks have been eroded and channels widened, so that in places there is insufficient flow in drought periods to maintain the character of the river in all its channels. Restoration by infilling over-deepened reaches or by narrowing selected channels may be desirable in some situations, but must comply with flood defence and conservation requirements.

Special Conservation Areas

Most Sites of Special Scientific Interest (SSSIs) within the river corridor occur in the reaches to the south and east of Andover where the river flows through old permanent grasslands, many of them former water meadows. These wetland habitats together with unimproved grassland, fen, carr and wet woodland constitute the main interest of the SSSIs, which have high botanical interest, diverse faunas and high-quality aquatic habitats. In many cases the structure of the damp alluvial soil is important for specialised bird species such as reed and sedge warblers, snipe and redshank.

In the lower catchment adjacent to Southampton Water the Lower Test Valley SSSI preserves a broad wedge of old pasture, brackish grassland, reed beds and salt marsh as a natural buffer separating the urban areas of Southampton and Totton. To the west of this area a section of the very extensive New Forest SSSI impinges on the south west of the catchment. Noted for heath, bog and woodlands, some tributaries of the River Blackwater that drain the New Forest are also of geological interest.

Most of the Test Valley and many of its tributaries has been designated by the Ministry of Agriculture (MAFF) as an Environmentally Sensitive Area (ESA).

A.6 RECREATION AND AMENITY

Public access to the banks of the River Test is limited compared with other rivers in the Region, reflecting the history of ownership and uses of the catchment. Not having been used for navigation, the Test lacks a towpath; however, over forty footpaths either cross or run beside rivers in the catchment, following the valleys and allowing walkers to enjoy the scenery of the river corridor. The long-distance Test Way runs through most of the Test Valley, following the line of a disused railway, and the Clarendon Way crosses the River Test just downstream of Houghton, passing eastwards into the Itchen catchment.

There are areas of riverside parkland and common at Romsey, Laverstoke, Andover, Chilbolton and Stockbridge, and public access to the river is available at Mottisfont Abbey (National Trust) near Kimbridge. Riverside public houses also provide access to the water in many parts of the catchment.

Local Authorities within the catchment have a policy to provide footpaths and public access where housing and industrial development is allowed beside watercourses. The Test Valley Local Plan proposes the creation of a "Valley of the River Test Heritage Area" which will extend from Longparish to Romsey, and seeks to provide a number of foci for countryside recreation.


LEGEND
COAST LINE
RIVER TEST TOPOGRAPHIC CATCHMENT
RIVER TEST
TOWNS
NRA
N
OVERTON
CHARLTON LAKE
WHITCHURCH
ANDOVER
GOODWORTH CLATFORD
STOCKBRIDGE
BROUGHTON
KINGS SOMBORNE
ROMSEY
EMBLEY LAKE
BROADLANDS LAKE
TOTTON
SOUTHAMPTON
SALMONID FISHERY DESIGNATED UNDER EC FISHERIES DIRECTIVE (78/659/EEC)
SALMON FISHERY
STOCKED TROUT FISHERIES
NATURAL TROUT SPAWNING AREA
FISH PASS
FISH COUNTER
GAME FISHING LAKE
COARSE FISHING LAKE
0 1 2 3 4 5 10 km

FISHERIES

A.7 FISHERIES AND ANGLING

With fish being near the top of the food chain the status of their populations is a good indication of the overall quality of the river environment, which can be inferred from the distribution of fish species, their relative abundance, growth rates and state of health.

Game Fisheries

The River Test is world-renowned as one of the finest game fisheries in Britain and as the home of dry-fly trout fishing. Although the river has been fished for more than 200 years this reputation dates from the coming of the railways in the mid-nineteenth century, when the fisheries exploited a small natural population of wild brown trout. However, increasing popularity, an extended fishing season and economic considerations soon led to the need to sustain fisheries with stocked fish - firstly with native brown trout (some of which were introduced from Scotland) and later with rainbow trout from the USA. Many of the techniques of fish farming were developed in Hampshire and the River Test continues to support a number of hatcheries used to restock the river.

Brown trout spawn throughout the catchment but form only a small proportion of the resident salmonid fish population. Their spawning success in the middle and lower reaches of the River Test is, and always has been quite poor, but wild brown trout occur in the tributaries and headwaters.

The salmon fishery is concentrated in the reaches downstream of Romsey, although salmon spawn throughout the river from Nursling to Longparish. Rod catches have declined significantly over the last thirty years; the rolling five-year average for the period 1958 - 1966 was over 1200 fish, this fell below 800 between 1978 and 1983 and again to below 700 between 1986 and 1988, an overall decrease of 42% in thirty years. By 1991 the fishery had declined to a level which caused concern about its possible extinction. The reasons are unclear, but are thought to include the development of high-seas commercial salmon fisheries, changing river management practices within the catchment, prolonged drought flows and increased siltation arising from changed land use. The dynamics of the salmon fishery and the sediment budget of the river are the subjects of special NRA investigations.

Demand for salmon fishing is limited and catches are low, although with a declining stock they now represent some 30% of the adult run. In recent years there has been a move to improve matters by augmenting the juvenile population with farmed salmon fry derived from River Test stock, and by improving the spawning beds through a programme of silt removal.

By contrast the demand for trout fishing remains high, encouraging the development of fisheries on some carrier channels where flows are not ideally suited to the purpose. A number of still waters in the catchment are managed as "put and take" trout fisheries relying on hatchery-produced fish, mostly rainbow trout.

Game fisheries require intensive management of the river including the control of predators and competing fish species, weed cutting, channel maintenance and flow regulation. It is important that such work is undertaken with care, having regard to the objectives of conservation and flood defence.

Low flows in recent years have caused problems for river fisheries - game fish prefer a fast current and deeper water - and increased silting has interfered with weed growth and the spawning success of wild fish. Reaches of the Bourne Rivulet and Wallop Brook have dried, and low flows downstream of Testwood have delayed the upstream migration of salmon and sea-trout.

Many reaches of the River Test and its tributaries have been designated "Salmonid Fisheries" under the EC Freshwater Fisheries Directive (78/659/EEC). The Test itself is designated from its source to Testwood; the Anton, Bourne Rivulet and Dever from source to confluence, and the Wallop Brook from Broughton to the Test confluence.

Coarse Fisheries

Whilst the rivers in the catchment are capable of supporting grayling and a diverse variety of coarse (non-salmonid) fish, many are considered to be predators or competitors of trout and salmon and are controlled by game fishery managers. Surviving coarse fish benefit from reduced competition, growing rapidly to specimen size and are prized by anglers permitted to fish for them in the winter months.

The lower reaches of the River Blackwater support a good mixed fishery and still-waters such as Broadlands Lake, Charlton Lakes and Embley Lake are managed as successful coarse fisheries.

No coarse fisheries in the Test catchment have been designated under the EC Freshwater Fisheries Directive.

