local environment agency plan

DORSET STOUR

CONSULTATION REPORT

JANUARY 1997

ENVIRONMENT AGENCY

DORSET STOUR LOCAL ENVIRONMENT AGENCY PLAN
CONSULTATION REPORT

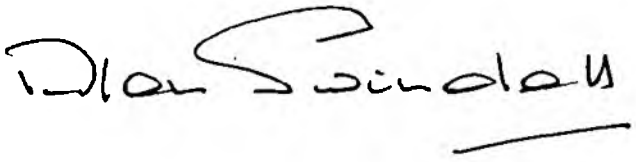
FOREWORD

This Plan represents a significant step forward in environmental thinking. It has been clear for many years that the problems of land, air and water, particularly in the realm of pollution control, cannot be adequately addressed individually. They are interdependant, each affecting the others. The Government's answer was to create the Environment Agency with the umbrella responsibility for all three. The role and duties of the Agency are set out in this document.

This holistic approach is now reflected in this Plan. It is a logical development of the Catchment Management Plans prepared by the old National Rivers Authority, now subsumed into the new Agency. It sets out the environmental problems of the area in a way which has not been done before, and suggests the most important issues which should now be addressed. It is, I believe, vital reading for everyone concerned with the future of this part of Wessex.

The Stour is a major river influencing a large part of Dorset and small parts of Somerset and Wiltshire. It impacts on the lives of many people with different interests and priorities. The Environment Agency wants to be sure that these are recognised in its own future programme of action, and this Consultation Document seems the best way of doing this.

An effective programme of action can only be developed if people read it, think about it, and then tell us their reactions. So please do not leave it on the shelf to gather dust. I believe strongly that it is important, and I commend it to you.



Alan Swindall

Chairman, South Wessex Area Environment Group of the Environment Agency

DORSET STOUR LOCAL ENVIRONMENT AGENCY PLAN
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YOUR VIEWS

The Dorset Stour is the first Local Environment Agency Plan (LEAP) produced by the South Wessex Area of the Environment Agency.

This Consultation Report is our initial view of the issues facing the catchment. Public consultation allows people who live in or use the catchment to have a say in the development of our plans and work programmes. We welcome your ideas on the future management of this catchment:

- *Have we identified all the issues?*
- *Have we identified all the options for solutions?*
- *Have you any comments on the issues and options listed?*
- *Do you have any other information or views that you wish to bring to our attention?*

This is your opportunity to influence our future plans.

We look forward to hearing from you.

Howard Davidson

Area Manager, South Wessex Area of the Environment Agency

Please send your comments by 31 March 1997, preferably by writing to:

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Published January 1997

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1. DRAFT VISION STATEMENT

The Dorset Stour catchment is a system of great diversity that is greatly influenced by landuse along its length, including:

- *Poole, Bournemouth and Christchurch conurbation in the lower catchment*
- *mixed farming in the middle catchment*
- *intensive dairy farming in the upper catchment*

The river and its tributaries make an important contribution to the rural economy through agriculture and an equally important contribution to the urban economy through public water supply, effluent disposal, waste disposal, recreation and tourism.

Our vision of the Dorset Stour is of a healthy and diverse catchment, managed in an environmentally sustainable way, that balances the needs of all users with the needs of the environment.

The Environment Agency cannot realise this vision on its own and will seek to work in partnership with local authorities, industry, farmers, environmental groups and other interested organisations to turn this vision into reality.

We look forward to a future where there is:

- *development of a sustainable agricultural, aquacultural and forestry system which reduces diffuse pollution and improves the physical habitat of the river system and wetlands for wildlife*
- *maintenance and, where appropriate, enhancement of biodiversity*
- *significant reductions in waste and improved standards of disposal and treatment*
- *achievement of environmentally sustainable use of water resources*
- *continuing improvements to existing discharges to meet the most appropriate standards*
- *minimal risk to people and property from flooding*
- *full development of potential for sustainable salmonid and freshwater fisheries*
- *increasing enjoyment and appreciation of the water environment*
- *improvements in the quality of air*

2. INTRODUCTION

2.1 The Environment Agency

2.1.1 Who are we?

The Environment Agency is a non-departmental public body established by the Environment Act 1995 and formed on 1 April 1996. We are sponsored by the Department of the Environment with policy links to the Welsh Office and the Ministry of Agriculture, Fisheries and Food.

We have taken over the functions of our predecessors: the National Rivers Authority (NRA), Her Majesty's Inspectorate of Pollution (HMIP), the Waste Regulation Authorities (WRAs) and some parts of the Department of the Environment (DoE).

We provide a comprehensive approach to the protection of the environment by combining the regulation of air, land and water into a single organisation. We cannot work in isolation, but seek to educate and influence individuals, groups and industries to promote best environmental practice, and develop a wider public awareness of environmental issues.

Our Vision is:

- *a better environment in England and Wales for present and future generations*

We will:

- *protect and improve the environment as a whole by effective regulation, by our own actions and by working with and influencing others*
- *operate and consult widely*
- *value our employees*
- *be efficient and businesslike in everything we do*

Our Aims are:

- *to achieve significant and continuous improvement in the quality of air, land and water, actively encouraging the conservation of natural resources, flora and fauna*
- *to maximise the benefits of integrated pollution control and integrated river basin management*
- *to provide effective defence and timely warning systems for people and property against flooding from rivers and the sea*
- *to achieve significant reductions in waste through minimisation, re-use and recycling and to improve standards of disposal*
- *to manage water resources to achieve the proper balance between the needs of the environment and those of abstractors and other water users*
- *to secure, with others, the remediation of contaminated land*
- *to improve and develop salmon and freshwater fisheries*
- *to conserve and enhance inland and coastal waters and their use for recreation*
- *to maintain and improve non-marine navigation*
- *to develop a better informed public through open debate, the provision of soundly based information and rigorous research*
- *to set priorities and propose solutions that do not impose excessive costs on society*

2.1.2 Sustainable development

In 1987, the World Commission on Environment and Development (the Brundtland Commission) defined sustainable development as that *which meets the needs of the present without compromising the ability of future generations to meet their own needs.*

Sustainable development brings together four sets of values: environmental protection, providing for the future, quality of life, and fairness, to create a new policy which integrates environmental, developmental, social and economic concerns.

One of the primary reasons for setting up the Environment Agency was to provide a means of helping the government deliver its sustainable development strategy. Section 4 of the Environment Act (1995) defines the Agency's aims and states that *the minister shall give statutory guidance on objectives and the contribution to sustainable development.* Draft guidance has already been published, and the key elements are that the Agency should:

- *take a holistic approach to the protection and enhancement of the environment*
- *take a long-term perspective*
- *maintain biodiversity by exercising its statutory obligations with respect to conservation*
- *discharge its regulatory functions in partnerships with business in ways which maximise the scope for cost effective investment in improved technologies and management techniques*
- *provide high quality information and advice on the environment*

Our management of the catchment will take forward these key elements as our contribution towards sustainable development.

2.1.3 Our umbrella duties

There are a number of umbrella duties which we carry out for all our functions:

- *Rural Areas - when considering any proposal, we must have regard to any effect which the proposals would have on economic and social well-being of local communities in rural areas. Some of our activities, such as meeting statutory objectives, emergency actions and the taking of legal actions are not subject to this appraisal*
- *Costs and Benefits - we are required to take into account the likely costs and benefits when deciding whether to exercise our powers. Costs include both financial costs and costs to the environment; benefits include those which communities will enjoy, both now and in the future*
- *Conservation - we must have regard to conservation in our pollution control functions, and we have a duty to further conservation in all our other functions. We also have a duty generally to promote the conservation of flora and fauna dependent on the aquatic environment*

2.1.4 What we do not do

We do not cover all aspects of environmental legislation and service to the general public. Your local authority deals with all noise problems; litter; air pollution arising from vehicles, household areas, small businesses and small industries; planning permission (they will contact us when necessary); contaminated land issues (in liaison with ourselves); and environmental health issues.

2.2 This Local Environment Agency Plan

This Local Environment Agency Plan (LEAP) slots into a sequence of Catchment Management Plans (CMPs) which were being prepared by the NRA to cover all river catchments in England and Wales. We will use LEAPs to cover the same topics as Catchment Management Plans but they will also deal with other topics to cover the full range of our responsibilities.

A holistic approach to environmental management is required to plan for sustainability and improvement. LEAPs allow the full range of management issues to be identified and considered within a geographical area which is both relevant and meaningful. They are strategic in nature, since individual catchments cover large areas of land, often straddling local authority boundaries.

Economic and political constraints will influence what we are able to do. For example the funds that the water service companies and other industries invest in pollution control will make a difference to the extent of water quality improvements that we are able to achieve.

2.2.1 The Area Environment Group

During the summer of 1996, we set up an Area Environment Group (AEG) for the South Wessex Area. We regard the AEG as fundamental in assisting us in building relationships with local communities. The Group has twenty members (see Section 25) who have a broad experience and interest in environmental matters. The role of the AEG is an advisory one, and they have been consulted during the production of this Plan.

2.2.2 The Consultation Report

This Local Environment Agency Plan Consultation Report gives you the opportunity to comment on environmental problems or our work. It describes the environmental resources of the area, explains how these resources are affected by human uses or pressures, and outlines issues where we or others need to take action to address problems in the environment.

2.2.3 The Action Plan

We will collate responses to this Report and publish an Action Plan in June 1997. Each year we will review the progress that has been made with the actions identified in the Action Plan and publish a brief review. Within five years of publishing the Action Plan we will carry out a major review of the progress we have made.

2.2.4 Local Environment Agency Plans and Development Plans

While we can control some of the things that influence the quality of the environment, we have only limited control over the way that land is developed. This is the responsibility of local planning authorities.

Local authorities prepare statutory development plans; the policies in these plans will guide the way that land is developed in the future. We advise and guide local planning authorities to adopt policies that protect the water environment from harmful development. Where we can, we will reinforce these policies when we comment on planning matters or if we are making our own decisions.

2.2.5 How to use this plan

This Report is split into three parts:

Part I contains:

- *our Vision for the catchment*
- *this Introduction*
- *a general Description of the catchment*
- *the Issues that we have identified in our management of the catchment. Options and Actions for the resolution of these issues are also proposed*
- *Protection through Partnership which outlines the work that we do in collaboration with other organisations and where the work of other organisations plays an important part in helping us to achieve some of our aims and objectives.*

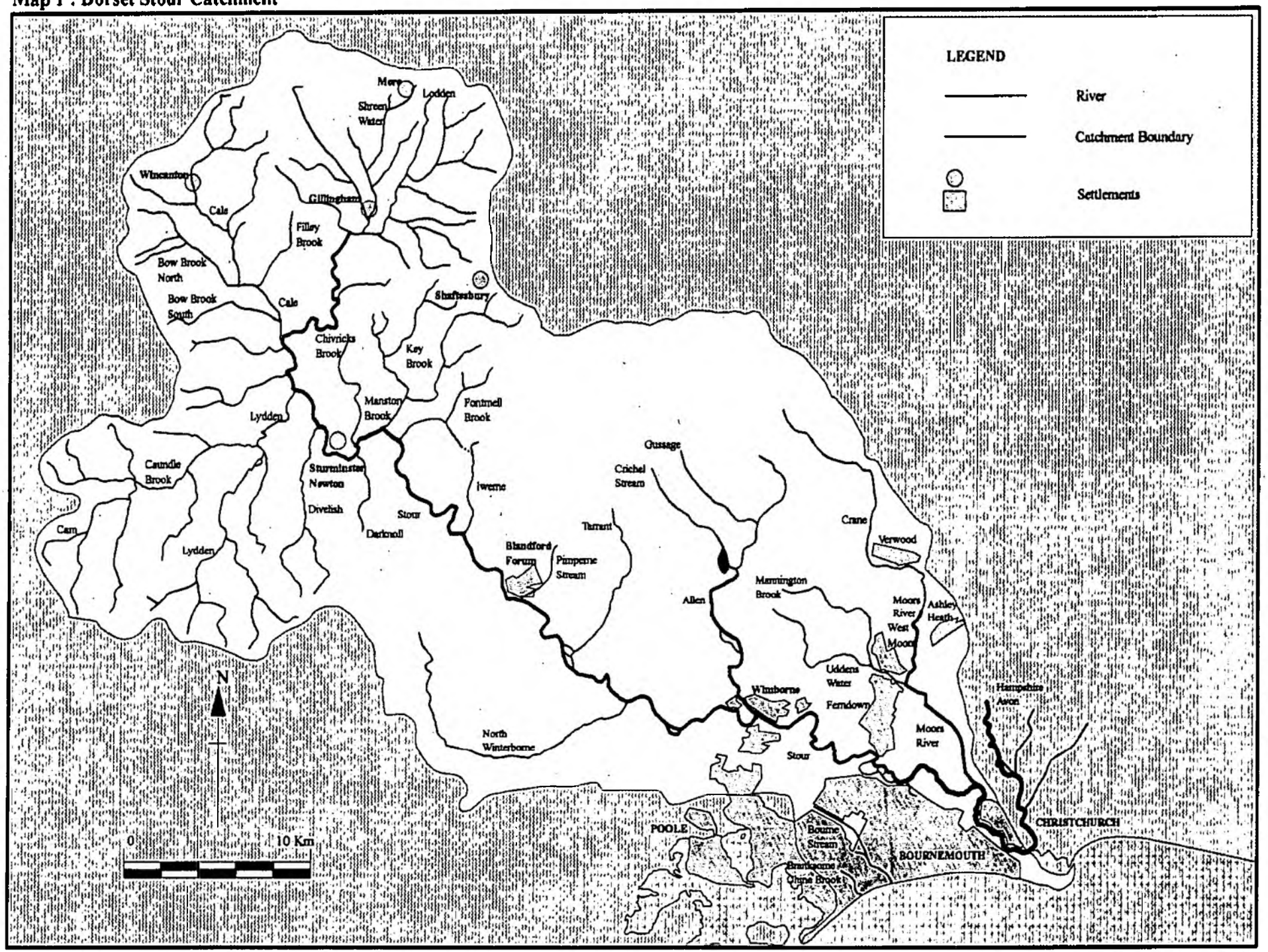
Part 2 contains:

- *a detailed account of catchment use, activities, and the state of the environment. This forms a useful reference document and will provide background information relevant to the issues identified in Part 1.*

Part 3 contains:

- *Technical Appendices including details of UK legislation and relevant environmental standards.*

Map 1 : Dorset Stour Catchment



Information Correct As Of Nov 1996

Environment Agency South West Region
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3. CATCHMENT DESCRIPTION

The Stour rises on the Greensand at St Peters Pump in Stourhead Gardens and flows 96km to the sea at Christchurch; the fall over its entire course is approximately 230m. The catchment lies predominantly within the county of Dorset, with smaller areas falling within Somerset and Wiltshire. It covers a land area of 1,300km^2 with a population of about 394,000 (1991 census).

From Stourhead, the river flows south to Gillingham where it is joined by the Shreen and Lodden, which drain from the Kimmeridge clays. Around Gillingham, the landform varies from expansive open landscapes, to deep enclosed valleys running off the North Dorset Limestone Ridge and onto clay. Further west and south, the Blackmore Vale is broad and gently undulating, and is drained by the Stour and a dense network of tributaries. This is a domestic farmed landscape of pastures, scattered villages, hedgerows and small woodlands forming an irregular patchwork.

Flowing south towards Sturminster Newton, the Stour is joined by several clay influenced tributaries including the Bow, Filley and Caundle Brooks, the Cam, the Lydden and Divelish. The nature of the geology gives rise to a dense drainage network which is particularly responsive to rainfall.

Below Sturminster Newton, the Stour flows towards Blandford Forum through a narrower valley with chalk hills either side. The landuse is mainly arable on the gentle slopes towards the edge of the floodplain and pasture on the flat valley floor. Settlements and roads either hug the foot of the chalk escarpment as on the Stour, or are concentrated on the valley floor. Tributaries here are fewer in number, and include the Iwerne, Allen, Gussage, Tarrant, North Winterborne and the Pimperne.

At Wimborne Minster, the Stour flows over the geological boundary onto the tertiary deposits and on towards Bournemouth across a landscape of typically large open fields, predominantly pasture with arable and settlements along the outer margins of the valley floor.

The Allen flows over chalk for almost all of its length until it joins the Stour at Wimborne. Its valley landscape is much more intimate than the surrounding countryside, with flat water meadows on either side of the river contrasting with adjacent arable fields. Copses and riverside trees are frequent; development is rare, though historic bridges are a feature.

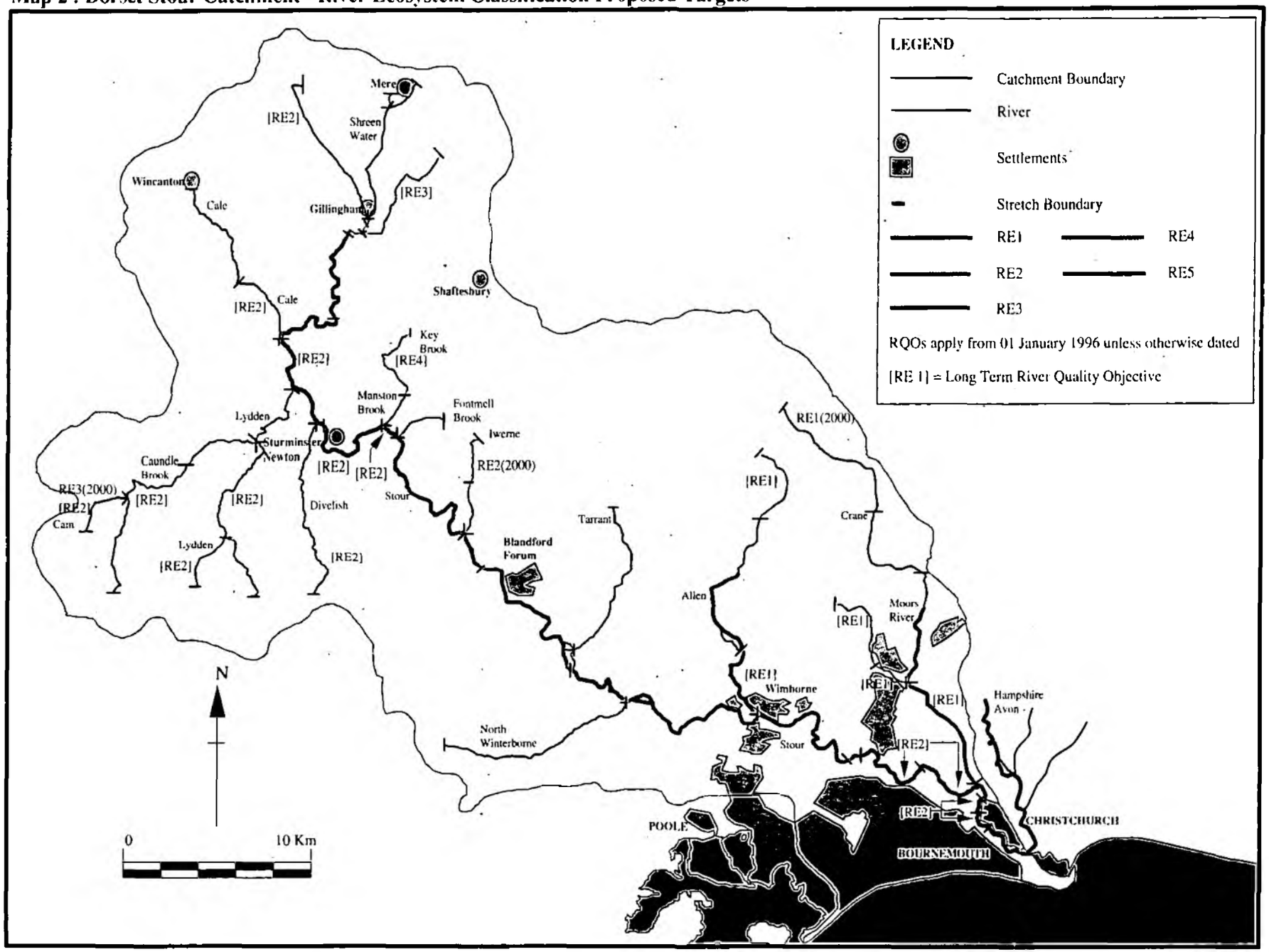
The Crane rises on the chalk, but is known as the Moors River after it enters the tertiary deposits; it is joined by the Uddens Water at Ferndown, and joins the Stour at Hurn. It flows down through a landscape of low rolling hills, through an irregular and enclosed patchwork of pasture, woodland including coniferous plantations, hedgerows and heathland on acid soils.