NWC RIVER CLASSIFICATION

A.8 WATER QUALITY

River Quality Objectives

Rivers are the natural recipients of drainage in a catchment and the discharge of effluents to them is a legitimate use, conserving and recycling the water resource. Rivers have a natural ability to stabilise and degrade organic matter, but become stressed or polluted if this is exceeded. It is the duty of the NRA to set Water Quality Objectives for rivers and to control the nature, volume and composition of effluents to ensure that these objectives are met.

Statutory Water Quality Objectives will be introduced progressively from 1993, but until this system is in place river quality will be judged according to the National Water Council (NWC) which recognises four broad Classes (with a subdivision of Class I) based mainly on chemical criteria. These are summarised in Table 2.

Table 2. NWC River Water Quality Class Criteria

NWC Class		Remarks
Class IA	Good	Exceptional water quality typical of clean upland rivers or chalk streams.
Class IB	Good	Good water quality typical of clean lowland stream.
Class II	Fair	Water quality typical of a lowland stream containing well treated effluent.
Class III	Poor	Water quality in need of improvement.
Class IV	Polluted	

The River Test and its chalk-stream tributaries are of the highest quality with an objective of NWC Class IA. The River Blackwater and streams draining the New Forest have been set a lower objective (NWC Class IB or Class 2) which reflects the natural conditions of the area.

Table 3. Water Quality Objectives and Performance

NWC Class	Objective (km)	Achieved 1991 (km)
IA	143.5	100.8
IB	22.2	136.2
2	97.0	20.6
3	-	5.1
4	-	-

Effluent Disposal

More than fifty sewage works discharge to the Test catchment, ranging from 14,000 cu.m/day (Andover) to less than 3 cu.m/day for the smaller private plants. In addition a number of treated effluents are discharged to soakaways, the largest being Overton STW (1600 cu.m/day).

The Test catchment receives only one industrial process effluent, from Portals Paper factory at Overton (15,000 cu.m/day). There are also three cooling water discharges which have minimal impact on the receiving waters, discharges from ten fish farms and seven cress farms (see Sections A.3 and A.10). The organic pollution load from Portals trade effluent plant is comparable to that from Andover sewage treatment works, but that from the largest fish farm in the catchment is 30% greater than either of these.

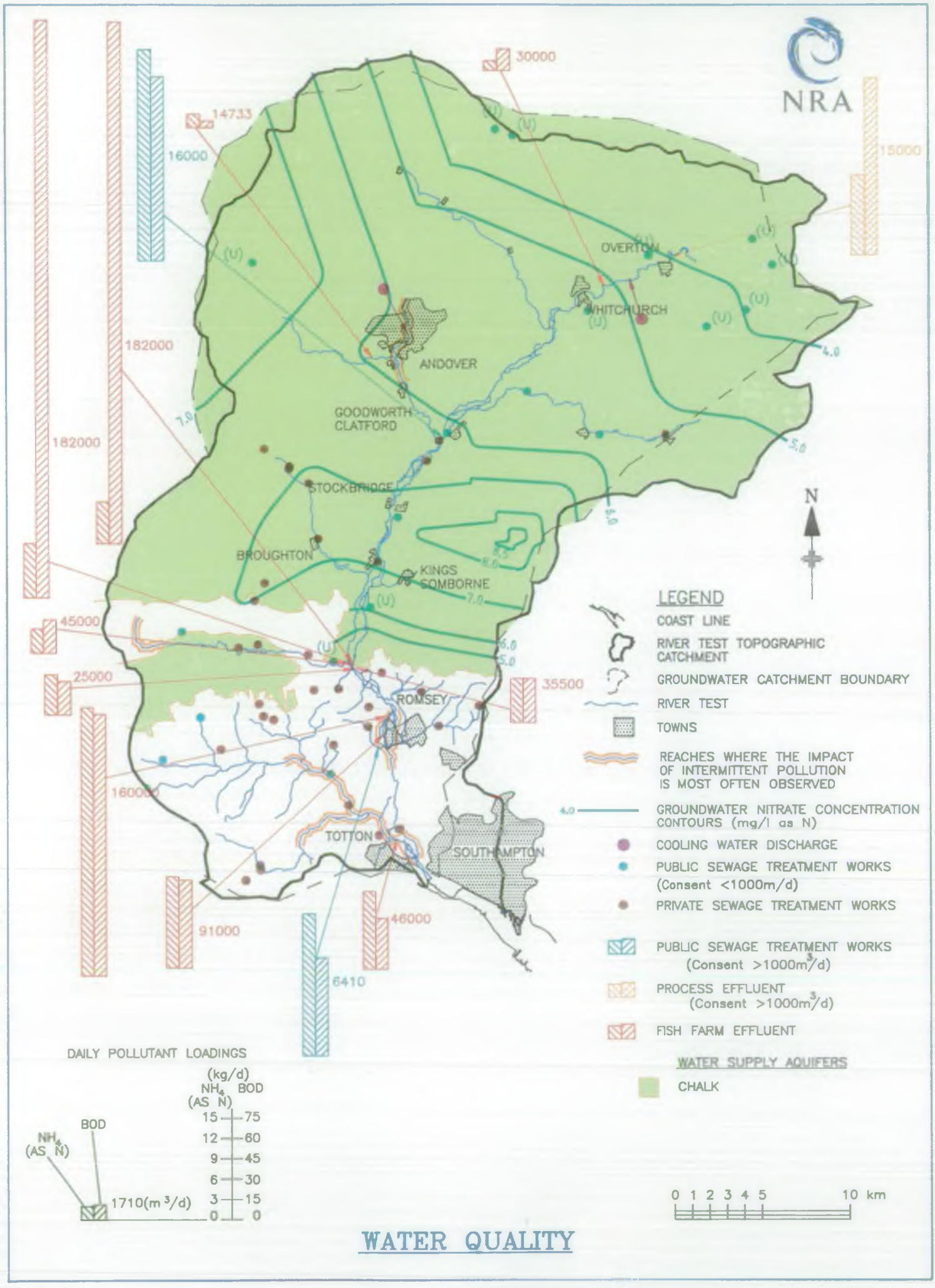
Intermittent and Diffuse Pollution

Intermittent pollution incidents in the Test catchment are most common on the River Blackwater, in the upper reaches of the River Dun and in the urban areas of Romsey and Andover. The Blackwater and Dun incidents tend to involve agricultural wastes, urban incidents usually involve oil which may discharge via consented surface-water drains.

Consented storm sewage overflows occur on combined surface-water/sewerage systems and at treatment works, but normally operate only at times of heavy rainfall.

Groundwater nitrate concentrations are monitored by the NRA. EC Directive 71/354/EEC lays down a Guideline level of 5.6mg/l and Maximum Admissible Concentration (MAC) of 11.3mg/l (measured as N) for water to be used for public supply. Nitrate concentrations in the groundwater are well within the MAC, but the guideline level is exceeded in parts of the catchment.