In Bournemouth, the watercourses are an important part of the townscape, as narrow, wooded corridors. The coastal fringe is heavily populated with the main centres of Bournemouth, Poole and Christchurch. The coastal area, with its bathing beaches and potential for recreational activities, is popular with tourists during the summer season.

Towards the coast, the floodplain widens to form extensive level pastures, marsh and mudflats, meeting the Hampshire Avon to form Christchurch Harbour. This has an area of approximately 2km^2 and consists mainly of intertidal fine muddy sand with small areas of salt marsh. We published a Catchment Management Plan for the Hampshire Avon in 1992.

Christchurch Harbour has a particularly rich flora that largely reflects the diversity of habitats it supports. The Harbour is an important landfall and dispersal point for bird migrants. The peninsula, culminating at Hengistbury Head, has revealed traces of settlements dating back to the upper palaeolithic period. The sheltered nature of the Harbour also makes it very popular for recreation.

Map 2 : Dorset Stour Catchment - River Ecosystem Classification Proposed Targets



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4. ISSUES AND OPTIONS

4.1 The setting of water quality targets

4.1.1 Background

We manage water quality by setting targets called River Quality Objectives (RQOs). They are intended to protect current water quality and future use, and we use them as a basis for setting consents for new discharges and planning future water quality improvements.

We have proposed our RQOs using a classification scheme known as River Ecosystem (RE) (see 26.3 for details of the associated chemical water quality) which was introduced by the National Rivers Authority, following public consultation, in 1994. It replaces a former scheme introduced by the Water Authorities in the late 1970s and used by the NRA until 1994. The RE classification comprises five hierarchical classes as summarised below.

RQO (RE Class)	Class Description
RE1	Water of very good quality suitable for all fish species
RE2	Water of good quality suitable for all fish species
RE3	Water of fair quality suitable for high class coarse fish populations
RE4	Water of fair quality suitable for coarse fish populations
RE5	Water of poor quality which is likely to limit coarse fish populations

The RQOs we set must be achievable and sustainable; we must be able to identify what needs to be done to meet the RQO, and to ensure as far as practicable that water quality can be maintained at this level in the future.

Where we are unable to identify solutions or resources to resolve current water quality problems, we can also set a visionary or Long Term RQO; we will use this visionary target as a basis for setting consents for new discharges. This will ensure that future developments will not hinder our efforts to improve water quality.

4.1.2 The proposed water quality targets

The rivers of the Stour catchment have been divided into 49 classified reaches and the RQOs that we intend to set are outlined in Map 2.

Section 7.1 provides more information on the RQOs and includes a map which details compliance with these RQOs. Where a reach does not comply with the proposed RQO, the reasons are investigated and the necessary actions are taken to ensure compliance.

4.2 Impact of agriculture on water quality

4.2.1 Background

Over the last ten years there have been significant improvements by farmers in farm waste storage facilities and disposal methods which have resulted in significant reductions in the numbers of point source pollution incidents attributed to dairy farms in the catchment. However, stretches of the rivers which drain the Blackmore Vale, a low lying area with heavy clay soil that is intensively dairy farmed, are still susceptible to agricultural runoff from the land when it rains.

4.2.2 Effects

Farming activities cause or contribute to marginal non-compliance with our water quality targets (River Quality Objectives, RQOs, see 26.3) in the Stour, Divelish, Caundle and Manston Brook (see 7.1); non-compliance with long term RQOs in the Stour, Lydden, Lodden and Caundle Brook (see 7.1); an EC Freshwater Fish Directive (see 26.2.1) failure on the Lydden, and an EC Surface Water Abstraction Directive (see 26.2.6) failure to meet the nitrate standard at Longham (see 7.4).

In some instances, the nutrient loading causes algal problems in lakes within the catchment, for example in the upper Stour and the Allen. Discharges of these algae through the lake outlets to the river affect our chemical analyses like any other organic material, and can distort the biochemical oxygen demand (BOD) results; if we do not have appropriate data to allow us to set aside (see 26.3.1) these results, they can lead to spurious failures in RQOs.

Nutrient enrichment from agricultural sources probably contributes to eutrophication in the Stour and Christchurch Harbour. Algal blooms in the Stour itself have been observed for a number of years. During 1995 monitoring requirements for the EC Urban Waste Water Treatment Directive (see 26.2.4) provided chlorophyll data which showed that four stretches of the Stour between the Tarrant confluence and Longham had elevated BOD concentrations attributable to major algal blooms, and the 1995 BOD data will be set aside.

The presence of summer algal blooms may itself contribute to non-compliance with RQOs and long term RQOs in the Stour and possibly the Lydden. Algal blooms cause diurnal fluctuations in dissolved oxygen concentration in the river with significant reductions at night. This can pose a risk for fish populations.

There were 49 substantiated farm pollution incidents in the catchment between January 1994 and October 1996.

In recent years, Wessex Water Services (WWS) have reported rising levels of nitrates at their Black Lane borehole near Blandford, which have occasionally exceeded the EC Groundwater Directive standards. Hall & Woodhouse in Blandford have also reported rising levels of nitrates from their borehole.

4.2.3 Options for action

We set our water quality targets (RQOs) based on the need to protect current water quality and future use.

Monitoring of chlorophyll will be included at a further 26 sites in the Stour catchment to provide further information on the duration of algal blooms.

A major campaign on farm pollution prevention work in the Stour catchment is planned during 1996; we have already targeted the Caundle, Cam and Lydden. Prevention is better than cure, and we commit substantial resources to advising farmers to ensure that the risk of pollution from all agricultural activities is minimised, and we encourage the active use of Farm Waste Management Plans.

We have resolved one local source of nitrogenous material to groundwater, at a local fertiliser storage facility; we will continue to investigate changes in nitrates in groundwater resulting from this.

We have been investigating the levels of fertiliser application at some arable farms around Blandford; we will shortly be employing a consultant to produce fertiliser management plans for four farms.

4.3 Impact of sewage and sewerage on water quality

4.3.1 Background

The EC Bathing Waters Directive concerning the quality of bathing water protects the environment and public health of bathing waters, by reducing pollution entering identified bathing areas (see 26.2.2). Of the ten identified EC Bathing Waters in the catchment (see 7.2), only Bournemouth Boscombe Pier has failed since 1990, in 1993.

4.3.2 Effects

Samples containing high bacteriological counts have been taken during investigation work at Boscombe West surface water short sea outfall (SSO), which may indicate sewage contamination, although surface water can have naturally high bacteriological counts. These results, and the fact that sampling was undertaken during dry weather conditions, imply that foul connections to the SSO would be a likely source of contamination. The outfall site will also be routinely monitored during the bathing water season. The outfall discharges a short distance below the mean low water mark approximately 250m west of the Bathing Water site.

Discharges from Kinson, Palmersford and Holdenhurst STWs may be contributing to non-compliance with long term RQOs on the lower Stour, and contributing to the nutrient enrichment in the Stour and Christchurch Harbour.

RQO results have identified a problem with stormwater discharges from Iweme Minster STW.

Lack of mains drainage, private discharges, leaking sewers and septic tanks may cause or contribute to non-compliance with RQOs in the Lodden and the Key Brook.

Poor sewerage may cause or contribute to marginal non-compliance with long term RQO in the Shreen Water downstream of Mere.

4.3.3 Options for action

Wessex Water Services (WWS) has announced that it will install secondary treatment and disinfection for all its sewage discharges to recreational and bathing waters by 2005. This will include proposals to improve the effluent from Holdenhurst STW (Stour) and Christchurch STW (Hampshire Avon) by UV disinfection. The timing of these improvements has yet to be determined.

Investigation work is also to be undertaken to assess the possible impact on the bathing water of the Boscombe Pier CSO long sea outfall (LSO), which discharges beyond the end of the pier. Depending on the outcome of a specialist report, spill frequencies of CSOs at Bournemouth may also be improved.

Work has also been undertaken with Bournemouth Borough Council to investigate occasional high counts at the Bournemouth Pier bathing water site. The Bourne Stream may be a source of contamination, although during normal conditions the stream does not discharge at the bathing site but is directed out to sea via the long sea outfall.

Work is to be undertaken at Boscombe West surface water short sea outfall (SSO) to investigate the possibility of foul connections to the SSO as a likely source of contamination.

WWS are taking short-term measures to reduce the stormwater discharges from Iwerne STW by increasing the throughput of the treatment plant. They are also planning a long-term solution which would involve uprating the whole plant.

We will complete studies on the trophic status of the Stour and Christchurch Harbour using water

quality modelling techniques to assess the relative importance of the various sources of nutrients.

We set our water quality targets (RQOs) based on the need to protect current water quality and future use.

We will provide information regarding the installation of first time sewerage.

We will negotiate with Wessex Water Services to rectify sewer flooding problems at Mere.

4.4 Impact of urban runoff on rivers

4.4.1 Background

Water quality in the Moors River, Ameysford Stream, Crane and Uddens Water are affected by urban runoff and sporadic pollution incidents from local industrial estates and urban areas. Sluggish flow in these watercourses compounds these problems. The Moors River is a Site of Special Scintific Interest (SSSI), and there is a proposal to extend this designation to include parts of the Crane.

4.4.2 Effects

Runoff from roads and trading estate drainage problems may cause marginal non-compliance with RQOs in the Uddens Water and the Crane (see 7.1).

Runoff from extensive areas of roads and hardstanding can lead to problems with spate flows in rivers. The inability of surface water to soak into the ground can produce rapid rises in water level, and exacerbate the problem of materials being washed into the watercourse.

4.4.3 Options for action

We have just started a major survey of water quality in the Moors River, using both chemical and biological sampling. In the first instance we will try and identify the causes of problems in the area around Woolsbridge, concentrating our attention on site drainage from industrial estates and drainage from farms.

In dealing with planning matters which involve surface water runoff, we normally require some form of attenuation to be included to remove oil and grit and to reduce runoff rates into the receiving watercourse. In some cases, developers are encouraged to include additional pollution protection measures such as reed bed ponds as well as monitoring equipment. We also encourage developers, where possible, to discharge clean surface water to ground to assist the recharge of the aquifer.

4.5 Contaminated land

4.5.1 Background

The Ashington Stream, a tributary of the Stour, is affected by volatile organic solvents from the nearby Cogdean Elms industrial site, which has a long history of association with solvent storage and supply. There have been two licensed waste solvent storage operations prior to the wastes being sent for recovery. Only one is now licensed, the other having ceased operation following enforcement action by the Waste Regulation Authority. Solvents spilled on the ground since 1950 have contaminated a minor aquifer and discharge to the stream via local springs.

4.5.2 Effects

Environmental Quality Standards (EQS, see 26.2.3) levels are being exceeded, and the solvents are detectable in the Ashington Stream for about two kilometres. Monitoring data from the Stour approximately 4km downstream shows no measurable solvent concentrations.

4.5.3 Options for action

At present we are carrying out an assessment of treatment options and actions which we can take. Clean up is likely to involve treatment of collected leachate and removal of the solvent layer within the ground using specialised techniques. Such remediation is technically and legally complicated, and actions taken may involve ourselves, the local authority and the landowners.

We will continue to monitor downstream water quality and assess the effectiveness of treatment options.

4.6 Impact of public water supply abstractions on the Allen

4.6.1 Background

The Allen has been identified as one of the top 20 low flow sites in England and Wales requiring attention as a consequence of groundwater abstraction, principally from the Bournemouth & West Hants Water Company (BWHW) borehole at Stanbridge.

4.6.2 Effects

Biological surveys have investigated the effects of low flows on invertebrate fauna and macrophyte growth. The growth of *Ranunculus* (water crowfoot), often regarded as an indicator of the perceived health of chalk rivers, is erratic and in some years very poor. This appears to be related to the flow regime, with low summer flows and high winter flows being particularly damaging.

Bird surveys since 1989 have revealed a total collapse of the important breeding populations of snipe and redshank. River birds such as the little grebe and coot, which depend on a rich growth of macrophytes may also have declined. Species such as moorhen, sedge and reed warblers, and reed buntings that depend heavily on marginal and bankside vegetation remain relatively stable.

There is a likelihood that low dilution flows in the Allen contribute to marginal non-compliance with RQOs; road runoff and trading estate problems are the most probable source of the contamination.

The Allen was once the major spawning area for salmon in the Stour catchment. Abstraction has reduced much of the suitable spawning and nursery habitat, and probably also reduced the magnitude and delayed the onset of the peak flows that attract migratory salmonids to the Allen. Recent electric fishing surveys on the Allen have encountered juvenile salmon in the vicinity of Hinton Dairy and Fitches Bridge (1994), confirming that a salmon population still exists on the Stour with the potential to expand given suitable habitat.

The original wild trout population of the Allen was probably part migratory; sea trout are now rarely seen on the river and the known effects of abstraction on migration flows and production of juvenile trout may have played some part in the decline.

The impact of groundwater abstraction on brown trout angling quality and the fisheries of the Allen was assessed during the period 1991 to 1993, using the *Instream Flow Incremental Methodology*. Available habitat and spawning habitat for trout and salmon parr were evaluated, and options which

gave the greatest improvements in April flows and spawning conditions and maintained summer angling conditions were considered to be preferable.

4.6.3 Action

In 1993, the NRA proposed an Action Plan which identified the need for a reduction of 50% in the BWHW licence at Stanbridge by 1999, in association with the setting of revised flow targets for the management of streamflow support from existing boreholes.

Progress with this plan has been mixed and much work remains to be done in the modelling of stream support rules to fit streamflow targets. This cannot be concluded until a firm agreement is reached with BWHW over the modifications to its Stanbridge abstraction licence which in turn have a dependency on the flexibility that we might allow in increasing authorised abstractions at the BWHW source at Longham to make good any resulting deficits to public water supply (see 4.7).

The need for this agreement has been acknowledged by BWHW. What is not in place at present is a positive undertaking to transfer some of its dependency on the Stanbridge source to the Longham river intake and register the necessary costs of this against possible OFWAT allowances for the water charge increases in the 5 year period following 1998. BWHW has nevertheless volunteered to reduce its abstractions from Stanbridge following the completion of a new water treatment works at Longham in the summer of 1996, while a formal licence variation is under consideration.

Gravel rehabilitation has been undertaken in the Allen downstream of Witchampton in order to improve salmonid spawning habitat, as gravels were found to be highly compacted.

4.7 Potential impact of public water supply abstractions at Longham on the lower Stour

Permanent reductions in abstraction from the Allen (see 4.6) will be dependent on the availability of water at Longham. Bournemouth & West Hants Water (BWHW) already have a licensed river abstraction at Longham which currently includes no prescribed flow condition to safeguard downstream users of the river.

While we are committed to the principle of abstractions as near as possible to the mouths of rivers, there is still a need to ensure that such abstractions do not have adverse environmental impacts.

4.7.1 Effects

Insufficient residual flows downstream of Longham may result in a deterioration in water quality associated with the lack of available dilution water to reduce the impact of treated sewage effluent discharges from Kinson STW, Palmersford STW and Holdenhurst STW.

4.7.2 Actions

A prescribed flow will be set for the abstraction at Longham, linked to flows at our Throop gauging station, and the flow condition will ensure that there are sufficient residual flows in the Stour downstream of Longham to provide adequate dilution of treated sewage effluents discharged to the river.

We will continue to emphasise the need for demand and resource management in preference to resource development, as detailed in our Water Resource Development Strategy (see 14.5).

4.8 Impact of public water supply on the Tarrant

4.8.1 Background

The Tarrant is a typical chalk winterbourne and during the summer months the upper reaches of the river have historically dried up. In 1995, the river totally dried up and in 1996, the river dried up in and downstream of Tarrant Keyneston. There is considerable local concern, particularly about the lower Tarrant. There are two public water supply abstractions operated by WWS, one at Stubhampton in the headwaters of the Tarrant and one at Shapwick in the valley of the Stour. For a number of years there have been concerns about the possible adverse effect these abstractions may have on flows in the Tarrant.

4.8.2 Effects

Data gathered by local enthusiasts indicates that in nine of the last 22 years, the Tarrant has dried up below Tarrant Monkton, and also the lower reaches have dried up in 1976, 77, 89, 90, 95 and 96.

In 1995, a major fish rescue operation was mounted as the river progressively dried out both from the source and from its confluence with the Stour, leaving little more than a trickle in the vicinity of Tarrant Rushton.

4.8.3 Options for action

Initial investigations indicate that the small Stubhampton source has little significant influence on the natural pattern of events but we do not dismiss the possibility of a connection with the Shapwick source.

With the fullest cooperation of the local communities, we have been monitoring the rise and fall of stream flows in recent years to attempt to identify their natural characteristics. We now consider that a more detailed investigation of the possible influence of the Shapwick borehole is warranted. This is likely to involve not only field investigations aimed at improving our understanding of groundwater movement and the links between groundwater and the river, but consideration of the construction of a gauging station in the vicinity of Tarrant Crawford to provide a continuous record of stream flows. To implicate the Shapwick source, the investigation will need to provide hard evidence of cause and effect which strips away the influence of natural climatic variations and other factors.

We will keep local people informed of our progress with this investigation.

4.9 Maintaining our rivers and flood defences

4.9.1 Background

We undertake maintenance work to ensure the efficient working of the natural or artificial drainage system, and to ensure that flood alleviation schemes provide protection up to their design standard. We must also take account of our conservation duty when undertaking maintenance work.

4.9.2 Effects

If we do not undertake the appropriate level of maintenance, there will be an increased risk of flooding and land drainage problems. Additionally, maintenance work has the potential to impact on the habitat and wildlife of the river and the river corridor.

4.9.3 Options for action

Our maintenance work is underpinned by the Standards of Service (SoS) methodology which identifies the level of maintenance required based on the use and associated value of the adjacent land. We monitor compliance with the SoS and, where we are not meeting our target, remedial work is considered. On the Stour, 70km of river does not meet the target Standard of Service; the completion of many urban schemes in recent years has resulted in additional work associated with the maintenance of mechanical and electrical systems. Much of the extra maintenance effort is required on river reaches between urban flood alleviation schemes.

Higher standards of maintenance are proposed to meet the target Standard of Service and for the urban flood alleviation schemes. This will result in further expenditure being shifted away from other catchments or the need for additional financial resources.

We need to review whether the historical maintenance that we have carried out, e.g. weed cutting to maintain agricultural land drainage schemes, is justifiable or whether this maintenance effort should be redirected to urban areas.

We must also take account of our conservation duty when undertaking maintenance work. Our maintenance work provides enhancement opportunities for conservation and fisheries. Rare aquatic plants and especially diverse plant communities are present on the Stour, and we will update our database and use this information when considering maintenance work. Where maintenance work is taking place, we will control invasive species of plants where appropriate.

We will review the current operational and maintenance plan, including the weed cut, on the Moors River SSSI and Piddles Wood SSSI. On the Moors River SSSI we will extend the present operational and maintenance plan specification to incorporate our work on the Uddens Water. We will also prepare a conservation strategy and consenting protocol for the Crane/Moors River proposed SSSI extension.

In addition to reviewing standards of service for historical land drainage schemes to those appropriate for the current landuse, there is a need to review maintenance so that it is consistent with the need to protect and enhance the natural environment.

There is a need to explore potential enhancements for wildlife when undertaking river work, especially on the upper tributaries, e.g. Cale and Bow Brook.

There is a need to review the routine maintenance operations on the Stour (Marnhull Ham-River Cale) to benefit plants and bird populations, and on Millhams Stream, North Winterborne and the Church Street Stream (Sturminster Marshall) to identify opportunities for conservation improvement.

There is a need to review grass cutting operations and enhancement opportunities on the Stour through Gillingham, Quomps, Wick, Holdenhurst, Shapwick and Blandford.

4.10 The adequate provision of flood warning and emergency response in the catchment

4.10.1 Background

Absolute flood protection is not possible; because of this we need to warn people when there is a risk of flooding. From 1 September 1996, we have the lead role in passing flood warnings to people who

are at risk, so that they can take action to protect themselves and their properties. Where there is a risk that flooding could occur, flood warnings will be issued for the area affected. These warnings are issued to the Police, Local Authorities, media and in places to those directly at risk. Detailed arrangements are documented in the *Dorset Floodwarning Dissemination Plan* which can be viewed at our Regional Office at Exeter or our Area Office at Blandford.

Flood warning for the Stour is based on the gauging station at Colesbrook, a level recorder on the Lodden, and principally the gauging station at Hammoon. These are supplemented by rain gauges, gaugeboard readings and the gauging station at Throop. Flooding in the tidal stretch of the river at Christchurch is extremely difficult to predict.

Flood warning is not an exact science; we use the best information available to predict the possibility of flooding, but no warning system can cover every eventuality. It is the responsibility of those who live in flood prone areas to be aware of any risk and to know what action they should take to protect themselves if flooding occurs. Warnings are issued for flooding from most major rivers and the sea. There are other types of flooding for which a warning service cannot be provided, for example, road flooding caused by blocked drains.

4.10.2 Effects

Flooding can cause widespread damage to property, business, transport, and even death.

4.10.3 Options for action

We have a strategy (ERLOS) which details how flood warning procedures operate, and we use this to improve our emergency response. Where possible, we issue a warning at least two hours in advance of flooding.

A flood prediction model of the Stour is being developed which will predict flood levels at Colesbrook and Hammoon from rainfall. This will assist in providing earlier floodwarnings and faster operational response than is currently available by monitoring actual conditions at these locations.

To improve flood warning, we are also proposing additional telemetry stations with the following priority

Priority One	Priority Two	Priority Three	Priority Four
Stour - Gillingham, Milton Farm	Cale - Wincanton	Cale - 5 Bridges, Lower Nyland	Lydden - Bagber Bridge
Stour - Ecliff	Stour - Shapwick	Stour - Pimperne	
Stour - Bryanston	Stour - Grove Farm	Stour - Holdenhurst	
Stour - Sturminster Marshall		Stour - Beaulieu Gardens	
Allen - Wimborne			
Stour - Iford			
Stour - Willow Way			

In addition to issuing flood warnings, we have our own emergency workforce which works to ensure that flood alleviation schemes work to their design standards (see 17.2.8). To ensure that our workforce can respond to flooding, the system includes an *inform operations* level which is reached before a *yellow warning* is issued. This puts our emergency workforce on *alert status*; the following response times are being tested for a trial period:

Location	Hrs	Location	Hrs	Location	Hrs
Gillingham FAS	2.5	Blandford FAS	3.0	Quomps/Christchurch	3.0
Upper Stour (U/S of Hammoon)	2.5	Lower Stour (D/S Hammoon)	4.0	Lower Stour FAS	3.0

Over the next 5 years, we will be improving the flood warning service so that more information reaches those who need it.

4.11 Potential effects of climate change on the environment

4.11.1 Background

A Review of the Potential Effects of Climate Change in the United Kingdom has recently been completed by the UK Climate Change Impact Review Group (CCIRG) for the DoE. It was published by HMSO in July 1996.

The Agency has had a policy guidance note on climate change since 1992 which allows for increases in sea levels of 5mm per year until 2030, and 7.5mm per year thereafter, within this Region.

4.11.2 Effects

The CCIRG defined scenarios under which:

- *temperatures are expected to rise 0.2° Centigrade per decade*
- *extremely warm seasons and years are expected to occur more frequently*
- *annual precipitation as a whole is expected to rise by about 5% by 2020, and by 10% by the 2050s*
- *winter precipitation increases everywhere, but more substantially over the southern UK. Summer precipitation decreases over the southern UK*
- *average seasonal windspeeds are expected to increase over most of the UK*
- *sea level is expected to rise at the rate of 5cm per decade. This is likely to be exacerbated in southern and eastern UK by sinking land and mitigated in the north by rising land*

Effects which may be anticipated include:

- *reduced protection for sea defences*
- *impeded drainage to tidal waters*
- *greater overtopping and damage to coastal defences*
- *changes to wetland hydrology, flora and fauna*
- *possible increased flood risk in some catchments*
- *possible increase in drought*

4.11.3 Options for action

The need for tidal defences in Christchurch Harbour needs to be assessed when more detailed local information is available regarding sea level rise.

The implication of global warming and sea level rise needs to be determined for our other functions.

4.12 Constraints on fish populations

4.12.1 Background

The Stour is fished from Gillingham to Christchurch, and the lower river in particular is a coarse fishery of national repute. There are local concerns about fish populations related to obstructions to fish movement and the loss of habitat diversity. There has also been a decline in populations of migratory salmonids.

Our work to reduce pollution, to manage water resources, and our flood defence maintenance each makes a significant contribution to providing suitable conditions for many species of fish.

4.12.2 Effects

Local angling clubs claim that coarse fishing on the Stour between Blandford and Spetisbury has declined as a result of major flood alleviation schemes in the 1970s.

Coarse fish populations on the Moors River are at the lower end of the expected densities, and it is believed that Hurn Weir restricts upstream migrating dace in all but the very highest flows. Migration of dace occurs in the autumn and winter, particularly after a rise in flow. During an investigation, dace were seen attempting (and failing) to ascend the weir and subsequent examination of these fish showed abrasions on their bodies consistent with repeated attempts to ascend an obstruction.

Hurn Weir is not thought to pose a problem to the majority of salmonids migrating upstream to their spawning grounds on the Crane and Mannington Brook, although some degree of obstruction may be encountered here and at other developments. There are various obstructions to migration along the Allen, the most notable of which is the Board Mill at Witchampton; it is locally understood that Witchampton is the upper limit for migrating salmonids. Additionally there are various hatches and weirs which, while posing no problems provided there is an ample volume of water passing over them, have become obstructions to the movement of fish for longer each year due to the low flow conditions experienced in recent years.

The amount of available spawning and nursery habitat in the Allen has declined as a result of reduced flows since 1970 (see 4.6).

4.12.3 Options for action

We are currently investigating ways of improving coarse fish habitat diversity on the Stour between Blandford and Spetisbury.

We have recently assessed the options for helping fish to ascend Hurn Weir without compromising its gauging capacity, and a preferred option has been identified. Construction will take place as soon as flow conditions allow.

We will investigate migration conditions for sea trout on the Crane, and take action to reduce any obstructions which may be identified.

We introduced a byelaw in 1994 to protect large, early-running spring salmon. The season has been shortened by two and a half months, and netting is only permitted between 15 April and 31 July inclusive. Within this period fishing is further restricted by weekly close times.

We will produce a Local Salmon Action Plan in 1999 which will provide a clear plan of action with targets to work to.

We are also trying to achieve physical habitat improvements by gravel loosening and cleaning where appropriate; this should improve the use of the currently available habitat.

4.13 Loss and decline in the value of riverine and floodplain habitat

4.13.1 Background

The river floodplain habitat has been significantly reduced, in many places to a narrow strip. This has resulted in patchy habitat which has reduced the value of the remaining habitat and potentially makes the impact of river maintenance work much more severe. Some watercourses in the catchment have been greatly modified and the loss of meanders, marsh and ditches has further reduced the value in riverine and floodplain habitat.

4.13.2 Effects

The loss of habitat could restrict the spread of otters. Additionally, the Stour supported the largest inland breeding population of lapwing, snipe, curlew, redshank and yellow wagtail in Dorset. A steady decline has occurred since the 1970s for all species.

4.13.3 Options for action

Throughout the catchment there is potential for restoration and enhancement of the river corridor. There is a need to set targets for the amount (width/length) of restored wetland and linear river habitat.

Specifically the river corridor can be improved by tree planting, setting back fencing and establishing permanent grassland adjacent to rivers. Such work is needed on the Cale, Bow Brook, Shreen, Lodden, Key Brook and some parts of the Stour. Additionally there is the need for a programme of tree management on the Stour, Lydden and Caundle Brook.

We need to promote the aim of linking the remaining valuable habitat by encouraging the growth of tree cover out of the channel section on the Lydden and Caundle Brook.

We will be partners in the Blackmore Vale Habitat Restoration Project, one of whose aims is to restore and link streamside habitat.

Agricultural Incentive Schemes, such as the Habitat Scheme, Water Fringe Option (MAFF), Stewardship (MAFF) and Gillingham Royal Forest can be used to support forms of agriculture which balance the needs of the environment with production.

Improvements in habitat will require us to review our own flood defence maintenance operations and to work in partnership with riparian owners to secure improvements.

Areas of existing and potential habitat for breeding birds have been identified at Marnhull, Fiddleford, Sturminster Marshall and Corfe Mullen on the Stour and the upper Allen, Lydden and Cale. We will investigate options for the creation of wetland habitat.

4.14 Protection of ecologically important habitats and species

4.14.1 Biodiversity

In 1994, the government published the UK Biodiversity Action Plan as its response to the international initiative for conserving biodiversity. This plan led to a steering group which produced outline plans and targets for the most threatened species and habitats in the UK.

The government has identified formal contact points for each of the species and habitats. We have been named as the contact point for one habitat (chalk rivers), and twelve species, at least six of

which occur in the South Wessex Area: water vole, otter, white-clawed crayfish, depressed river mussel *Pseudanodonta complanata*, southern damselfly *Coenagrion mercuriale*, and a pea mussel *Pisidium tenuilineatum*.

Although we can directly influence some of the activities affecting the quality of the water environment, achieving environmental sustainability requires the commitment and cooperation of many people and organisations, including ourselves. We will collaborate with other organisations to set targets, prepare and implement the UK Biodiversity Action Plan for key species and habitats. We will incorporate appropriate actions in the LEAP Action Plan for relevant species and habitats.

In addition to our work on the UK Biodiversity Action Plan, we will play our full part in contributing towards the appropriate management of protected sites in the catchment. These include SSSIs, proposed Special Areas for Conservation (SAC) nominated under the EC Habitats Directive, and proposed Special Protection Areas (SPA) nominated under the EC Birds Directive.

With regard to SACs and SPAs, the Agency is a *competent authority*, and has extra responsibilities regarding their protection; specifically we are obliged to review all existing authorisations affecting these sites, taking advice from English Nature into full account.

4.14.2 Otters in the catchment

Formerly widespread throughout the UK, the otter underwent a rapid decline in numbers from the 1950s to 1970s and was effectively lost from midland and south-eastern counties of England by the 1980s. The otter is one of the species identified in the UK Biodiversity Action Plan for which the Agency is a contact point.

Factors causing loss or decline include: pollution of watercourses, especially by PCBs and other biologically active chemicals which affected their reproductive system; insufficient prey associated with poor water quality; impoverished bankside habitat features needed for breeding and resting; and incidental mortality, primarily by road deaths and drowning in eel traps.

Monitoring of pesticide levels in eels (a major food source of otters) is ongoing and shows that pesticide levels, which were known to be high in some parts of the catchment, are stable or in decline. Further results of these analyses will be available late in 1996. Habitat quality is good but patchy; some lengths of river are almost devoid of tree and shrub cover and this, coupled with increasing access in river corridors, may be limiting factors. Improvements in bankside habitat may assist the spread of otters in the catchment.

We will provide post mortem analyses of any dead otters found in the catchment; details are available from our offices. The sites of road fatalities around Wimborne have been investigated, but the costs of making them otter-friendly appear prohibitive at present.

4.14.3 Crayfish in the catchment

The native white-clawed crayfish (*Austropotamobius pallipes*) is globally threatened and is another species identified in the UK Biodiversity Action Plan for which the Agency is a contact point. Historically it was widespread throughout the UK, and throughout the Stour catchment. Numbers have declined since 1984, and none have been seen in the Stour since 1986, although some are still present in tributaries.

The introduction of American signal crayfish (*Pacifastacus leniusculus*) for farming brought with it a virulent fungal infection which proved fatal to our native crayfish. This infection can be spread on damp equipment and mud, and also by birds, fish, mink and otters. Crayfish are also susceptible to

habitat modification, especially dredging and weed removal, and water quality, especially siltation and herbicides.

We are publicising the dangers of plague transfer and the benefit of disinfecting equipment and boots by people who regularly cross between catchments; a leaflet will be available from our offices. We will also ensure that river and bankside works are carried out in a sensitive manner where native crayfish are known to be present.

4.14.4 Water voles in the catchment

We are supporting a project run by Dorset Wildlife Trust to find out the current distribution of water voles in the county. A National R&D project is studying the interactions between water voles and mink, by trapping and radio tracking, habitat manipulation, and analysis of landuse and water quality data. This is a two year project due to report in 1998.

4.14.5 Headwater streams

Headwater streams of the Stour catchment have been identified in recent studies as containing rare invertebrate populations (Furse 1995), and winterbourne sections are known to contain a specialised fauna. These could be at risk from future abstraction proposals and agricultural activities. Where resources permit, we will sample the invertebrates of selected reaches of the potentially more vulnerable rivers to provide data on which we can assess future proposals.

4.15 Need to protect features of archaeological interest

4.15.1 Background

The extent of known archaeology, coupled with the relative paucity of information, highlights archaeology as a key interest in the catchment. We have a statutory duty to protect and conserve buildings, sites and objects of archaeological, architectural or historic interest.

4.15.2 Effects

Archaeological features are at risk from direct damage by our work e.g. river maintenance and dredging, and indirectly through the drying out of organic remains with lowered water tables and the deposition of spoil on sites of historic interest.

4.15.3 Options for action

We must ensure that the our database is kept updated, and screen all our works and consented works for the presence of these sites. We consult with County Archaeologists where any known site may be affected by ourselves or by Agency-consented works.

As very little is known about the wetland resource within the catchment there is also a need to identify those sites with as yet unknown interest. We need to further identify the wetland archaeological resource within the catchment.

4.16 Developing waste minimisation strategies for sustainable waste management

4.16.1 Background

The DoE White Paper *Making Waste Work* sets out the government's policy framework for the management of waste. It sets out ways in which waste can be managed in a more sustainable way, and sets targets for achieving that aim.

This strategy is based on three key objectives: reducing the amount of waste that society produces, making the best use of the waste produced, and choosing waste management practices which minimise the risks of immediate and future harm to the environment and to human health.

Waste minimisation is the first priority for more sustainable waste management; this includes reducing the amount of waste produced that would otherwise need to be processed or disposed, and reducing the degree of hazard represented by such wastes.

4.16.2 Effects

Failure to minimise waste will result in more waste to be disposed. Disposal is usually to landfill, and this can result in the risk of environmental harm and risk to human health.

4.16.3 Options for action

In October 1996, we held a Waste Minimisation Seminar for local industry and businesses. The aim of the seminar was to illustrate the commercial benefits of looking after their operations and reducing waste.

Contacts have already been made with interested businesses and our aim is to establish a waste minimisation group which will progress waste minimisation projects, reducing waste and producing tangible benefits for industry.

4.17 The effect of acid rain on heathland areas in the lower catchment

4.17.1 Background

The term acid rain is used loosely for all acidic deposits from the atmosphere, whether wet or dry, and is not restricted to those brought down by raindrops. It is more accurately referred to as acid deposition.

In the northern hemisphere, these compounds come mainly from burning fossil fuels, but also from natural sources such as organic decay, volcanic eruptions and lightning strikes. These natural sources account for less than 5% of acid deposition in the UK. The main emissions responsible for acid deposition are sulphur dioxide and oxides of nitrogen.

Emissions of nitrogen oxides are thought to be responsible for about one third of the acidity of rainfall, and the proportion appears to be increasing. Road vehicles are responsible for about 90% of the emissions of nitrogen oxides from the transport sector, and for over 50% of all emissions of nitrogen oxides in the UK. The Agency has no control over emissions from road vehicles.

4.17.2 Effects

Acid deposition can degrade land and cause damage to plants and soils. Acid depositions which contain nitrogen can have the effect of acting as a fertiliser, which can change the make-up of

communities of land and water plants and affect the animals that live on them. There is concern that acid deposition in the lower catchment may be changing heathland areas into grassland areas.

4.17.3 Options for action

A review of authorisations for power stations in the electricity supply industry in early 1996 provided for, in particular, very substantial reductions in the emissions of sulphur dioxide, and for continuing reductions in the emissions of both oxides of nitrogen and particulates. This will result in reductions in acid deposition from UK power stations of approximately 75% by 2001, and of 80% by 2005.

Through our IPC (Integrated Pollution Control) authorisations, we are seeking to drive down releases of oxides of nitrogen from industrial processes, for example by requiring the installation of low oxides of nitrogen emitting burners.

4.18 The development of recreation in the Stour catchment

4.18.1 Background

Many people spend their spare time enjoying our rivers and coasts. We have a general duty to promote the recreational use of the water environment throughout England and Wales. The recreational use of the Stour catchment was examined in some detail by the NRA in 1995, during the collation of a recreational database.

The Stour catchment provides good opportunities for land-based and water-based recreation (see 12.1). Some parts of the catchment are already under considerable pressure, while others may be under-utilised.

4.18.2 Effects

Recreational activities can result in tremendous pressure on our environment and result in conflicts of interest between various activities.

4.18.3 Options for action

There is scope for increasing the recreational use of the river corridors where this does not conflict with other legitimate uses of the river; this is particularly so in urban areas where there is scope for educational use.

We will work with other organisations to promote and develop the recreational use of water in the catchment where such use can contribute to an appropriate balance of uses.

Christchurch Harbour is an important recreational and ecological resource that is subject to many competing pressures. We will explore with other parties the best approach to obtaining a sustainable use of this resource.

5. PROTECTION THROUGH PARTNERSHIP

To resolve the Issues identified and to protect the Stour catchment, we need to work in partnership with local authorities, industry, farmers, environmental groups and other interested organisations. This section outlines some of our work with other organisations, and highlights where we need to further develop these partnerships.

5.1 Links with local authorities

We need to work with local authorities to reduce the harmful effects of development. We will advise local planning authorities about the impacts of proposed developments on the environment, and identify opportunities for environmental improvement

New developments may be at risk from flooding or may aggravate flood risks elsewhere by obstructing floodplain flows and increasing surface water runoff. We routinely give advice on flood defence matters for planning applications and other enquiries, and are also consulted on local plans. When necessary, we will ensure that flood protection measures are incorporated in all new developments. We will encourage a presumption against culverting of watercourses and other major modifications to urban watercourses as this reduces habitat and amenity.

Where appropriate we will seek to ensure that pollution control measures are incorporated in all new developments, including implementing our Policy and Practice for the Protection of Groundwater

Where appropriate we will seek to ensure that the wildlife and landscape of river corridors are protected and enhanced in all new developments. Watercourses should be protected from development, and river corridors extended and managed as wildlife corridors.

The aesthetic impact of litter in these watercourses is also of concern, for example in Blandford and Wimborne along with other pressures facing these urban watercourses. We will encourage Local Authorities to investigate litter clearance schemes.