Average pesticide concentrations are determined from representative surface and groundwater sites. Triazines and the 'Drins' (Aldrin, Dieldrin etc) represent the two major groups of compounds which give rise to concern, concentrations are generally below the MAC of 500 ng/l (parts per million million) for each group of compounds.



WATER QUALITY

In recent years there has been an increase in phosphate concentrations in the River Test, which may be due to reduced diluting flows rather than an absolute increase in the phosphate load, much of which comes from domestic sewage effluents. Indications are that even historical phosphate concentrations were above the limiting value for algal growth, but the NRA proposes to investigate the issue further.

There is concern that accidental spills of industrial chemicals in the Andover area have found their way into the aquifer and are contaminating the groundwater (see Section A.3).

A.9 FLOOD DEFENCE

In general, flood events result from climatic conditions which vary in frequency and intensity and are ranked according to their statistical return period, eg. 1 in 50 years (this does not imply that similar events will be separated by fifty years, but that in such a period one event of that severity can be expected). The effectiveness of flood defences is expressed in similar terms. Different types of land use (housing, arable land, etc) require different levels of protection which are usually determined on the basis of benefit/cost.

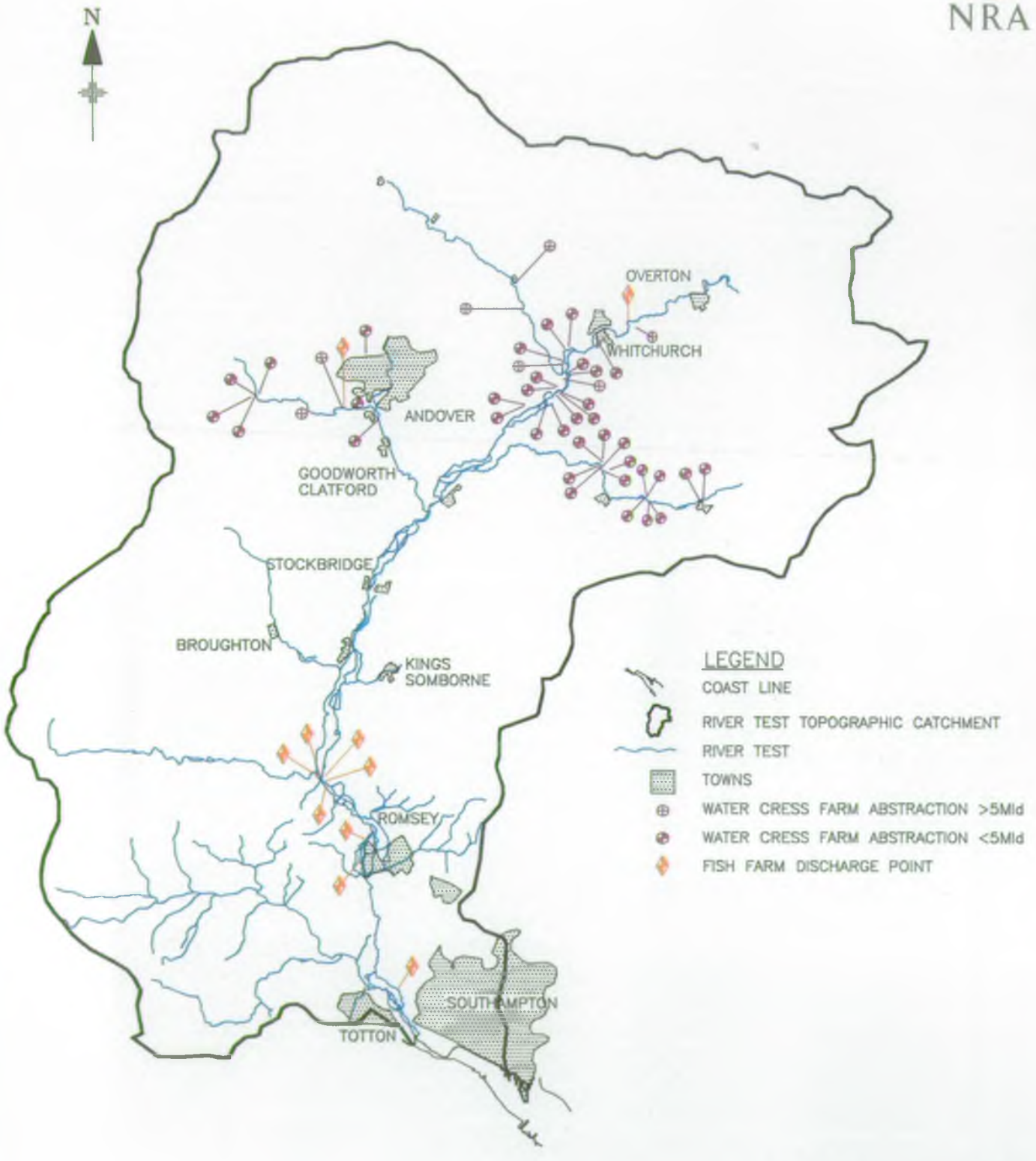
The NRA has a general duty to oversee and control significant flood risks, but has special responsibility for the management of strategic watercourses which have been designated "Statutory Main River"; it is here that the Authority promotes flood defence works and conducts routine maintenance operations. In parallel with its direct role the Authority also has powers through a formal byelaw consenting procedure to control development which has implications for river management.

The situation on the River Test

In the case of the River Test the regime of stable flows and water levels makes flood defence a secondary consideration in river management. Flood events are rare, the worst having occurred in 1947, 1961, 1974 and 1990, affecting only a limited number of properties. However, low-lying water meadows are subject to regular inundation which is of benefit to their conservation value.

The river flows through Romsey in a number of channels and culverts which would cause flooding if blocked. Cut weed drifting downstream can cause such problems, which are countered by the NRA operating a weed boom at Timsbury Bridge during the weed-cutting periods agreed with the Test and Itchen Fishing Association. The Fish Lake Hatches in Romsey are operated by the NRA during flood emergency periods, but elsewhere river flows are controlled by private sluices.

NRA



FISH FARMING AND WATERCRESS GROWING

A.10 WATERCRESS GROWING AND FISH FARMING

Watercress

Watercress and fish production are economically important in the catchment. For reasons of public health commercial cress beds are fed only from springs or groundwater, whereas fish farms usually rely on river water.

Watercress farming is by far the largest licensed agricultural use of groundwater in the Test catchment. Twenty three abstractions account for almost 80% of the total in this category, but their demand varies throughout the year being highest in the Autumn when groundwater is used to protect the growing cress against frost.

This is essentially a non-consumptive use, the outflow being fed into an adjacent stream. However, the large scale abstraction involved may reduce groundwater levels or even cause streams to dry where a lowered water table causes surface flows to leak through the stream bed. In the case of the Bourne Rivulet cress farming abstractions of 34.6 Ml/d have caused parts of the stream to dry and are believed to have been responsible for the summer spring-line moving one kilometre or more down the valley. Following NRA investigations it is proposed to improve the Bourne flow by pumping a proportion of the outflow from the cress farms to a point upstream of the abstraction. Resolution of the problem will depend on active cooperation between the NRA and riparian interests in the area.