The Agency and local authorities both have responsibilities for air quality, and there is a need to work together to deliver improvements. Equally important is the need to further develop effective working relationships with local Environmental Health Officers in areas of common interest.

5.2 Planning in the coastal zone

This Plan also considers issues that affect the coastal zone. Above the low water mark, the Town & Country Planning system provides the means of regulating development and requires the local authorities to consult us on planning issues which may impact on the water environment. Below the mean low water mark, regulation is controlled by a number of government departments.

Historically there has been considerable concern about the sectoral approach in that it allows departments to take a single issue view discouraging an integrated approach. The government has rejected a seaward extension of the planning system as the most effective means of controlling development in the marine environment.

The view taken is that voluntary cooperation and self regulation, with local authorities taking the lead role, is the best way to control activity and development. Dorset County Council have taken the lead role in setting up a Coast Forum for Dorset, consisting of local authorities, environmental agencies, central government departments, businesses and other interest groups. The aim of the Forum is to promote a sustainable approach to the management of the coastal zone and to develop an integrated coastal zone management policy. We are a member of this Forum and support its aims.

5.3 Shoreline Management Plans

Shoreline Management Plans set out the coastal defence strategy for lengths of coast, taking into account natural coastal processes, human and other environmental influences and needs. They are promoted by coastal defence authorities such as the Agency, and District and Borough Councils, and used in local authority development plans and coastal zone management. The objectives of these plans are to improve our understanding of coastal processes, develop sustainable coastal defence policies, and set out arrangements for continued consultation with interested parties.

There is one such plan in preparation that covers the catchment coastal zone, extending from Durlston Head eastwards to Hurst Spit. Bournemouth Borough Council are the lead agency in this plan, and we are working in partnership with other organisations in the development of this plan.

5.4 Local Agenda 21

Across the catchment, all local authorities are assisting their local communities in developing local strategies and action plans for sustainable development. The approach adopted varies from district to district, with many Local Agenda 21 groups setting up working groups looking at specific issues. We are currently looking at how we can be most effective in assisting local communities in developing their Local Agenda 21 plans.

5.5 Protecting and enhancing wildlife

Historically the Stour has not enjoyed a special reputation for high wildlife value, although this plan indicates its richness and diversity. We need to work with others to protect and enhance habitats and species. We will collaborate with other organisations to set targets, and to prepare and implement Biodiversity Action Plans for key habitats and species.

We will promote Agricultural Incentive Schemes as a means of supporting forms of agriculture which can protect and enhance habitats and species.

5.6 Working with business

We are working in partnership with local businesses and their representatives to promote pollution prevention and waste minimisation. The recent waste minimisation seminar (see 16.5.1), our oil care campaign (see 19.5), and our training video for construction workers are practical examples of how we intend to combine education and communication to prevent pollution.

5.7 Education

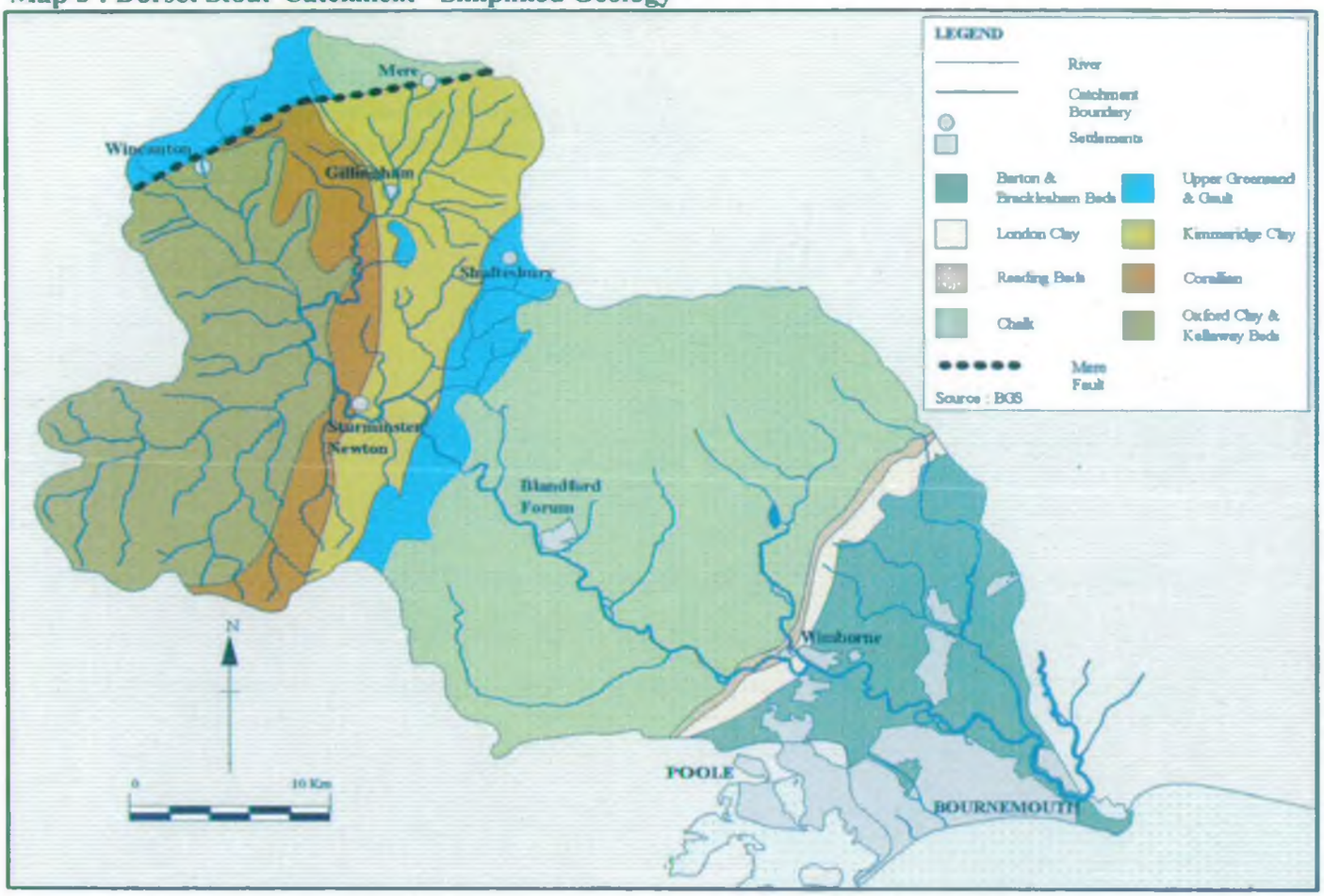
We recognise that broad-based education covering the community, educational and industrial sectors will result in a more informed society that is better able to understand the environment, its needs, and the impact of society's activities upon it. In particular, there is a need to:

- *educate young people to equip them to make informed judgements about future environmental decisions*
- *educate industry through consultation, collaborative activities and targeted campaigns to promote a culture of prevention rather than cure*
- *raise public awareness of environmental issues to engender in society a common ownership of the environment and its challenges*

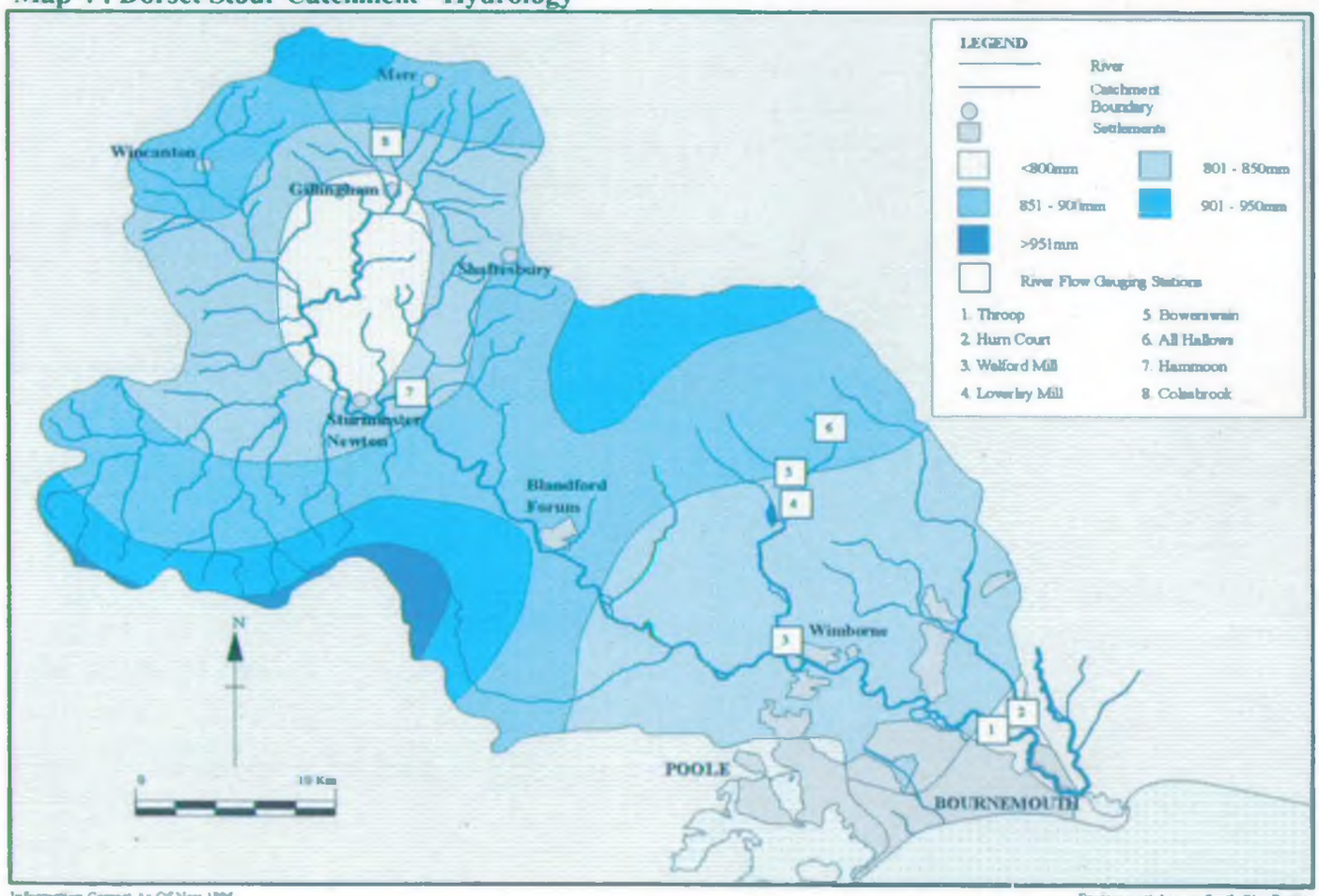
Currently, we provide a wide range of information to all sectors of society, and in addition give many talks and presentations. This LEAP is a practical example of the material we publish which can assist in raising public awareness and understanding of environmental issues.

PART 2
SUPPORTING INFORMATION

Map 3 : Dorset Stour Catchment - Simplified Geology



Map 4 : Dorset Stour Catchment - Hydrology



6. THE PHYSICAL ENVIRONMENT

6.1 Geology, soil and landuse

The oldest outcropping strata, clays and shales of the Oxford Clay and Kellaway Beds, are found in the west of the catchment. Following an eastward line these beds pass into the fossiliferous limestones of the Corallian Beds and to a roughly wedge-shaped area of Kimmeridge Clay (shale with widely separated limestone beds). Further east, sands and clays of the Upper Greensand and Gault outcrop until the junction with the chalk, passing to the south of Shaftesbury and continuing south west across the catchment.

Just short of the northern catchment boundary the Mere fault is found, trending roughly northeast-southwest through Mere and Wincanton. This major fault downthrows to the north bringing younger Cretaceous strata up against Jurassic rocks.

The soils are predominantly clay influenced with smaller areas of chalky soils. The landscape of the Blackmore Vale is one of pastures, small woodlands and gently undulating clay vales.

Chalk outcrops in the middle catchment as the uplands of East Dorset. Soils are characteristically shallow, well drained and chalky, although there are areas of clay influenced soils; landuse includes large arable fields and small blocks of woodland. Although woodland is more extensive on the steeper valley sides and the escarpment, it is intermingled with rough grazing and open grassland.

Further south, the Reading beds appear as a thin band against the chalk; these beds then have a sharp junction with the London Clay.

In the lower catchment there is a more recent geology of sands, clays and pebbles making up the Barton and Bracklesham beds. Soils are clayey and sandy with lowland heath, pasture and woodland typical, along with limited arable farming.

The valley pastures of the lower Stour are typified by large open fields with smaller fields and copses along the river channels. The soils are mainly well drained and sandy in nature with pockets of gravel and river terrace deposits.

6.2 Hydrogeology

The principal aquifer is the Chalk; it provides most of the base flow of the river which is vital during prolonged dry weather. Abundant chalk springs feed the main river as well as the Allen, Crane, Iwerne, Pimperne Stream and North Winterbourne, all of which drain the chalk aquifer. Beneath the Chalk is the Upper Greensand which is also a major aquifer.

The older rocks in the north of the catchment, mostly clays, are non aquifers, although limestone beds between the clays form minor aquifers; these are the Cornbrash, Corallian and Forest Marble limestones. A further minor aquifer is the Kellaways Sandstone at the base of the Oxford Clay.

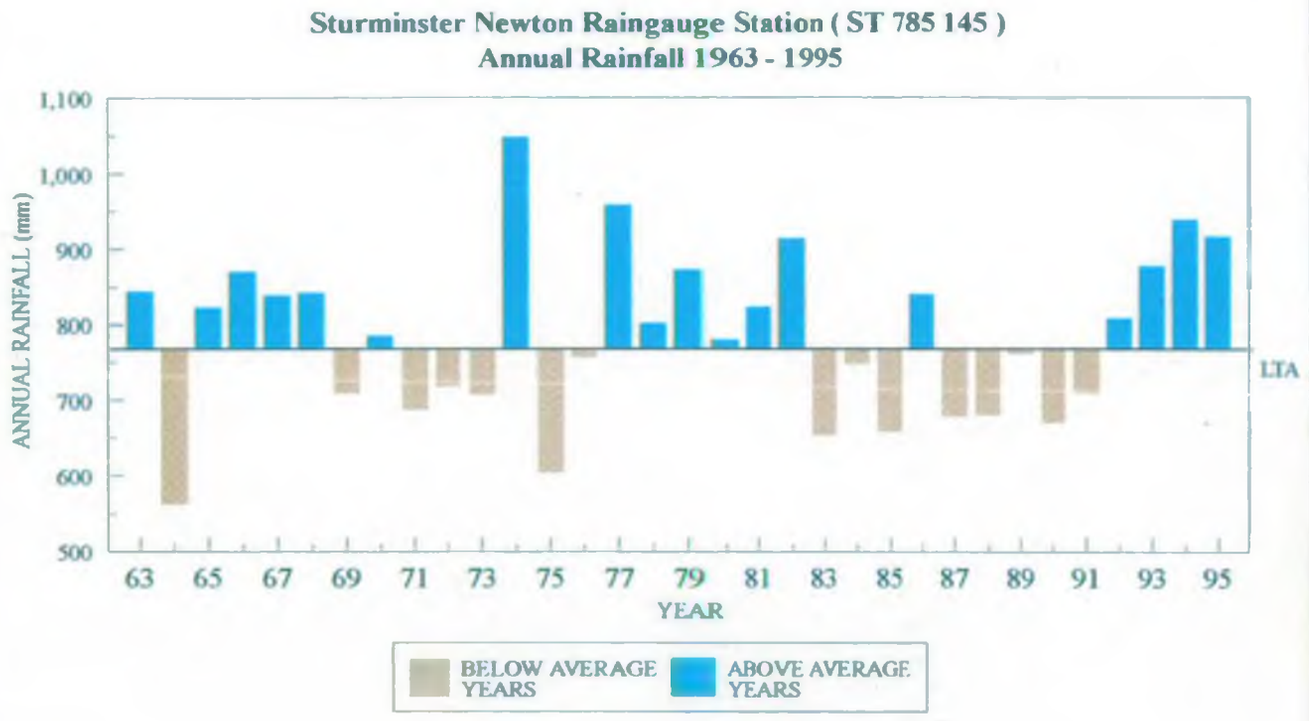
Above, and younger than the Chalk, lies a thick sequence of unconsolidated Tertiary sand, silts and clays. The basal Reading Beds overlying the Chalk constitute a minor aquifer, as do the sands of the younger Bracklesham Beds. The intervening London Clay is a poor aquifer.

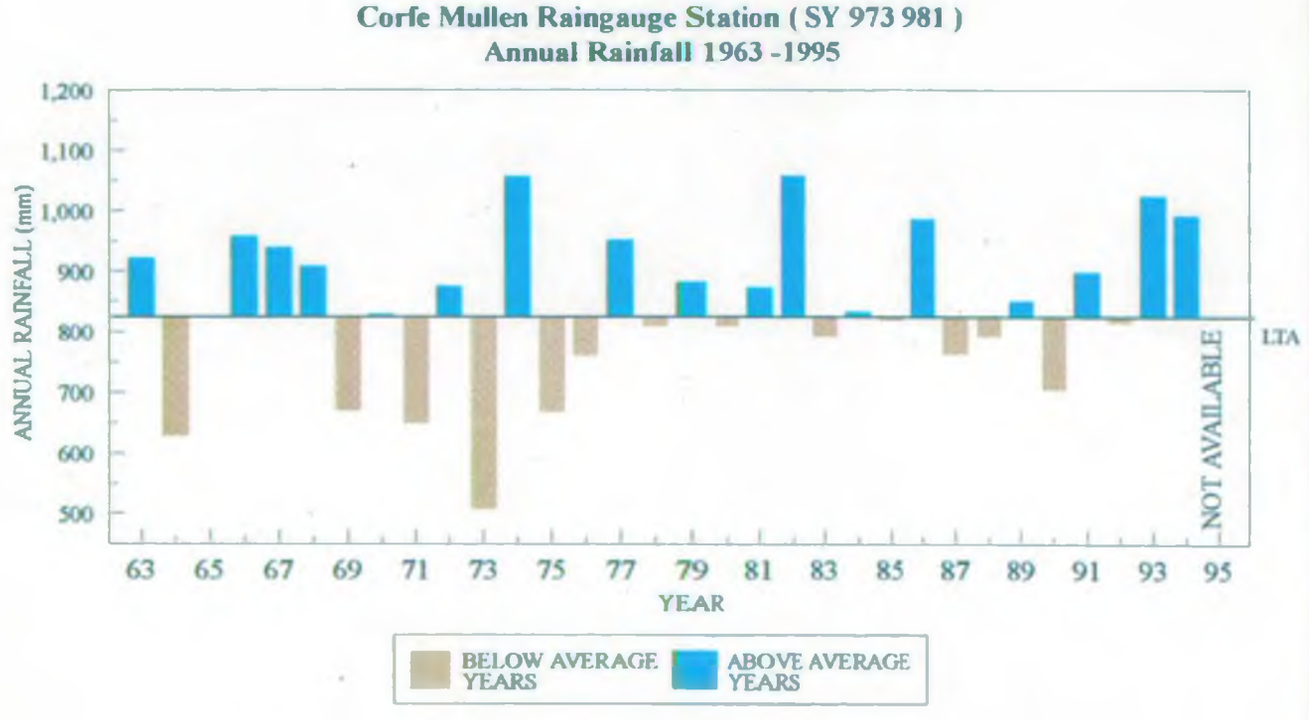
The main Stour valley is underlain by River Terrace deposits which are often extensive gravels constituting a shallow, minor aquifer; elsewhere the riverine alluvium is usually a non aquifer.

6.3 Rainfall

Rainfall is measured daily at 22 Meteorological Office approved gauges within the catchment, and these sites have been used to produce the long term average annual (LTA) rainfall (1961-1990).

Figure 1 : Dorset Stour Catchment - Long Term Rainfall





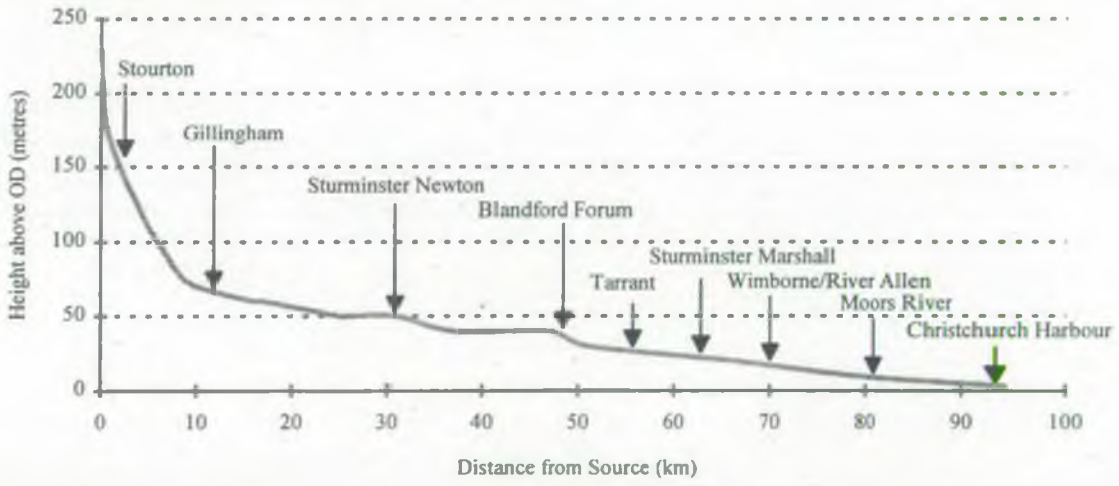
There are also telemetry raingauges at Black Lane (Blandford), Bournemouth Town Hall, Gillingham, King's Stag and Wincanton which record rainfall intensity. The raingauge at Bournemouth Town Hall is to be moved to Holdenhurst STW.

Map 4 shows how annual average rainfall varies across the catchment. The highest rainfall, over 950mm, occurs in the south west of the catchment; annual average rainfall decreases towards the coastal strip with the remainder of the catchment experiencing between 750-900mm.

6.4 River flow

Flows in the upper tributaries are flashy; they are mainly influenced by surface runoff during rainfall, due to the relatively impervious nature of the soils and geology. By contrast, the middle catchment lies on chalk, and here tributaries are sustained by springs. During the summer the water level in the chalk will fall and sections of watercourse may cease to flow. Rainfall is largely absorbed by the soil in prolonged dry periods but runoff will subsequently be increased following significant rainfall giving rise to short term peaks in flow. During winter, increased rainfall will normally penetrate to the chalk, restoring the groundwater storage and the spring flows.

Figure 2: Dorset Stour Catchment - River Profile



At this stage we can only review the hydrology based on recorded flows, not the natural flows; it is inevitable that historical water-use arrangements will have altered the natural flow regime.

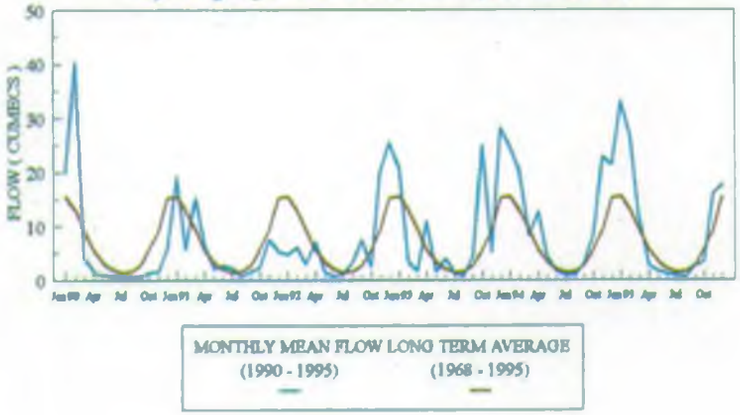
River flows are measured at eight permanent gauging stations in the catchment (Map 4). There are also level-only measuring stations, primarily for flood warning purposes, on the Stour at Blandford and Wimborne and the Lodden at Gillingham, and a tide level recorder at Christchurch Harbour. Summary data for Hammoon and Throop gauging stations are shown in the table below.

	LTA Daily Mean Flow	Q95 Flow	Max Daily Mean Flow	Min Daily Mean Flow
Hammoon	7.743 (6.90)	0.565 (0.624)	134.4 (27 Dec 1979)	0.215 (28 Aug 1976)
Throop	13.279	2.597	159.965 (28 Dec 1979)	1.116 (13 Aug 1976)

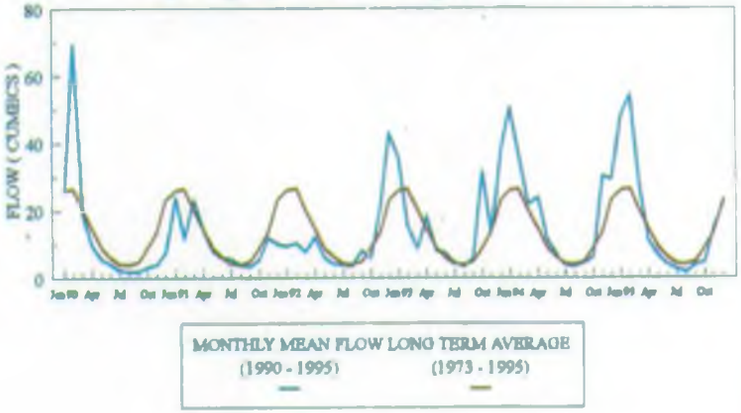
All flows in m^3/s. Data based on: Throop record 1973 - 5 August 1995; Hammoon record 1990 - 30 June 1995 (1968-91 in parentheses)

Figure 3 : Dorset Stour Catchment - Sample Hydrometric Data

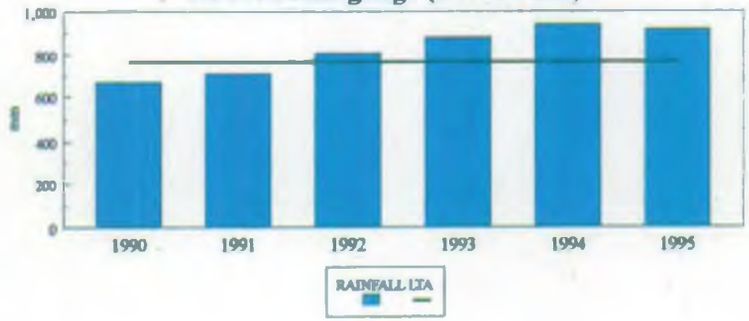
Hydrograph For Hammoon (ST 820 147)



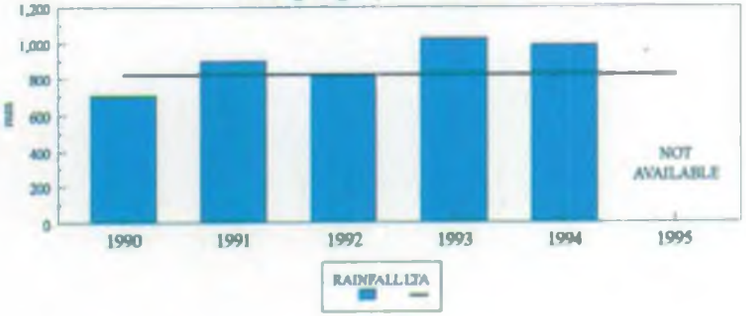
Hydrograph For Throop (SZ 112 963)



Rainfall Record From Sturminster Newton Raingauge (ST 785 145)



Rainfall Record From Corfe Mullen Raingauge (SY 973 981)



Throop does not measure the total outflow out of the catchment as the Moors River flows into the Stour downstream of the gauging station. The flow exceeded for 95% of the time (Q95) for Throop is 19% of its long term average (LTA) daily flow. In an average year, the flow would only be at or below Q95 levels for 18 days. The table below clearly indicates the drier years of 1976, 1989 and 1990 with more low-flow days than average in comparison with recent wetter years with fewer.

	Q95	1976	1989	1990	1991	1992	1993	1994	1995 (to May)
Hammoon	0.565	111	27	57	14	19	2	0	0
Throop	2.597	115	65	97	0	10	0	0	0

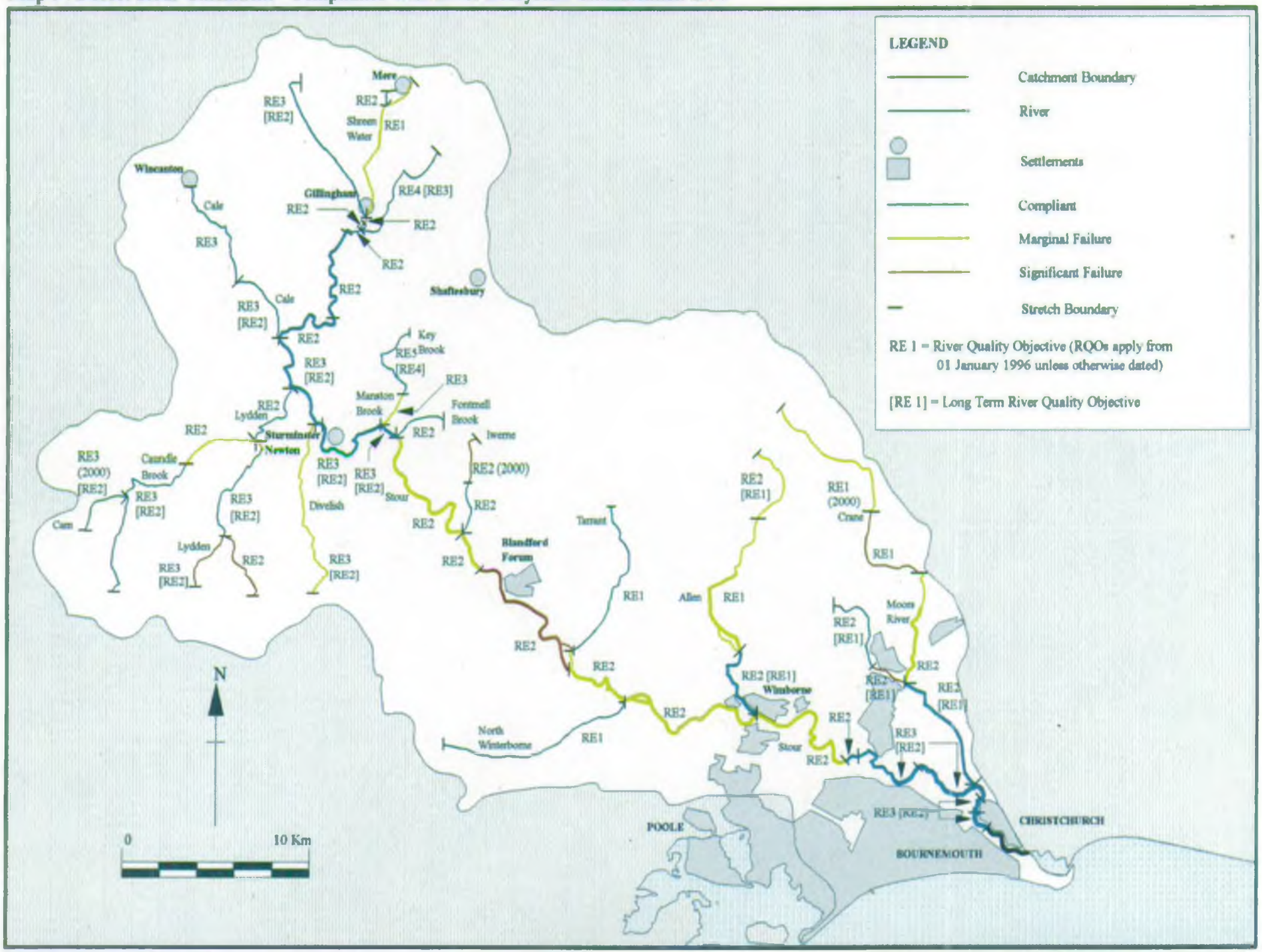
The hydrographs for Hammoon and Throop (Figure 3) illustrate the variability of flows in recent years.

We also monitor groundwater levels manually at 27 boreholes in the catchment.

6.5 Tides

Tidal ranges in Christchurch Harbour are small, although a double high water is experienced with spring tides. The Harbour entrance, known as the Run, is very constricted with tidal currents having speeds between 3-5 knots. Iford Bridge is the normal extent of tidal influence. Within the Harbour wave action is limited due to its sheltered nature.

Map 5 : Dorset Stour Catchment - Compliance With River Ecosystem Classification 1995



Information Correct As Of Nov 1996

Environment Agency South West Region
This Map Is Schematic Not Definitive

7. WATER QUALITY

In 1995, 33% of river length in the Stour catchment was of good or very good chemical quality, 56% was fairly good while 11% was either fair or poor. In biological terms 83.3% of the river was of good or very good quality while the remaining 17% was fairly good. Between 1990 and 1995 there was an overall improvement in chemical quality over 12% of river length while biological quality improved in 17% of the river. Although water quality has recently improved there are parts of the catchment where it is not good enough. These shortfalls in quality are described in this consultation report.

We aim to maintain and where appropriate improve the quality of water for all those who use it. We achieve this by setting water quality targets for the catchment based on:

- *River Quality Objectives to protect recognised uses*
- *standards laid down in EC Directives*
- *international commitments to reduce the amount of Annex 1A substances entering tidal waters*

7.1 River Quality Objectives

The water quality targets that we use for managing water quality are known as River Quality Objectives (RQOs); these are based on the River Ecosystem (RE) classification scheme (see 26.3); the target values that we are proposing to set are detailed in 4.1.

Map 5 also shows where current water quality fails to meet its RQO. This assessment is based on three years of routine monitoring data from the Public Register collected between 1993 and 1995. We have shown failures to meet RQO as *significant* and *marginal* failures. Significant failures are those where we are 95% certain that the river stretch has failed to meet its RQO. Marginal Failures are those where we are between 50% and 95% certain that the stretch has failed to meet its RQO.

Of the 49 monitored river stretches (286 km) in the Stour catchment there are 6 stretches (31.0 km) which significantly fail to meet their RQO, and 14 stretches (96.8 km of river) which marginally fail to meet their current RQO. We have also assessed whether river stretches meet their long term RQO.

7.2 EC Bathing Waters Directive

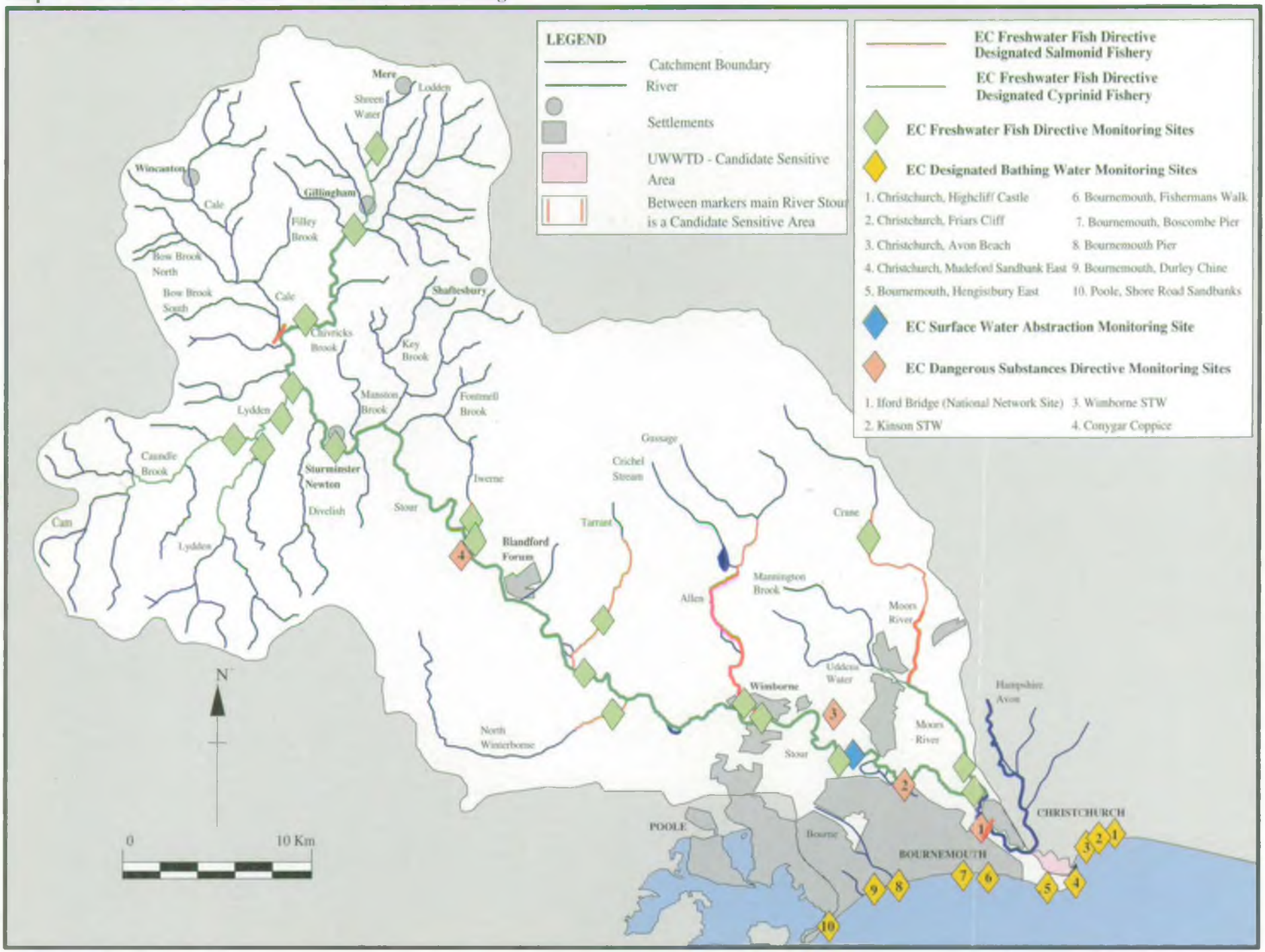
The EC Directive *concerning the quality of bathing water* (76/160/EEC) seeks to protect public health and the amenity value of popular bathing waters (see 26.2.2). There are ten identified EC Bathing Waters in the catchment, shown below.

Site Name	Compliance with Imperative Standards								
	1987	1988	1989	1990	1991	1992	1993	1994	1995
Christchurch Highcliff Castle	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Christchurch Friars Cliff	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Christchurch Avon Beach	Fail	Fail	Fail	Pass	Pass	Pass	Pass	Pass	Pass
Christchurch Mudeford Sandbank East	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Bournemouth Hengistbury East	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Bournemouth Fishermans Walk							Pass	Pass	Pass
Bournemouth Boscombe Pier							Fail	Pass	Pass
Bournemouth Pier	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Bournemouth Durley Chine							Pass	Pass	Pass
Poole Shore Road Sandbanks	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass

7.2.1 Non-identified bathing waters

We also monitor the quality of Christchurch Mudeford Quay, Southbourne, Bournemouth Toft Steps, Bournemouth Alum Chine, Poole Branksome Chine and Poole Sandbanks Car Park which are not identified as EC bathing waters but are still popular recreational areas. These sites are monitored to

Map 6 : Dorset Stour Catchment - EC Directive Monitoring



gauge the effects of river inputs on the identified Bathing Water sites. Only Christchurch Mudeford Quay exceeded the imperative EC Bathing Water Directive standards in 1992,1993 and 1994.