Discharges from cress farms are now subject to NRA consent, having been free from control before passage of the Water Act 1989. Local minor impacts on the river's invertebrate fauna have been reported below cress farm outfalls, this is the subject of research commissioned by the NRA and DoE.

Fish Farms

Rainbow trout are the most popular farmed species with some brown trout being grown to restock sport fisheries. Both species need a constant high flow of cool, clean, well oxygenated water which is usually taken direct from the river and may represent a significant proportion of the natural flow. Abstraction for 'agricultural purposes' was not subject to NRA control until 1989, but since then all fish farm abstractions have needed formal consent, which is subject to conditions to protect the environment.

The effluent from fish farms has been controlled since 1951. After passing through the growing ponds the water is usually treated in settlement lagoons or concrete tanks; the concentration of contaminants in the treated effluent is low, but in view of the high volumes involved it represents a significant organic load on the river.

A potential problem which fish farms share with other large-volume abstractors is that wild fish (especially juvenile salmon) are liable to be drawn into the intake and trapped. This can be minimised by careful intake design.

SOLID WASTE DISPOSAL

A.11 SOLID WASTE DISPOSAL

There are some fifty known landfill sites within the Test catchment, many of which have now been closed (active sites are shown on the map). The types of waste range from mainly inert materials to potentially more difficult industrial waste and domestic refuse.

Waste Disposal Authorities responsible for the catchment face three main problems:-

1) It is becoming increasingly difficult to find environmentally acceptable new landfill sites, particularly in South Hampshire.

2) Existing household waste incinerators are ageing and there are concerns over atmospheric emissions.

3) The quantity of waste being produced is likely to increase.

In response to these pressures the Hampshire County Council has policies promoting increased recycling of wastes and controlling the location and operation of new sites. Infilling of existing mineral extraction sites or the use of derelict land are favoured, rather than waste disposal activities which raise land levels.

The NRA Groundwater Protection Policy (GPP) is relevant to this use. GPP Zones are defined in terms of the travel time for water contributing to the abstracted resource and are applied to sources used for potable supply or for food or drink production.

Zone 1. Inner Source Protection

The zone around a water source encompassing the 50 day saturated flow travel time area (minimum radius 50m), other than where the aquifer is confined below a layer of very low permeability.

Operating procedures designed to minimise pollution are required within Zone 1.

Zone 2. Outer Source protection

The zone surrounding Zone 1, encompassing the 400 day saturated flow travel time area or the recharge catchment area calculated using 25% of the long term abstraction rate, whichever is the larger.

This zone is not generally defined for confined aquifers.

Zone 3. Source Catchment Zone

The area from which groundwater will eventually reach the source. This may be very large and in the case of confined aquifers may be some distance from the actual abstraction.

The NRA is a statutory consultee for waste disposal site licensing and operates a comprehensive water monitoring programme throughout the catchment, although this is not specifically related to disposal sites. Increased groundwater monitoring may be required in the future. There are few reports of problems associated with solid waste disposal.

A.12 MINERAL EXTRACTION

The Test Catchment contains a large number of active mineral sites, over one third of which lie within the river corridor. Twenty sites provide coarse aggregates, many of them exploiting river gravels from the lower Test and Blackwater valleys. Other large river terrace deposits are worked away from the river corridor in the Rownhams and Nursling area north west of Southampton. Building sand is derived from eight sites around Romsey and on the smaller tributaries of the Blackwater, particularly in the Sherfield English area.

Further upstream where the solid geology changes, chalk is quarried from five sites in the valleys of the Bourne Rivulet, River Dever and River Test south of Kings Somborne.

Other mineral resources in the catchment include hoggin and building sand at two sites on higher ground in the Kimbridge area and a brickearth pit in the floodplain at Michelmersh on the opposite side of the Test valley. Higher upstream there are two active oilfields at Wherwell and South Wonston.

Hampshire County Council anticipates expansion of mineral working in a number of preferred areas. Sites at Shootash, East Wellow and Sherfield English could have some impact on the Blackwater system and on one of the smaller Test tributaries west of Romsey. The Nursling gravel pits may expand westwards to the Southampton/Romsey railway line, but are unlikely to affect other catchment uses.

INTERACTIONS WITH PLANNING AUTHORITIES

A.13 FUTURE DEVELOPMENT

The Test Catchment is situated mainly in the County of Hampshire, with its extreme western boundary in the County of Wiltshire. The catchment includes parts of the Districts of Kennet & Salisbury in Wiltshire and of Basingstoke and Deane, Test Valley, New Forest, Winchester and the city of Southampton in Hampshire.

The Hampshire Draft County Structure Plan of 1990 recognised extensive rapid growth in the County in the previous decade, some 90,000 new homes having been built at an average rate of 9,000 per year. The Draft Structure Plan seeks to reduce this rate of growth, although a modest increase in population is expected. It is anticipated that 66,000 homes will be built in Hampshire between 1990 and 2001, dropping to an annual rate of 3,500 new homes per year at the end of this period.

In the Districts forming the catchment area the share of this total will be:-

Basingstoke and Deane	8,350
New Forest	8,250
Southampton	7,100
Test Valley	5,350

Little of this allocation will be in the Test catchment, but up to 5,000 new houses are expected at Andover.

Much growth will be by infill and urban renovation, with small developments in the fringes of villages and rural towns. One proposal of note is the possibility of a 5,000 home development at Micheldever, which does not feature in the Structure Plans and, indeed, runs contrary to established County policy.

Planning Authorities will normally permit only developments which comply with their objectives and policies, particularly as they relate to environmental protection. The allocation of water resources is of considerable concern to the NRA, particularly in the Test catchment, but this constraint on development is not dealt with explicitly in County or District Plans.

THIS CATCHMENT PLAN SHOULD BE READ IN THE CONTEXT OF COUNTY AND DISTRICT POLICIES, ESPECIALLY THOSE REGARDING RECREATION, CONSERVATION, WASTE DISPOSAL, MINERAL EXTRACTION AND COUNTRYSIDE MANAGEMENT.

RIVER TEST FINAL PLAN

SECTION B : KEY ISSUES & MANAGEMENT PROPOSALS

Our Aims are to :

- Achieve a continuing overall improvement in the quality of rivers, estuaries and coastal waters, through the control of pollution.
- Manage water resources to achieve the right balance between the needs of the environment and those of the abstractors.
- Provide effective defence for people and property against flooding from rivers and the sea.
- Provide adequate arrangements for flood forecasting and warning.
- Maintain, improve and develop fisheries.
- Develop the amenity and recreation potential of inland and coastal waters and associated lands.
- Conserve and enhance wildlife, landscape and archaeological features associated with inland and coastal waters of England and Wales.
- Improve and maintain inland waters and their facilities for use by the public where the NRA is the navigation authority.
- Ensure that dischargers pay the costs of the consequences of their discharges, and, as far as possible, to recover the costs of environment improvements from those who benefit.
- Improve public understanding of the water environment and the NRA's work.
- Improve efficiency in the exercise of the NRA's functions and to provide challenge and opportunity for employees and show concern for their welfare.