7.3 EC Nitrates Directive

The EC Directive *concerning the protection of waters against pollution caused by nitrates from agricultural sources* protects waters from pollution by nitrates used in agriculture (see 26.2.5).

The whole of Christchurch Harbour is identified as a candidate polluted water. Work during 1995 and 1996 in Christchurch Harbour to determine its trophic status and the principal sources of nitrates to the Harbour has not yet been analysed. Following a nitrate exceedance at the abstraction point at Longham (see 4.2) we are also compiling data in support of polluted water designation for the Stour.

7.4 EC Surface Water Abstraction Directive

The EC Directive *concerning the quality required of surface water intended for the abstraction of drinking water* protects the quality of surface water used for public supply (see 26.2.6); the only identified surface water abstraction point in the catchment is at Longham.

Since 1993, concentrations of mercury, chromium and cyanide have periodically caused exceedance of the EC Surface Water Abstraction Directive imperative standards at Longham. There are no known sources of these substances in the catchment. We will continue to report exceedances of Directive Standards, and we will increase the monitoring frequency during 1996-97 and carry out a survey of metal concentrations in sediment to determine whether there is historical contamination in the catchment.

The imperative standard for nitrate was exceeded in 1995; during 1996 an intensive farm campaign is planned for the mid-Stour catchment (see 4.2).

The imperative standards for Dissolved & Emulsified Hydrocarbons were exceeded in 1993 and 1995. We are currently concerned about the suitability of the methods for analysis of Dissolved & Emulsified Hydrocarbons as specified in the EC Surface Water Abstraction Directive. Exceedances of the Directives Standards cannot always be attributed to polluting discharges, and we suspect that some exceedances may be due to natural compounds resulting from the breakdown of vegetation. We are involved in discussions with the Department of the Environment (DoE) with a view to reviewing the analytical methods.

7.5 EC Dangerous Substances Directive

The EC Directive *on pollution caused by certain substances discharged in the aquatic environment of the community* protects the water environment by controlling discharges to rivers, estuaries and coastal waters (see 26.2.3). This Directive identifies two classes of substances to be monitored: List I contains substances regarded as particularly dangerous because they are toxic, they persist in the environment and they bioaccumulate; List II substances are less dangerous but can still have a harmful effect on the water environment.

Three designated List I sites are monitored in the Stour catchment. The receiving waters at Kinson STW are monitored for cadmium and met the EQS in 1992-95. Although no numerical standard is set for cadmium in sediments, sampling has shown that between 1993 and 1995 cadmium concentrations in sediment decreased.

The receiving waters at Wimborne STW are monitored for cadmium and mercury and have met the EQS; levels in sediments have remained at a standstill.

There are a further two List II sites both designated for copper, Iwerne Springs Trout Farm and

Swainesford Bridge Fish Farm; all quality standards have been met.

In addition there is a national network site at Iford Bridge where we monitor background levels of List I substances; all quality standards have been met at this site.

From 1996 we will be monitoring at Conygar Coppice, a designated List I waste disposal site. The site is consented for HCH, Aldrin, Dieldrin and Endrin. It is also designated for iron which is a List II substance.

7.6 EC Urban Waste Water Treatment Directive

The EC Directive *concerning urban wastewater treatment* specifies minimum standards for levels of sewage treatment and collection systems (see 26.2.4).

During 1995 and 1996 we have been monitoring the Stour from Marnhull Weir to the tidal limit at Iford Bridge and Christchurch Harbour to determine their trophic status and the principal sources of nutrients into them.

We are currently analysing the data we have collected. When we have completed these studies we will determine whether we have sufficient evidence to submit the Stour or Christchurch Harbour to DoE for designation as *sensitive* areas. If DoE were to designate these sites in 1997, then Wessex Water Services might be required to install nutrient removal at qualifying sewage treatment works.

7.7 Annex 1A Reduction Programme

At the Second and Third North Sea Conferences in 1987 and 1990, the UK Government made a commitment to reduce the load of certain harmful substances, known as Annex 1A substances, entering tidal waters from rivers and direct discharges (see 26.4). We report loads as significant nationally where they contribute to 95% of the total load for England and Wales.

The Stour at Iford Bridge is monitored for Annex 1A purposes. Nationally significant loads of mercury, cadmium, copper, zinc, lead, nickel, arsenic and chromium have been recorded at this site during the period 1990-94. The only metal for which there appears to have been an increase in annual loading during the period 1990-94 is copper, though there were no Environmental Quality Standard (EQS)(see 7.5) exceedances.

Nationally significant loads of the organic compounds gamma HCH, total HCH, dieldrin and atrazine were also detected. Gamma HCH (lindane) is an organochlorine pesticide and wood preservative and diffuse sources of contamination arise from its use as an insecticide and biocide. No samples were found exceeding the EQS over the period 1990-94. The lindane found at Iford Bridge probably arises from diffuse sources.

Dieldrin is an organochlorine insecticide which has been banned from use in the UK since 1989, but which is extremely persistent in the environment. The dieldrin found at Iford Bridge is most likely to be leaching from soil in the catchment; it is thought that this will gradually decrease over the years, and these data show that it is present at concentrations well below its EQS.

Atrazine is a herbicide which, although permitted for limited use in agriculture, has been banned from non-agricultural use since September 1993. These data show that atrazine is present in the Stour at concentrations below its EQS.

We will continue to monitor the loading of these substances in the Stour, but in the absence of EQS exceedances we are not planning on any further measures to control them; we anticipate that reductions in pesticide loads entering UK tidal waters will be achieved by MAFF's regulation of pesticide use. Any of these harmful substances could be present as a result of spillage or washing of contaminated equipment into surface water drains.

7.8 Bioaccumulation

We have carried out an annual monitoring programme which measures the levels of metals and organic residues in mussels, limpets and seaweeds to provide information on the levels and bioavailability of these pollutants. Two sites fall within the catchment; Hengistbury and Bournemouth pier. Data are available from 1991 to the present, and for 1980 and 1983.

Levels of metals in mussels were comparable to national background data (NRA 1990) although copper concentrations were not significantly higher than national background levels. Levels of metals in limpets were comparable to national background data. Limpets collected from Hengistbury during 1993 showed not significantly elevated levels of chromium and nickel. Recent data has showed levels have not risen and there is no contamination problem.

Seaweeds were only collected from Hengistbury. Levels of arsenic and chromium were not significantly higher than national background data.

Organic compounds were all below the limit of detection.

7.9 Biological assessment of water quality

Biological river quality is based on the diversity of aquatic invertebrate life, the small animals present in the river, which are unable to move far and respond to long term conditions within the watercourse. In order to present biological river quality, a Biological General Quality Assessment (GQA) Classification has been devised (see 26.5).

Subcatchment	Length (km)	a	b	c	d	e	f
Allen	21.5	16.3	5.2				
%		*75.8*	*24.2*				
Calc	14.4	6.4	7.1	0.9			
%		*44.4*	*49.3*	*6.3*			
Lydden	37.0	27.8	5.3	3.9			
%		*75.1*	*14.3*	*10.5*			
Moors	38.9	21.1	11.0	6.8			
%		*54.2*	*28.3*	*17.5*			
Stour (lower)	37.5	33.5	4.0				
%		*89.3*	*10.7*				
Stour (middle)	96.2	58.3	19.3	18.6			
%		*60.6*	*20.1*	*19.3*			
Stour (upper)	44.0	33.2		10.8			
%		*75.5*		*24.5*			
Total	289.5	196.6	51.9	41.0	0.0	0.0	0.0
%		*67.9*	*17.9*	*14.2*	*0.0*	*0.0*	*0.0*

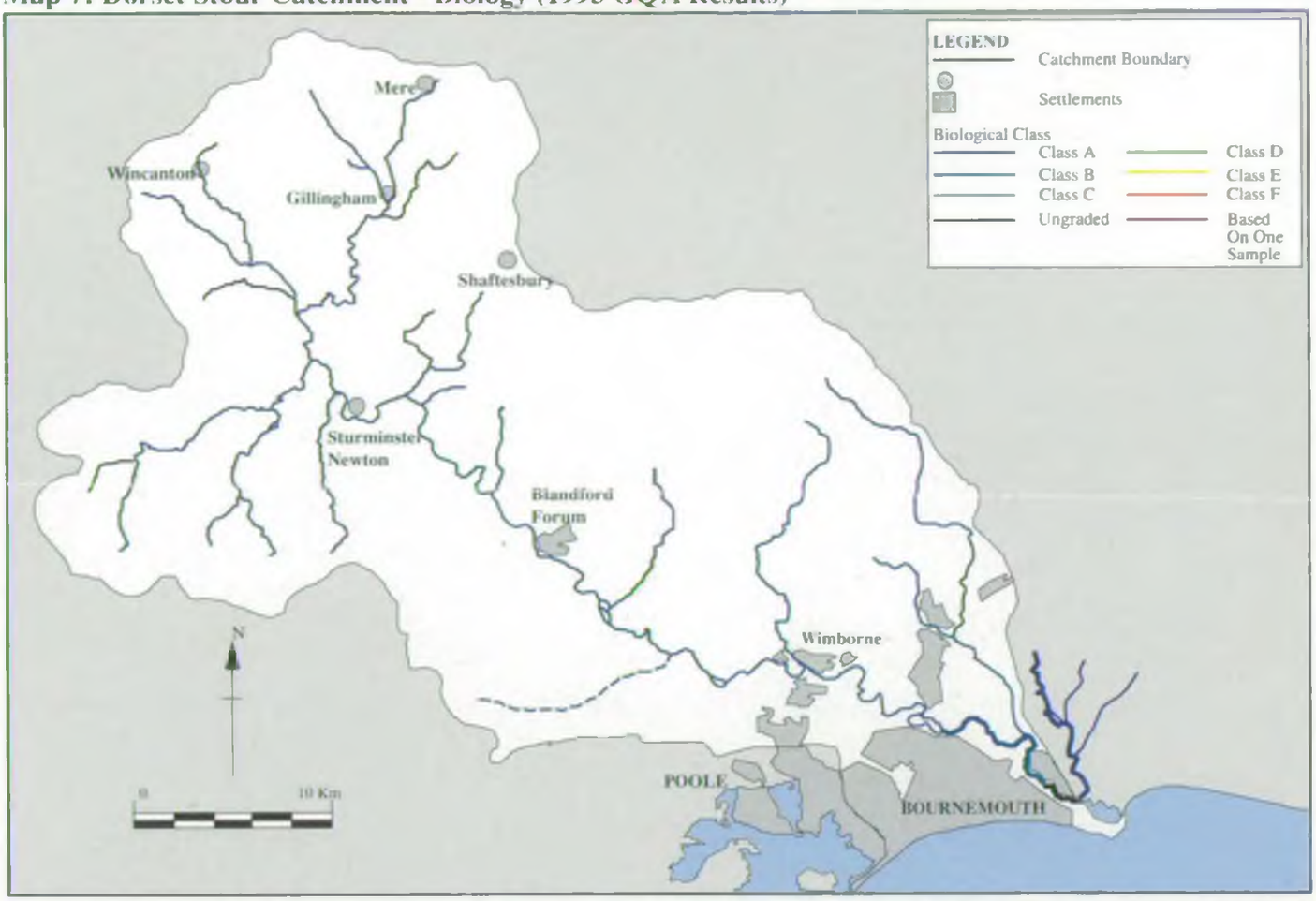
The majority of the Stour is classified *very good (a)* with the exception of four stretches classified *good (b)*. The upper tributaries show a greater diversity of classification reflecting the relatively greater impact of known pollution stresses; several reaches are *fairly good (c)* reflecting predominantly farm pollution problems.

Within the Lydden subcatchment, the majority of watercourses are classified *very good (a)* or *good (b)*, reflecting a general improvement in the biological river quality associated with intensive water quality campaigns and awareness programmes.

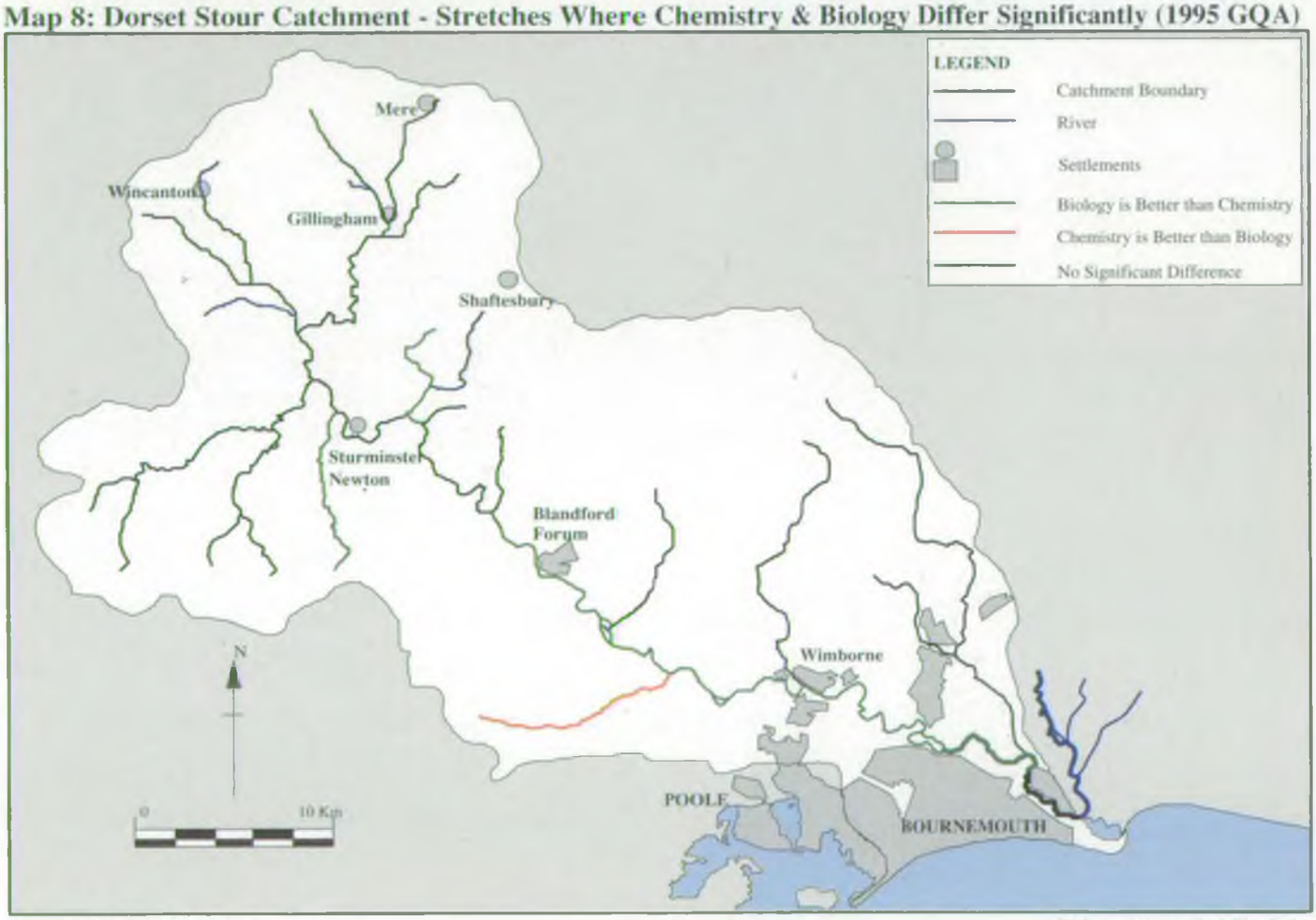
The middle tributaries are mostly classified as *very good (a)* or *good (b)*.

The classification of the lower catchment can be supplemented with results from the Lower Stour Biological Survey 1991-93, which was primarily undertaken in response to concerns expressed about the transfer of Palmersford STW discharge from the Moors River to the Stour in 1992.

Map 7: Dorset Stour Catchment - Biology (1995 GQA Results)



Map 8: Dorset Stour Catchment - Stretches Where Chemistry & Biology Differ Significantly (1995 GQA)



During the period 1991 to 1995 much of the lower Stour between Wimborne and Holdenhurst STWs supported a *very good (a)* biological quality; the exceptions were at Muscliff and Hurn Court (1991) and Parley Green (1993) which were classified *good (b)*. There was a marked decline in quality downstream of Holdenhurst STW to *fairly good (c)* (1991) and *good (b)* (1993 and 1995) followed by a partial recovery at Iford Bridge. Downstream of Iford Bridge saline intrusion adversely effects biological water quality.

There is no significant evidence to suggest that Wimborne, Kinson or Palmersford STWs are having a detrimental impact on the biological quality of the lower Stour.

Between 1991 and 1995 the Moors River supported a *very good (a)* biological quality down to Woolsbridge. In 1993 there was a dramatic decline in quality to *fair (d)* downstream at Lions Hill and East Moors Farm, possibly associated with drainage from nearby industrial estates. Quality recovered to *fairly good (c)* at the A31 road bridge and the site upstream of Palmersford STW. There was a further improvement to *good* from Fir Grove Farm to the confluence with the Stour.

In 1991 there was no evidence to suggest that the Mannington Brook, Uddens Water and the original discharge from Palmersford STW were having a substantial impact on the biological quality of the Moors River, and subsequent data show only a slight improvement after the transfer of the STW discharge. It would appear that water quality problems evident in the Moors River between Woolsbridge and the Uddens Water confluence mask any potential impact of the Uddens Water and inhibit any potential improvements resulting from the removal of the Palmersford discharge.

The lower Uddens Water has shown an improvement in biological quality from *fairly good/fair (c/d)* (1991) *good/fairly good (b/c)* (1993) and most recently *good (b)* (1995 GQA). This may reflect pollution problems in the middle and upper reaches of the Uddens Water and Ameysford Stream where sites sampled in 1993 were only classified *fairly good/fair (c/d)*. The Ameysford Stream drains land adjacent to the Ferndown Industrial Estate where a major pollution involving wood preservative took place in 1986.

Map 8 shows where there are significant differences between the biological and chemical GQA classifications. Only the North Winterbourne appears to have better water quality using the chemical classification, and this can be explained because RIVPACS is not designed to deal with the specialist fauna which occurs in streams that dry out regularly. Much of the catchment shows better water quality on the biological classification; the biological data describe the long-term water quality, and are less affected by transient lapses in chemical quality.

8. AIR QUALITY

Air quality is an indicator of environmental quality. Air pollution can damage flora and fauna and buildings, and have significant effects on soils and water. Some pollutants, such as acidic gases, can also cause serious problems for those with asthma, bronchitis and other respiratory diseases.

Air pollution may be in the form of gas or particulate matter with its dispersion and dilution depending on climatic conditions. Its impact may be local, especially with regard to particulate matter which will often settle on nearby land or water or may be global, for example, some refrigerant gases depleting the upper ozone layer, or affecting concentrations of greenhouse gases such as carbon dioxide.

Our work involves authorising and regulating emissions to air from certain prescribed processes (Part A processes) under Part I of the Environmental Protection Act 1990 (see Section 23), and regulating landfill sites and in particular landfill gas. This gas is principally a mixture of methane and carbon dioxide (see Section 16).

We need to work closely with others if environmental improvements are to be achieved. This is particularly important with regard to local air quality where we are only one of a number of regulatory bodies, with a role in helping to achieve the government's air quality strategy:

- *the Department of Transport (DoT) enforces controls on vehicle manufacturers*
- *the County Council Structure Plan contains policies on the need to control pollution and the County Analyst provides an analytical service for District Council Environmental Health Officers (EHOs)*
- *District Council environmental health departments regulate air pollution (Part B processes) under Part I of the Environmental Protection Act 1990. Only releases to air are controlled*
- *District Councils also deal with a range of other forms of pollution, such as smells from domestic and agricultural premises and noise pollution. Many local authorities monitor air quality in their area*
- *the Police are responsible for controlling emissions from vehicles*

8.1 Local perspective

The information given below is indicative for the plan and surrounding area and is not necessarily representative of catchment levels. This is due to the distribution of monitoring sites in relation to the plan area. The maps indicating ground level ozone, sulphur dioxide and nitrogen dioxide for the plan area are prepared on a 5km grid using a combination of data from the DoE air pollution monitoring networks and surrogate statistics such as land cover and emission inventory information.

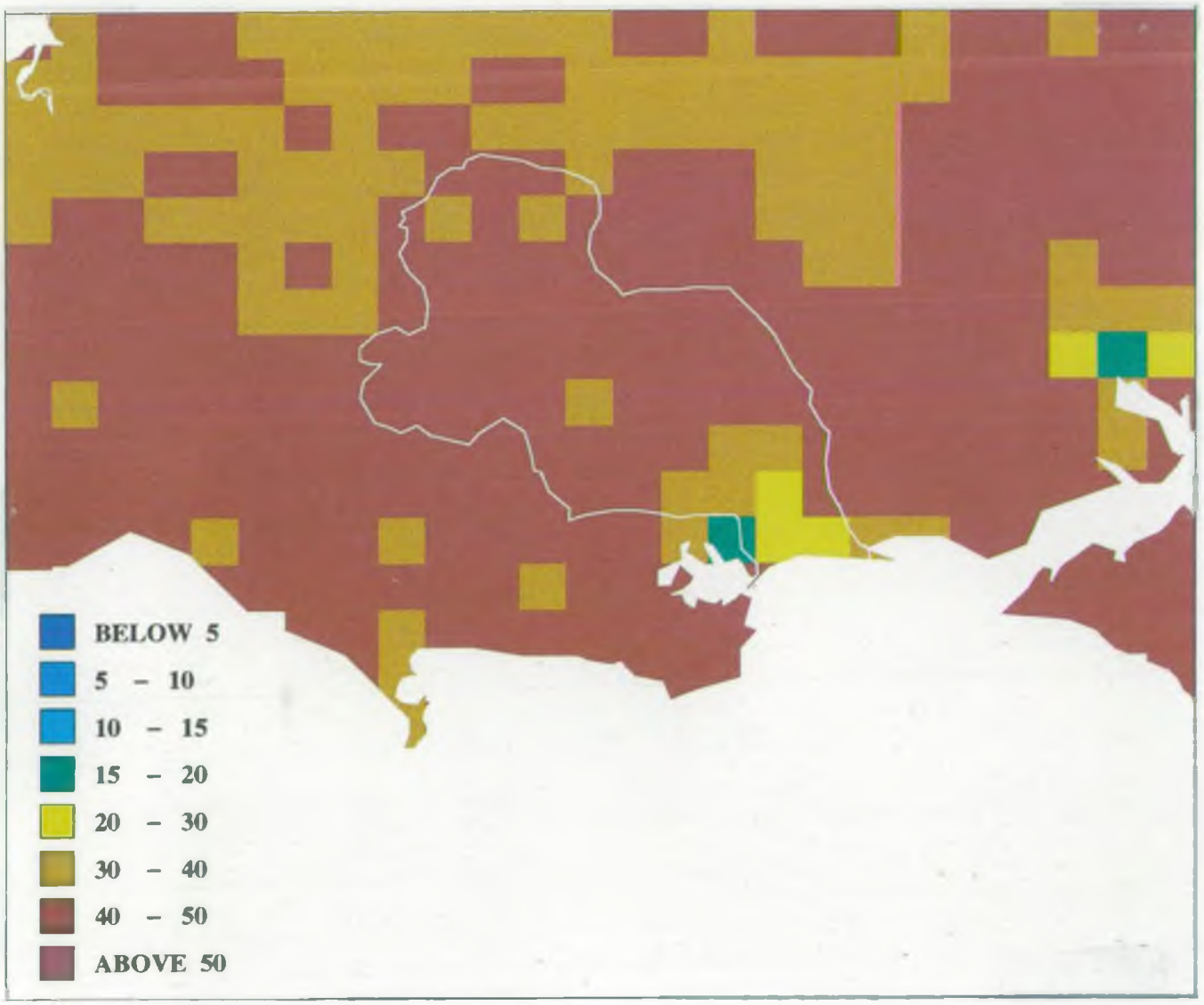
8.1.1 Ground level ozone

Ozone in the upper atmosphere shields the earth from harmful UV radiation. At ground level however, ozone can be a harmful pollutant. Ozone is not emitted directly from any man-made source in any significant quantities, but arises from complicated chemical reactions in the atmosphere driven by sunlight. In these reactions, oxides of nitrogen and hydrocarbons (derived mainly from vehicle exhausts) react in the atmosphere to produce ozone. These chemical reactions do not take place instantaneously and once ozone is produced it may persist for several days. Consequently, ozone produced at one site may be carried for considerable distances in the air, and maximum concentrations usually occur away from the source of primary pollutants. The highest concentrations of ozone generally occur during hot, sunny and relatively windless summer days.

In common with other parts of Southern England, ozone levels in the catchment may exceed those at which damage to vegetation may occur. The Expert Panel of Air Quality Standards (EPAQS) recommend an Air Quality Standard for ozone in the UK of 50 parts per billion (ppb) as a running 8 hour average. Map 9 indicates the estimated number of days in the plan area over which this recommendation would be exceeded.

The Department of Environment has published a UK strategy on the reduction of emissions that can produce ozone. Nationally we will have an input into the reduction of volatile organic compounds (VOCs) and oxides of nitrogen (NO_x), both of which are precursors in the formation of ground level ozone.

Map 9: The Estimated Number of Days with 8 Hour Periods with Ozone Greater Than or Equal to 50ppb in 1990-94. (Data Source NETCEN 17/11/95 16419002/JRS)



8.1.2 Sulphur dioxide

Sulphur dioxide is toxic to plants and animals. An environmental quality criteria for effects on natural vegetation recommended by the World Health Organisation is 7.5ppb as an annual average. Human health effects are best gauged by reference to the recommended standard from EPAQS, 100ppb as a 15 minute average. Map 10 indicates annual mean sulphur dioxide concentration for the plan area.

Map 10: Estimated Annual Mean Sulphur Dioxide Concentration (ppb) in 1994 (Data Source NETCEN 25/03/96 2000/8001/GWC)

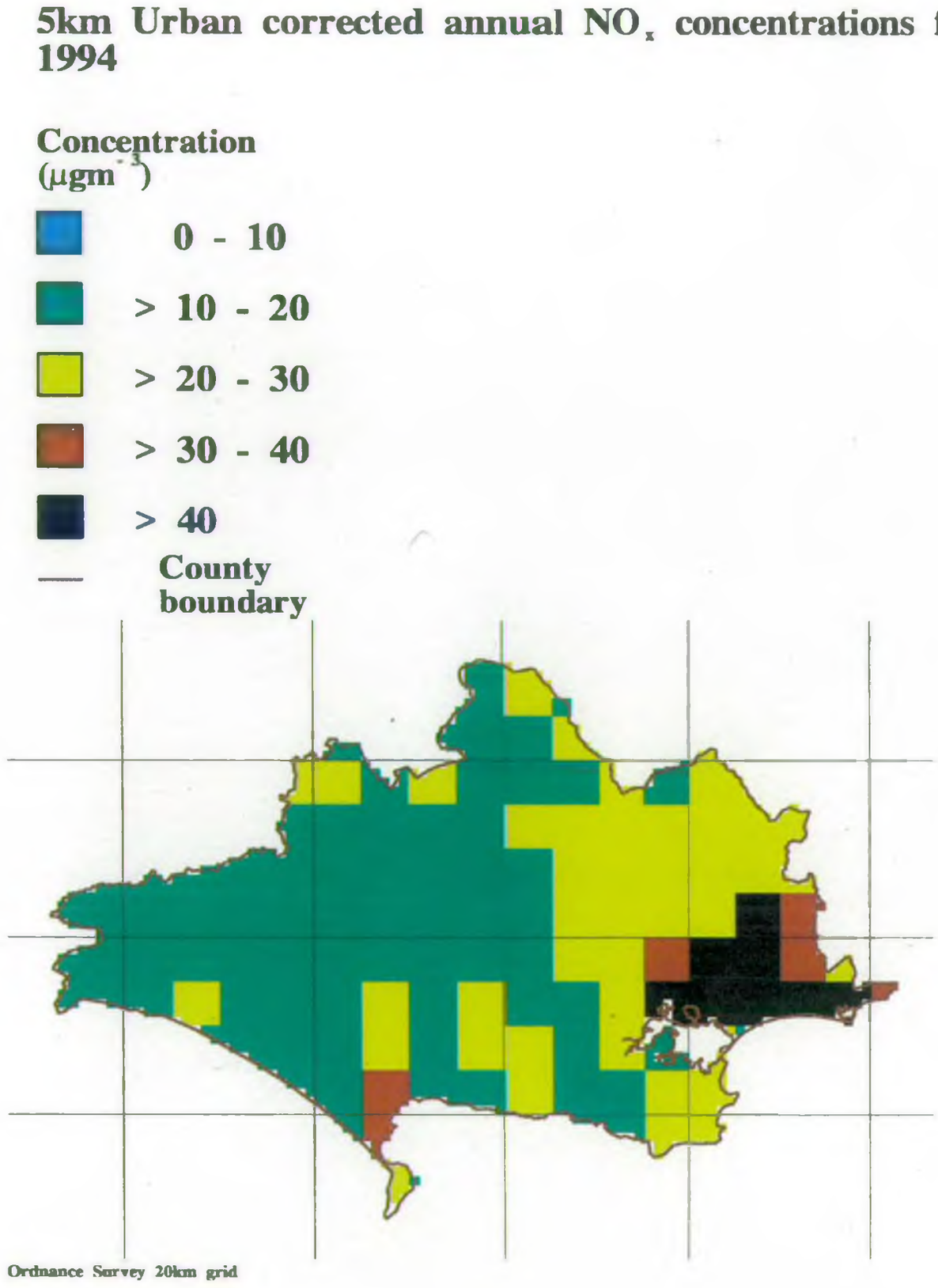
8.1.3 Nitrogen dioxide

Nitrogen dioxide is one of the principal urban air pollutants where it arises almost exclusively from motor vehicles and is toxic to plants and humans. Concentrations set down in the EC Nitrogen Dioxide Directive are generally not exceeded if the annual mean is less than 40ppb. Map 11 indicates that this value is unlikely to be exceeded in the plan area.

Map 11: Estimated Annual Mean Nitrogen Dioxide Concentration (ppb) in 1994 (Data Source NETCEN 19/12/95 20008001/JRS)

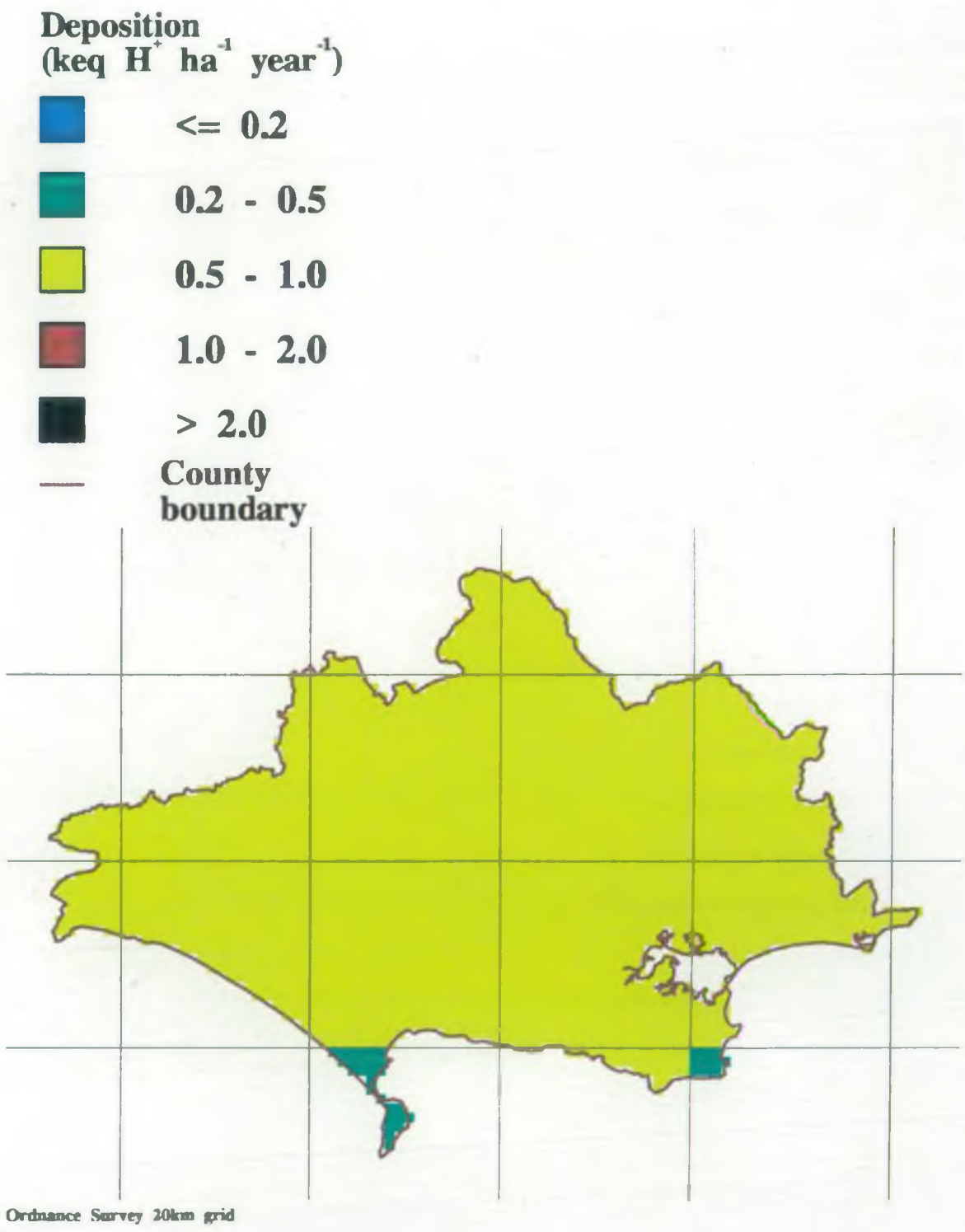
The World Health Organisation (WHO) and United Nations Economic Commission for Europe (UNECE) have recommended an air quality guideline of 30µg/m^3 (15.7ppb) for effects of nitrogen oxides (NO_2 and NO) on vegetation. Map 12 indicates that this value is exceeded in several localities. A map of this scale is not able to indicate specific sources which might lead to local exceedances, for example, alongside busy roads. These could only be identified through local monitoring.

Map 12: 5km Urban Corrected Annual NO_x Concentrations for 1994 (Data Source Critical Loads Mapping and Data Centre, ITE Monks Wood July 1996 and AEA Technology)

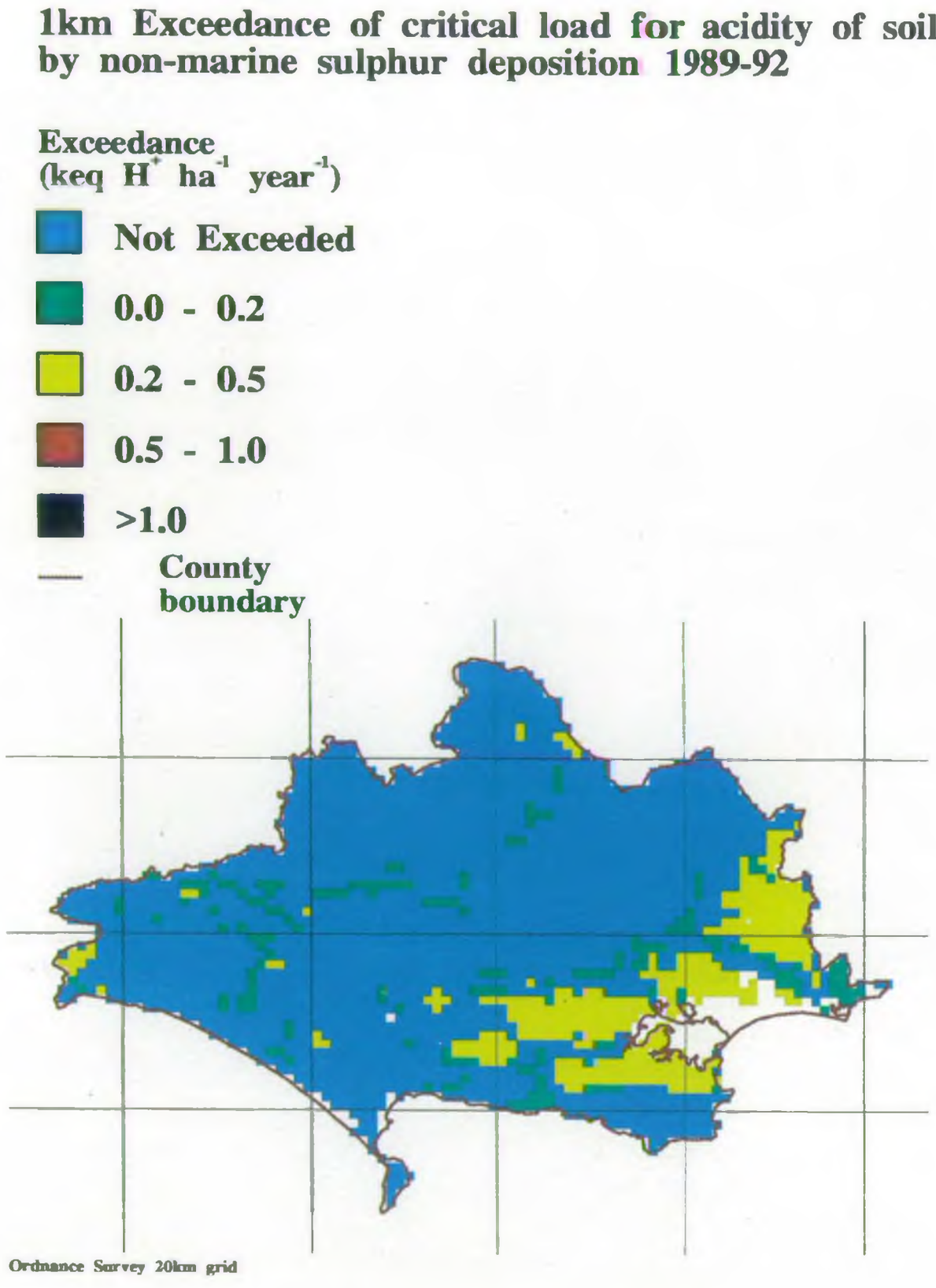


Map 13: The Deposition of Sulphur (Data Source Critical Loads Mapping and Data Centre, ITE Monks Wood July 1996, and NETCEN, ITE Bush)

20km total non-marine sulphur deposition 1989 - 92



Map 14: Exceedance of Critical Load for Acidity of Soils (Data Source Critical Loads Mapping and Data Centre, ITE Monks Wood, July 1996 and CLAG Soil Subgroup,)



8.1.4 Acid rain

The term is used loosely for all acidic deposits from the atmosphere, whether wet or dry, and not only for those brought down by raindrops. It is often more accurately referred to as acid deposition. In the Northern Hemisphere these compounds come mainly from burning fossil fuels but they also come from natural sources such as organic decay on land or under water, volcanic eruptions and lightening strikes. These natural sources account for less than five percent of acidic deposition in the UK. The main emissions responsible for acid deposition are sulphur dioxide and oxides of nitrogen. Ammonia which arises mainly from agriculture also plays a part.