B. KEY ISSUES AND MANAGEMENT PROPOSALS

The Consultation Report and public consultation which preceded this Catchment Management Plan identified a number of issues in the Test catchment. Many of these are being addressed by the NRA in the normal course of business, although the timing of solutions is dependent on the availability of funds and manpower. For information, the general Aims of the NRA are listed opposite.

In addition to these general management activites, a number of key issues have been identified which apply specifically to the Test Catchment. These are discussed in this Section along with the specific management action which the NRA considers is needed to address these Key Issues. Most of the Management Proposals lie within the competence of the NRA, but many solutions require collaboration or independent action by others with an interest in the catchment. Some are mutually contradictory (eg. reducing channel capacity to improve low flow velocities : maintaining the flood capacity of the river) and priorities will have to be tailored to local circumstances.

The Key Issues are listed below and are elaborated upon, along with the Management Proposals, in the following tables. An Action Plan with suggested timings is included in Section C.

Issue 1	Low flow velocity, shallow depths, turbid water and lack of weed
Issue 2	Reduced flows in tributary streams
Issue 3	Insufficient flow in lower reaches at times of drought
Issue 4	Reduced runs of salmon into the river
Issue 5	Localised failures of water quality targets
Issue 6	Rising Phosphate Concentrations
Issue 7	Rationalising Sewage Treatment
Issue 8	Concern over Pesticide Concentrations
Issue 9	Chalk Aquifer Vulnerable to Pollution
Issue 10	River Gauging Network Incomplete
Issue 11	Problems with Debris and Floating Weed
Issue 12	Predatory Birds
Issue 13	Other Issues

ISSUE 1
Low flow velocity, shallow depths, turbid water and lack of weed

KEY ISSUES	MANAGEMENT PROPOSALS
* The water meadow system divided the flow of the River Test between a number of channels, many of which have been widened and developed as valuable trout fisheries. This has resulted in excess low-flow channel capacity, increased siltation, and low water velocities which have changed the character of the river. Action to correct this imbalance needs to be undertaken with care so as not to damage the river's conservation or fisheries interests, or add to flood risks.	* Implement the NRA water resources strategy, which presumes against consumptive abstraction from the chalk aquifer or from the upper reaches of rivers and encourages the development of new water resources from their lower reaches, allowing environmental and riparian 'uses' to enjoy the full benefit of river flows at all times.
* Some reaches of the main river were over-deepened in the late 1940s to improve agricultural land drainage, removing the gravel shallows typical of a chalk stream.	* Encourage the provision of treatment capacity to allow the local discharge of effluents in the upper catchment, so that the water resource is conserved and made available for re-use. The provision of trunk sewerage schemes to transfer effluents downstream will be discouraged. **(NRA, dischargers) (See Issues 3 & 7)**
* Siltation and water turbidity (especially in early summer) are reported to have increased in recent years, possibly as a result of changed land use and river management practices.	* Investigate the potential for the development of groundwater augmentation schemes in the upper catchment to support river flows at times of drought. **(NRA) (See Issue 3)**
* Nuisance growths of blanket-weed algae have occurred in some summers when river flows have been low. The problem is most acute when there is abundant sunshine, and algal growths are strongest in shallow water where flows are slack.	* Where appropriate, narrow the river channel to increase flow velocity. Publish advice on how such work can be done with minimum disturbance to the river's ecology or risk of increased flooding. **(NRA, owners)**
	* Review the management of carrier channels to ensure that the distribution of flow is optimised at times of drought. **(Owners, NRA)**
	* Where appropriate, encourage an Autumn cut to manage aquatic weed, allowing high winter flows to scour sediment locally from the channel without removing the weed roots. **(NRA, owners)**

ISSUE 2 Reduced flows in tributary streams	
KEY ISSUES	**MANAGEMENT PROPOSALS**
* Some large abstractions for cress farming or public supply intercept springs or reduce surface flows, even to the extent of causing small streams to dry. These problems are significant in the catchments of the Bourne Rivulet and Wallop Brook.	* Investigate as a priority the potential for relocating the Broughton water supply source, or supplementing it from elsewhere at critical times, to improve summer and drought flows in the Wallop Brook. **(NRA, Southern Water)**
* Diversion of river water through fish farms depletes the flow in the natural channel between the farm intake and outfall and may change the nature of the river where a high proportion of the natural flow is abstracted.	* Investigate solutions to the problem of diminished flows in the Bourne Rivulet which result from the abstraction of groundwater for growing watercress. **(NRA, growers)**
	* Use the powers of the Water Resources Act 1991 to minimise low flow problems between the intake and outfall of new agricultural abstractors (eg. fish farms). Encourage existing agricultural abstractors to manage their systems to achieve the same end. **(NRA)**

Abbreviations

ADAS	Agricultural Development Advisory Service
BR	British Rail
CC	Countryside commission
DoE	Department of the Environment
EN	English Nature
IDB	Internal Drainage Board
LA	Local Authority
NRA	National Rivers Authority
MAFF	Ministry of Agriculture, Fisheries and Food
SWS	Southern Water Services

ISSUE 3
Insufficient flow in lower reaches at times of drought

KEY ISSUES	MANAGEMENT PROPOSALS
* The chalk groundwater resources of the Test catchment are fully committed to existing abstraction licences. As a consequence the NRA has a presumption against licensing new consumptive abstractions from this resource, although the existing licences still have some unused capacity which can be developed.	* Implement the NRA water resources strategy **(see Issue 1.) (NRA)**
* The quantity abstracted for public water supply at Testwood is significantly below the licensed maximum, but any increase above the authorised level would have adverse environmental effects at times of low river flow. However at times of average river flow there is capacity to increase abstraction, subject to a revised prescribed flow condition.	* Encourage the provision of adequate treatment capacity to allow the local discharge of effluents in the upper catchment, to conserve the water resource and make it available for re-use. The provision of trunk sewerage to transfer effluents downstream will be discouraged. **(NRA, dischargers) (See Issues 1 & 7)**
* An agricultural abstraction diverts water to a point downstream of the Testwood intake, restricting development of this public water supply source to its licensed maximum and reducing the downstream river flow to the extent that salmon migration is impeded at times of drought.	* Investigate the potential for the development of groundwater augmentation schemes to support river flows at times of drought. **(NRA) (See Issue 1)**
(The problem has been controlled in the short term by imposing conditions on the agricultural abstraction, but the situation will need to be reviewed if it is proposed to develop the potable water resource to its full potential).	* Support the proposal of Southern Water Services Ltd to build a bankside storage reservoir at Testwood. **(NRA, Southern Water)**
	* Keep under review the allocation of the water resource from the River Test at its tidal limit. **(NRA, abstractors)**

ISSUE 4
Reduced runs of salmon into the river

KEY ISSUES	MANAGEMENT PROPOSALS
* Salmon catches from the River Test have declined steadily over the past forty years and are now at a level which suggests that the continued existence of the run is at risk. The cause is unclear but is likely to be complex, involving factors such as:- - Reduced spawning success in the parent streams - The development of high seas fisheries for adult salmon - Increased predation on juvenile salmon - Low rainfall and river flows in recent years - Hydrographic and temperature changes in the North Atlantic - Changing land use and river management regimes - Other effects resulting from changed weather patterns	* Continue investigations into the population dynamics and spawning success of Hampshire salmon. **(NRA, MAFF, owners)**
	* Investigate the nature and source of sediments in the River Test, with a view to proposing a management regime to improve the quality of spawning gravels. **(NRA)**
	* Subject to economic appraisal and the results of field trials, introduce a programme of management to improve fish spawning gravels. **(NRA, owners)**
* The spawning gravels used by wild salmon and trout are prone to siltation, reducing hatching efficiency and the survival of young fry. Changing land use and river management practices are thought to have contributed to the problem, but other factors are probably involved.	* Subject to the recommendations of the Hampshire Salmon Study and appraisal of the results of earlier stocking, continue salmon restocking using fish of the correct genetic strain. **(Owners, NRA)**
* Wild fish, especially migrating salmon smolts (juveniles), risk being trapped in abstraction intakes if these are not adequately screened.	* Where necessary, require abstractors to improve measures taken to exclude salmon smolts from their intakes. **(NRA, abstractors)**
* Care needs to be taken to ensure that genetic integrity is maintained when restocking salmon in support of the declining wild population. (The genetic integrity of native British brown trout populations needs similar protection, but in the case of the River Test the original strain of trout is likely to have been diluted by stocking with fish from other sources).	* Encourage stocking with Brown Trout in preference to Rainbow Trout. **(NRA, fisheries interests)**
* The population of large trout in the River Test is maintained for fisheries purposes at a higher level than could be supported by a wild population. Their numbers need to be managed carefully to avoid the risk of affecting the native brown trout and salmon populations by predation or competition for food.	

ISSUE 5
Localised failures of water quality targets

KEY ISSUES	MANAGEMENT PROPOSALS
* Parts of the River Test system have failed marginally to achieve their NWC objectives under low flow conditions although effluents have kept within consent limits at such times, suggesting that the river has little capacity to accept additional polluting loads.	* Keep under review water quality objectives and effluent consent conditions to ensure that appropriate standards are set. **(NRA)**
* Whilst containing only small concentrations of contaminants and generally meeting their discharge consent standards, the very high volume of fish farm effluents makes them significant contributors to the organic load on the River Test.	* Propose Statutory Water Quality Objectives for adoption by the Department of the Environment. **(NRA, DoE)**
* Storm sewage overflows cause intermittent local pollution problems.	* Where appropriate, designate further reaches of the river under EC water quality Directives. **(NRA, DoE)**
* Minor local ecological changes have been detected below cress farm effluents.	* Monitor compliance with effluent discharge consents and environmental water quality objectives. **(NRA)**
* Isolated pollution incidents arising from industry, agriculture and accidental spillages are a constant threat to water quality.	* Investigate pollution incidents and take appropriate ameliorative action, including the prosecution of offenders. **(NRA)**
* The opportunity exists for further reaches of the River Test and its tributaries to be designated under the EC Freshwater Fisheries Directive.	* Continue to advise Local Authorities, Industry and Agriculture on 'best practice' for preventing water pollution. **(NRA)**
	* Investigate the potential for the development of groundwater augmentation schemes to support river flows at times of drought. **(NRA)**

ISSUE 6
Rising Phosphate Concentrations

KEY ISSUES	MANAGEMENT PROPOSALS
* There has been a rising trend in phosphate concentrations in the River Test in recent years, which may be due to a decrease in diluting flows (due to the drought) rather than an increase in the absolute phosphate load.	* Investigate the problem in the context of the review required under the EC Urban Waste Water Directive. **(NRA)**

ISSUE 7
Rationalising Sewage Treatment

KEY ISSUES	MANAGEMENT PROPOSALS
* Treated effluents represent a valuable water resource, their transfer downstream by the introduction of trunk sewerage schemes could significantly detract from the water balance of the upper catchment. (Of particular concern is the situation in the Wallop villages, where the NRA favours centralisation of sewage treatment at the Wallop Camp works).	* Encourage the provision of adequate treatment capacity to allow the local discharge of effluents in the upper catchment, to conserve the water resource and make it available for re-use. The provision of trunk sewerage to transfer effluents downstream will be discouraged. **(NRA, dischargers) (See Issues 1 & 3)**

ISSUE 8
Concern over Pesticide Concentrations

KEY ISSUES	MANAGEMENT PROPOSALS
* Elevated pesticide levels, particularly the Triazine herbicide group, have been found upstream of Romsey. Data are insufficient to give a true measure of the problem, but the need for constant vigilance is recognised.	* Encourage reduced use of pesticides, especially on highways, railway land and close to the river. **(NRA, LAs, BR, owners)** * Continue to advise Local Authorities, Industry and Agriculture on the best practice for the storage and use of pesticides so as to avoid water pollution. **(NRA)**

ISSUE 9
Chalk Aquifer Vulnerable to Pollution

KEY ISSUES	MANAGEMENT PROPOSALS
* Groundwater is at risk from chemicals spilt from industrial premises or from transport accidents. Significant contamination with industrial solvents has already be detected in some aquifers. * Groundwater nitrate concentrations over parts of the Test catchment exceed the Guideline limit of 5.6 mg/l imposed by the EC Drinking Water Directive, but are within the MAC of 11.3 mg/l. Any increase would be of concern and might cause the closure of small (mainly private) drinking water sources. * The disposal of solid wastes is a potential problem for groundwater quality. The NRA maintains close liaison with Waste Regulation Authorities who control the disposal of waste.	* Implement the NRA Groundwater Protection Policy to achieve control over polluting activities in sensitive areas. **(NRA)** * Encourage site owners and operators to take care in the storage and handling of oils, solvents and toxic substances. **(NRA, LAs, owners)** * Investigate pollution incidents and take appropriate ameliorative action, including the prosecution of offenders. **(NRA)**

ISSUE 10
River Gauging Network Incomplete

KEY ISSUES	MANAGEMENT PROPOSALS
* A full river gauging network has not yet been completed by the NRA.	* Review the river gauging network, making provision for additional gauges in the capital investment programme. **(NRA)**

ISSUE 11
Problems with Debris and Floating Weed

KEY ISSUES	MANAGEMENT PROPOSALS
* Flow-control structures are liable to be blocked by debris and floating cut weed increasing flood risks, interfering with fishing and detracting from the amenity value of the river.	* Increase awareness of the problem and draw attention to the need to comply with agreed weed cutting periods. **(NRA, fisheries interests, owners)** * Encourage Autumn cutting to manage aquatic weed, which reduces early growth in the following season and protects weed from being ripped out by high winter flows. **(NRA, fisheries interests, owners)**

ISSUE 12
Predatory Birds

KEY ISSUES	MANAGEMENT PROPOSALS
* Predation by herons and cormorants is reported to be a problem for trout fisheries.	* Investigate the extent of the problem. **(Fishery interests, RSPB)**

ISSUE 13
Other Issues

KEY ISSUES	MANAGEMENT PROPOSALS
* The conservation value of the river corridor is enhanced by the existence of an uncultivated buffer strip alongside the river bank, which also helps to reduce the input of silt. This feature may be eroded by development or intensive cultivation and is missing in parts of the catchment.	* Encourage government agencies to structure agricultural grant schemes to favour the development of buffer zones alongside river banks and the maintenance of the river as a "green corridor" through the landscape. **(NRA, EN, CC, MAFF, farmers)**
* Development needs to be controlled to preserve a "Green Corridor" alongside the river, which has great landscape, conservation and amenity value.	* Encourage good fisheries management practices which are compatible with nature conservation. **(NRA, fisheries interests, owners)**
* Fisheries management operations may conflict with conservation objectives, eg: - The control of grayling, pike and other species in game fisheries affects the natural balance of fish populations. - Intensive management of river banks may impact upon their landscape and conservation interest. - Bank strengthening, channel narrowing and the management of aquatic weeds have implications for flood defence and conservation.	* Take account of Scheduled Ancient Monuments and historic sites when planning work programmes and take action to conserve and enhance them. **(NRA, EH, landowners)**
* Archaeological and historic sites within the river corridor must be protected. The remains of abbatical fish ponds in Romsey are an example of a "soft" archaeological feature in need of sensitive conservation.	* Where appropriate, support Local Authority initiatives to improve public access to the river bank. **(NRA, LAs)**
* There is limited public access to the river bank for recreation.	* Take account of the possible consequences of climate change when preparing strategic plans **(All)**
* The possible effects of climate change need to be taken into account when planning future management of the catchment.	

RIVER TEST FINAL PLAN

SECTION C : ACTION PLAN SUMMARY

RIVER TEST CATCHMENT PLAN.
ACTION PLAN SUMMARY

Management Task	93 94 95 96 97 Future	Action by	Estimated Cost £'000
Issue 1. Low Flow Velocity etc.			
Implement Water Resources Strategy	Then ongoing	NRA	
Investigate potential for groundwater recharge schemes		NRA	30
Implement groundwater recharge scheme		NRA	>5,000
Publish advice on chalk stream management		NRA	
Where appropriate, narrow channels etc.		Owners	
Review management of carriers to optimise flow distribution		Owners	
Encourage use of Autumn weed cut	Ongoing	Owners NRA	
Issue 2. Reduced Flow in Tributaries			
Investigate relocation or reinforcement of Broughton source		SWS,NRA	
Implement solutions for low flows on Bourne Rivulet		NRA, Growers	60
Issue 3. Insufficient River Flow during Droughts			
Implement Water Resource Strategy (see Issue 1)	See above	NRA	
Investigate potential for groundwater recharge (see Issue 1)	See above	NRA	
Provide bankside storage resources at Testwood	*Ten year programme *	SWS	18,000

RIVER TEST CATCHMENT PLAN.
ACTION PLAN SUMMARY

Management Task	93 94 95 96 97 Future	Action by	Estimated Cost £'000
Issue 4. Reduced Salmon Runs			
Continue Hampshire salmon research.	▬	NRA,MAFF, Owners	600
Investigate nature and source of sediments.	▬	NRA	15
Continue annual maintenance of spawning gravels	▬▬▬	NRA, Owners	25
Continue restocking juvenile salmon	▬▬	Owners, NRA	100
Where necessary, screen juvenile salmon from intakes	Ongoing	Owners	
Encourage stocking with Brown Trout	▬▬▬	NRA, Owners	
Issue 5. Local Failure of Water Quality Targets			
Review effluent consents	▬	NRA	
Propose SWQOs and additional EC Designations	▬	NRA, DoE	
Monitor compliance with targets and consent conditions	Ongoing	NRA	
Advise others on pollution control measures	Ongoing	NRA	
Investigate groundwater recharge to improve dilution	See above	NRA	
Provide advice on pollution prevention and control	Continuing	NRA	
Investigate pollution events and prosecute offenders	Continuing	NRA	
Issue 6. Rising Phosphate concentrations			
Investigate problem	▬▬	NRA	
Issue 7. Rationalising Sewage Treatment			
Retain effluent in upper catchment	Ongoing	NRA, Dischargers	

RIVER TEST CATCHMENT PLAN.
ACTION PLAN SUMMARY

Management Task	93 94 95 96 97 Future	Action by	Estimated Cost £'000
Issue 8. Rising Pesticide concentrations			
Reduce pesticide use, especially on roads & railways	Ongoing	All	
Take care with pesticide storage	Ongoing	All	
Issue 9. Pollution of Chalk Aquifer			
Implement Groundwater Protection Policy (launched 12/92)	Ongoing	NRA	
Take care when handling or storing hazardous substances	Ongoing	All	
Issue 10. Incomplete Gauging Network			
Review data collection network	▬	NRA	
Build additional gauges	▬	NRA	100
Issue 11. Debris and Floating Weed			
Increase awareness, encourage Autumn weed cut.	Continuing	NRA, Owners	
Issue 12. Avian Predation			
Investigate extent of the problem	▬	Owners, MAFF, RSPB	
Issue 13. Other issues			
Encourage use of grant schemes to promote buffer zones	Ongoing	NRA;CC;EN;MAFF	
Encourage good fisheries management	Ongoing	Owners, NRA	
Conserve Ancient Monuments & historic sites	Ongoing	Owners, NRA	
Where appropriate, develop public access to the river bank	Ongoing	LAs, NRA	
Take account of climate change in long-term planning	▬	NRA	

RIVER TEST FINAL PLAN

APPENDIX 1 - FURTHER READING

APPENDIX 1 - FURTHER READING

Acts of Parliament

Salmon and Freshwater Fisheries Act 1975
Wildlife and Countryside Act 1981
Water Act 1989
Environment Protection Act 1990
Land Drainage Act 1990
Water Resources Act 1991

NRA Publications

NRA Corporate Plan (Annually)

Water Resources Development Strategy
A Discussion Document. 1992

Sustaining our Resources.
Southern Region Water Resources Development Strategy.
NRA Southern Region 1992

Policy and Practice for the Protection of Groundwater (1992)
(See also the Southern Region Appendix)

River Test Catchment Management Plan, Phase I
NRA Southern Region 1991

Other Publications

Changing River Landscapes
Countryside Commission CCP238 1987

Code of Practice on Conservation, Access and Recreation
MAFF, DoE & Welsh Office. HMSO 1989

Conservation and Land Drainage Guidelines
Water Space Amenity Commission 1980

Conservation Guidelines for Drainage Authorities
MAFF, DoE & Welsh Office. 1991

Development and Flood Risk. Circular 30/92
MAFF, DoE & Welsh Office. 1992

Nature Conservation and the Management of Drainage Channels
Nature Conservancy Council & Assn. of Drainage Authorities 1989

Nature Conservation and River Engineering
Nature Conservancy Council 1983

Rivers and Wildlife Handbook RSPB 1984

RIVER TEST FINAL PLAN

APPENDIX 2 : GLOSSARY OF TERMS AND UNITS

1:10 YEAR DROUGHT/FLOOD
A drought/flood event with a statistical probability of occurring once in a ten year period. (other periods may be specified in a similar way)

ABSTRACTION LICENCE
Licence to abstract water from a surface or underground source. The maximum annual, daily and hourly abstraction rates are set by the licence.

ABSTRACTION - ACTUAL
Individual abstraction records are reported to the NRA each year but under the Water Resources Act 1991 these data are confidential. Actual abstraction figures reported in the Plan are area annual totals expressed in Ml/d.

AONB
Area of Outstanding Natural Beauty, notified by the Countryside Commission.

BOD
Biochemical Oxygen Demand. A measure of polluting potential.

COARSE FISH
See FRESHWATER FISH, CYPRINIDS, SALMONIDS

CONSUMPTIVE USE
Water which is abstracted but not returned to the catchment, either because it evaporates (as in spray irrigation) or is exported for use in another catchment.

COUNTY STRUCTURE PLANS
Statutory documents produced by County Councils outlining their strategy for development over a 10-15 year timescale.

CYPRINIDS
Fish of the carp family. (See also FRESHWATER FISH, SALMONIDS)

DISTRICT LOCAL PLANS
Statutory documents produced by District or Borough Councils to implement the development strategy set out in County Structure Plans. Specific land use allocations are identified.

DROUGHT ORDER
Order issued by the Secretary of State for the Environment allowing the terms of abstraction licences to be varied and/or the levels of service to water company customers to be reduced at times when the resource is under stress.

EFFECTIVE RAINFALL
Total rainfall minus direct evaporation and the water used by plants for transpiration. This is equivalent to the total resource of a catchment. (See also TOTAL RAINFALL)

EIFAC
The European Inland Fisheries Advisory Commission. An agency of the United Nations Food & Agriculture Organisation (FAO).

EMERGENT VEGETATION
Plants with roots in the river bed but which emerge from the water. Examples include reeds, iris and bullrush.

EPHEMERAL FLOW
River flow which dries at some times of the year (eg winterbournes).

FLOW MEASUREMENT UNITS

m^3/s	Cubic metres per second
l/s	Litres per second
Ml/d	Megalitres per day. A megalitre is equivalent to a ten metre cube (approximates to a 4-bedroom detached house).
mgd	Millions of gallons per day

FLOW CONVERSION TABLE

m^3/s	Ml/d	mgd
0.012	1	0.224
0.06	5	1.12
0.12	10	2.24
0.24	20	4.48
0.6	50	11.2
1.2	100	22.4

FRESHWATER FISH (COARSE FISH)
For the purposes of the Salmon and Freshwater Fisheries Act 1975, fish other than Salmon, Brown Trout, Rainbow Trout, Sea-trout and Char.

HECTARE
Unit of area 100m x 100m, equal to 2.471 acres.

HIGH SEAS RIGHTS
Common law rights of navigation and fisheries on tidal waters where no specific authority exists.

IDB
Internal Drainage Board. A local land drainage authority with powers to raise finance and do works.

IMPOUNDMENT RESERVOIR
Surface water storage area formed by construction of a dam and supplied only by natural inflow from the upstream catchment.

ISOHYETALS
Contours of equal mean annual rainfall.

LOCAL NATURE RESERVE
A nature reserve designated by a Local Authority, frequently owned or managed by a voluntary conservation organisation.

mAOD
A measure of altitude. Metres above ordnance datum.

MARSH FEEDING
Supply of water from the river to marsh areas during the summer for wet fencing and abstraction (usually for spray irrigation).

MEAN LICENSED ABSTRACTION
In this Plan the mean licensed abstraction is the total annual abstraction permitted within the terms of a licence, expressed as an average daily volume in terms of megalitres per day (Ml/d).

MHWS
Mean High Water Spring Tides. A datum level used in mapping.

MINIMUM RESIDUAL FLOW (MRF)
The flow set at a river gauging station to protect downstream uses and below which controlled abstractions are required to cease. (see also PRESCRIBED FLOW)

NATIONAL NATURE RESERVE
A nature reserve of national importance, designated and managed by English Nature.

NATURAL FLOW REGIME
The river flow pattern experienced prior to the influence of man, i.e. with no abstraction from or discharge to the catchment.

PERENNIAL FLOW
River flow present through the entire year. (See also EPHEMERAL FLOW)

POTABLE WATER SUPPLY
Water supplied for domestic use, including human consumption.

PRESCRIBED FLOW (PF)
A river flow incorporated as a condition in an abstraction licence, such that abstraction must cease once the flow falls below this value. Prescribed flows are set at or above the MRF which applies to the river where the abstraction takes place.

In many instances the PF applying to new licences is increased incrementally in step with the total licensed abstraction to protect the interest of existing abstractors: ie. newer abstractions have to cease at higher river flows. (see also MINIMUM RESIDUAL FLOW)

PRIMARY GAUGING STATION
A permanent river flow gauging installation included in the National Surface Water Archive.

PUMPED STORAGE RESERVOIR
Surface water storage area where the natural inflow is supplemented by water pumped from a separate source, typically a nearby river.

POOL:RIFFLE
A stretch of river with alternate sections of shallow fast-flowing water and deeper slow-moving pools.

Q95
River flow that is exceeded for 95 percent of the flow record (a low flow, the Q5 flow would be a high flow).

RAMSAR SITE
A wetland site of international significance for conservation, notified under international treaty.

SALMONIDS
Fish classified by the Salmon and Freshwater Fisheries Act 1975 as belonging to the salmon family - Salmon, Brown Trout, Sea Trout, Rainbow Trout and Char. (Summer-spawning salmonid species such as Grayling are classified by the Act as Freshwater Fish).

SPATE FLOWS
Episodic fresh water flood flows.

SSSI
Site of Special Scientific Interest. A site designated by English Nature as being in need of protection to conserve its outstanding ecological or geological features. Land use and management operations within SSSIs are subject to control.

SNCI
Site of Nature Conservation Interest. A site of local importance for wildlife or geology, identified by the County Wildlife Trust or the County Council.

STW
Sewage Treatment Works.

TOTAL RAINFALL
Rainfall as measured by a rain gauge.

TOTAL RESOURCE
See EFFECTIVE RAINFALL

WET FENCING
Water-filled ditches used as field boundaries or to control livestock.