In some parts of the UK, natural ecosystems have a significant capacity to neutralise acidity and acid deposition has little impact on them, but in acid sensitive areas, acid rain degrades the land and causes damage to plants and soils. In these areas substances can be released from soils which run-off into water bodies and are toxic to water life. Acid deposition can also alter the acid balance in water bodies and this too has an effect on the life they support; it can also corrode buildings. Acid rain components which contain nitrogen have the effect of acting as a fertiliser, which can change the make up of communities of land and water plants and affect animals that live on them.

In the UK research over the last 20 years has given a basis for the development of effects based emission control policies through the formulation of the Critical Loads approach. The definition adopted by UNECE is a quantitative estimate of exposure to one or more pollutants below which significant harmful effects on sensitive elements of the environment do not occur according to present knowledge.

Map 13 shows an estimate of the current deposition of sulphur calculated on a 20km grid. Map 14 shows where the deposition of acidifying compounds exceeds the critical loads for soils. The critical loads are particularly exceeded over the heathland areas of the lower catchment. There are also several conifer plantations in this area.

8.2 National Air Quality Strategy

Under Part 4 of the Environment Act 1995 the Government is required to publish a national strategy for air quality including:

- *a framework of standards and objectives for the pollutants of most concern*
- *a timetable for achieving objectives*
- *the steps the Government is taking and the measures it expects others to take to see that objectives are met*

We will be working closely with local authorities to help achieve the objectives of the National Air Quality Strategy.

8.3 Local Air Quality Management Areas

In due course air quality standards may be prescribed in regulations made by the Government and obligations placed on local authorities regarding the establishment and operation of local air quality management areas. Local authorities will have to carry out periodic reviews of air quality in their areas. Where standards are not being met, or are not likely to be met, an air quality management area should be declared (a Designated Area) and an action plan produced to improve air quality.

9. LANDSCAPE

We have duties to conserve and enhance landscape, especially in rivers and wetlands, and to protect and conserve buildings, sites and objects of archaeological, architectural or historic interest. We aim to ensure that these features are not degraded through neglect, mismanagement, or insensitive development and, where we can, to take measures to enhance them. We promote the conservation of landscape through our work to safeguard water quality, manage water resources and provide flood alleviation. An important part of this work is to influence landuse planners and land managers to look after rivers and wetlands sensitively.

9.1 Local perspective

Both the Dorset and Cranborne Chase and West Wiltshire Downs Areas of Outstanding Natural Beauty (AONBs) cover small parts of the catchment (Map 15). AONBs are landscapes of national importance, within which new development must conserve the landscape character.

East Dorset District Council have also defined four Areas of Great Landscape Value (AGLVs), informal designations which describe the distinctive features of each area and assist in maintaining their essential character. The Crane Valley falls into the woodland AGLV, characterised by an intimate wooded landscape with much evidence of historic use of the river through sluices, water meadows and mills. The Stour Valley AGLV is characterised by an open landscape, predominantly agricultural with small settlements and few other buildings. The valley is wide with sweeping meanders across the valley floor, and views tend to focus on the river.

The *Dorset County Landscape Assessment: Landscape Character*.(Countryside Commission, 1993) divides the catchment into three broad types, which roughly correspond to the draft proposed English Nature Natural Areas. This is not surprising as the geology strongly influences both landform and ecology. The upper catchment forms the Wessex Vales Natural Area, the central Stour lies in the Wessex Downs Natural Area, and finally, the Stour enters the Heathland Basin Natural Area which includes the main areas of the urban conurbation.

9.1.1 Wessex Vales

The Cale catchment has been strongly influenced by agriculture, and some tributaries have been straightened to follow field boundaries. The land is predominantly grassland with some arable and little woodland. Tree cover is limited, often following the watercourses, and sites of interest are very few. The rivers, though narrow, act as wildlife corridors.

The National Trust owned Stourhead Estate, including St Peter's Pump, Six Wells Bottom and the Stourhead Lakes which form the source of the Stour, is an important amenity landscape and also contains a cluster of areas of conservation value, mainly grassland and woodland. Stourhead tributaries meander through wooded valleys, becoming more intensively farmed towards Gillingham, with fishing lakes a feature. The Lodden tributaries appear mostly unmodified and thickly wooded, especially in the upper sections. Valuable wet woodland, spring lines and seepage zones are located on the steep slopes around East and West Knoyle, Motcombe and Shaftesbury. The watercourses link a diverse patchwork of hedges, wood and pasture, and most are tree-lined.

The Caundle, Lydden, Divelish and Darknoll tributaries are all naturally-meandering, mainly tree-lined watercourses. Permanent and temporary pools, ancient commons, thick hedges and small copses form a diverse habitat in which the rivers are important linking corridors. Finally, the tributaries joining the Stour below Sturminster Newton from the north-east are mostly unmodified sinuous channels. They flow within moderately intensive farmland, with limited features of conservation value. The mixed open and tree-lined watercourses provide valuable habitat in this area.

9.1.2 Wessex Downs

Within the Wessex Downs Natural area, tributaries are much less numerous than in the clay vales. The main Stour is a large river with abundant aquatic vegetation; its banks are diverse though in the main, fairly open. There are few woodlands and features within the valley which are dependent on a high water table; landuse is mostly grassland with blocks of arable.

The tributaries lying on the chalk have all been significantly modified; many lengths are straightened and featureless, and flow through intensively farmed land. Tree cover is mostly sparse and the river corridor narrow. All the major tributaries are winterbournes, and a specialist fauna is usually present.

The Allen is a chalk stream which, in places, has been physically modified, and the typical *Ranunculus* communities affected by lowered river levels. Nevertheless, some excellent floodplain habitat remains as relic watermeadows, fen and wet woodland. Despite major habitat loss, this valley remains important for wildlife.

9.1.3 Heathland Basin

Here, the Stour is mostly within its natural course and is a broad, deep clay river, supporting a varied and abundant aquatic flora. There are few wetland habitats associated with the river, though the Leaden Stour is an important channel linking the Stour and Moors, and there are important fens and grassland at Redhill and in the Harbour lands. Elsewhere, the corridor is narrow, rarely extending more than a few metres from the bank top. Past land drainage schemes have had an impact in both lowering bed levels, and reducing the diversity of channel form, flora and fauna.

The Uddens, Moors and Crane catchments are very mixed, both geologically and in river corridor habitat. The rivers cross geological transitions between Chalk, Reading beds and London Clay, to Bagshot Sands and Gravels. They link a range of wetland habitats including wet grassland, bogs, fens, heathland, fen and carr woodland. The aquatic vegetation is both diverse and abundant, and the banks are extensively tree-lined.

The watercourses of Bournemouth are, in places, artificial and formally landscaped and elsewhere act as the link for remnant high quality heathland and wetland habitat. They are always important as green, though narrow, corridors within the built environment. The coastline has been extensively modified for recreational use, and a promenade runs the full length of coast in the plan area. Sections of the cliff have been designated SSSIs for their geological and heathland interest.

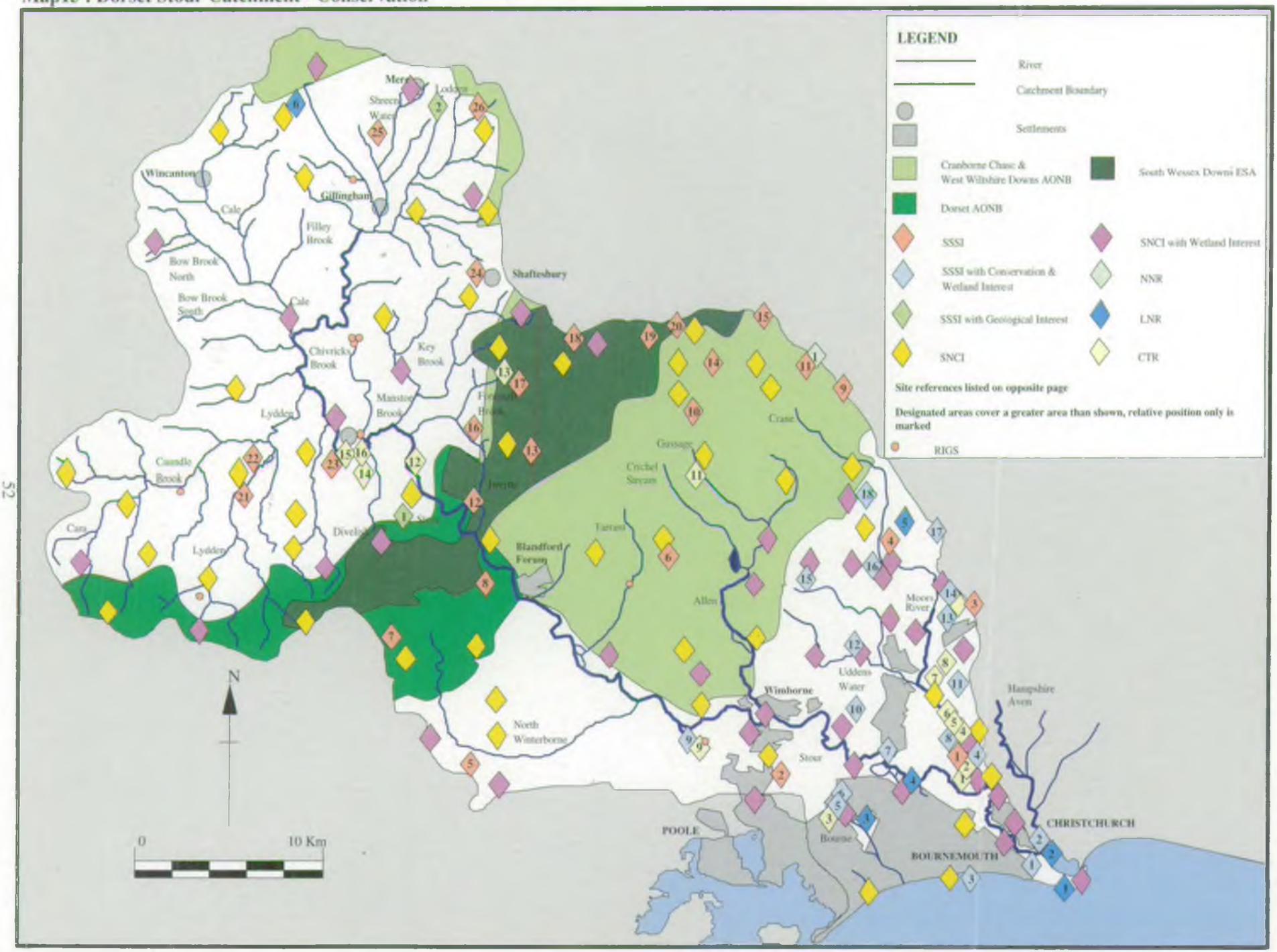
9.2 Our survey and monitoring work

River corridor surveys have been carried out on all designated main rivers and some low flow rivers since 1989. This is a rapid habitat mapping technique that provides detail on the structure and communities of the river, banks and adjacent land. It is used to advise on all operational work in the area. The remaining network of rivers and coast has been described through rapid analysis of aerial photos (1993-94). The disadvantage of this technique is that the channel is rarely visible.

Sites in the catchment have been used to pilot the River Habitat Survey (RHS) technique (Environment Agency 1996) since 1994. RHS will produce a national standard basic habitat assessment for rivers.

Land drainage consents, abstraction licences, discharge consents, planning applications and our own operational works are screened for their implications for conservation and recreation; each has had a major impact on the catchment in the past.

Map15 : Dorset Stour Catchment - Conservation



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10. WILDLIFE

Here we consider how we protect and manage the natural environment associated with rivers and wetlands. We have duties to conserve and enhance wildlife, especially in rivers and wetlands; these are fulfilled through the work of other functions. However, we have a free-standing duty to promote conservation, particularly in the aquatic environment. An important part of our work is to influence landuse planners and land managers to look after rivers and wetlands sensitively.

10.1 Designated areas

The EC Habitats Directive seeks to protect habitats and species of European importance by designating Special Areas for Conservation (SACs). The process of defining SACs is underway and will be complete by 1998. There are 3 proposed within the plan area. The Dorset Heaths is a single designation combining 15 SSSIs within the plan area; wet heath and the habitat of the southern damselfly are key reasons for their selection. The Dorset Heathlands is also a proposed Special Protection Area under the EC Birds Directive, for breeding heathland birds. Rooksmoor pSAC is a site of damp grassland, important for marsh fritillary butterflies.

At present there are 28 Sites of Special Scientific Interest (SSSIs) within the catchment area of which 19 have a specific wetland interest (Map 15). SSSIs are statutory sites of national conservation importance and are fully protected. In particular, the Moors River and its corridor is notified as a good example of a river of varied physical and chemical nature. It has its origins in the chalk, receives acid waters and displays some characteristics of a lowland clay river and this produces a rich flora and fauna. The Crane is being considered as an extension to the Moors River SSSI. Christchurch Harbour SSSI which includes the saltmarsh and wet grasslands of Stanpit Marsh Local Nature Reserve and the geologically interesting promontory Hengistbury Head, is also notified for its breeding, migratory and wintering birds.

County wildlife sites are non-statutory sites, representing the best remaining areas of semi-natural habitat in the County. There are 537 SNCIs in the catchment; at least 12% have an important wetland interest. This number of sites represents a most important wildlife resource, or possibly, could represent the fragmentation of the resource into many smaller sites. The wetland interest covers meadows, woods, ponds and streams. These sites are identified in Local Plans; together with advice on suitable management this helps to protect these important sites from inappropriate development.

There are 9 Regionally Important Geological and Geomorphological Sites which form an important regional scientific and educational resource. They have the same protection as SNCIs.

There are 20 County Wildlife Trust Reserves in the catchment of which 8 have wetland importance, 6 local nature reserves and 2 country parks. Many of these sites contain high quality wetland interest, and provide good opportunities for public access and education.

There are a number of agricultural incentive schemes operating in the area. The South Wessex Downs ESA aims to maintain the landscape and ecological diversity of the area, particularly permanent grassland. Countryside Stewardship encourages the sustenance or return to traditional management practices, to conserve landscapes, wildlife and historic features. The waterside landscape and old meadows and pasture schemes are probably the most appropriate to the Stour catchment. Also, the National Trust (NT) are a significant landowner in the catchment and manage much of their land on traditional lines and with long term conservation objectives in mind. The inalienable nature of NT land, protected by an Act of Parliament, also confers long term protection from unsuitable development.

In the upper catchment, North Dorset District Council is coordinating the long-term re-establishment of the former Royal Forest of Gillingham, to be jointly funded by Central Government Agencies and Local Authorities. This community woodland project intends to combine private, voluntary and public interests with an aim of conserving and enhancing the environment whilst initiating suitable economic and recreational developments.

Sites of Special Scientific Interest and proposed Special Areas for Conservation				
1. Hurn Common	2. Canford Heath (2)	3. Cranborne Common (2)	4. Bugdens Copse & Meadows	5. East Coppice
6. Oakhills Coppice	7. Higher Houghton	8. Bryanston	9. Bowlsbury Wood	10. Cranborne Chase
11. Martin & Tidpit Downs	12. Hod & Hambledon Hill	13. Handcocks Bottom	14. Rotherley Downs	15. Bowerchalke Downs
16. Sutton Combe	17. Fontmell & Melbury Downs (1)	18. Wingreen Down	19. Winklebury Down	20. Pincombe Down
21. Rooksmoor (1)	22. Lydlinch Common & Stock Wood	23. Piddles Wood	24. Breach Fields	25. Dead Maid Quarry
26. Hang Wood				
Sites of Special Scientific Interest with Wetland Interest				
1. Christchurch Harbour (2)	2. Purewell Meadows	3. Poole Bay Cliffs	4. Town Common	5. Bourne Valley
6. Turbury & Kinson Commons	7. Parley Common	8. The Moors River	9. Corfe Mullen Pastures (2)	10. Corfe & Barrow Hills (2)
11. Ferndown Common (2)	12. Matchams (2)	13. Slop Bog & Uddens Heath (2)	14. Lions Hill (2)	15. Ebblake Bog (2)
16. Holt & West Moors (2)	17. Horton Common (2)	18. Verwood Heaths (2)	19. Sutton Meadows	
Sites of Special Scientific Interest with Geological Interest				
1. Shillingstone Quarry	2. Charnage Down Chalkpit			
National Nature Reserves				
1. Holt Heath	2. Holt Forest	3. Martin & Tidpit Down SSSI		
Local Nature Reserves				
1. Hengistbury Head	2. Stanpit Marsh	3. Alder Hills	4. Stour Valley	5. Stephen's Castle
6. Moldrams Ground	7. Dewlands Common	8. Potterne Hill	9. Leigh Common	10. Pennington's Copse/Alder Bed
County Trust Reserves				
1. Height Restriction Zone (3)	2. Troublefield (WI) (4)	3. Alder Hills (WI) (10)	4. Sopley Common (3)	5. See Below
6. Moors River (WI)	7. St Leonards South (WI)	8. St Leonards North (WI) (5)	9. Corfe Mullen Pastures (7)	10. Cranborne Common (11)
11. Sovell Down	12. Millham Island (WI)	13. Fontmell Down (8)	14. Broad Oak	15. Piddles Wood (9)
16. Girdlers Coppice (WI) (9)				
County Trust Reserves falling in area marked 5 on Map 15				
Crabbsfield (WI) (6)	Brick Kiln Triangle (3)	Ramsdown (3)	Troublefield Heath (4)	Avon Heath Country Park (6)

(1) also a proposed Special Area for Conservation (pSAC)
(2) within the Dorset Heaths pSAC
(3) partly within Town Common SSSI
(4) partly within Moors River SSSI
(5) partly within Hurn Common and Moors River SSSIs
(6) partly within Hurn Common SSSI
(7) within Corfe Mullen Pastures SSSI
(8) within Fontmell and Melbury Downs SSSI
(9) within Piddles Wood SSSI
(10) within Bourne Valley SSSI
(11) within Cranborne Common SSSI
(WI) wetland interest

10.2 Rare species

The variety of habitats within the plan area is reflected in the range of rare fauna and flora present. The species highlighted here are classified as National Red Data Book, National Scarce or Dorset Scarce Species. This indicates the extent of their distribution and rarity value on a national or county basis.

The Stour itself supports a number of rare aquatic plants. Lodden pondweed *Potamogeton nodosus* grows on firm gravel substrates and in Dorset is only found along 9km of river between Child Okeford and Blandford. *Potamogeton x schreberi* was discovered in the Stour in 1992, the first record for the British Isles. This hybrid species occurs along just 1.5km of river in the Marnhull area,

where it flows over a soft clay substrate. River water-dropwort *Oenanthe fluviatilis* and summer snowflake *Leucojum aestivum* both occur along the middle reaches; the latter grows on banks, islands and in riverside copses. Near the mouth of the Stour, in or next to the river the following Nationally Scarce Species are present; narrow-leaved water-dropwort *Oenanthe silaifolia*, mudwort *Limosella aquatica* and dwarf spike-rush *Eleocharis parvula*. Black poplar *Populus nigra* grows in a few locations in the central Stour around Sturminster Newton and Sturminster Marshall.

The alga *Hydrodictyon reticulatum*, or water net, has recently been discovered on the lower Stour. Under certain conditions, this species can become a problem and its occurrence will be monitored.

Of the invertebrate species found, dragonflies and damselflies are noteworthy. The white-legged damselfly *Platycnemis pennipes* is uncommon apart from in the Stour and its tributaries. The Moors River once supported several national rarities, but pollution problems have been the likely reason for their demise in recent years. The scarce chaser *Libellula fulva* is one rarity that survives on the Moors River and occurs along the lower Stour upstream to Wimborne and occasionally upstream to Sturminster Marshall and recently on the lower Allen. The heathland SSSI adjacent to the upper Moors River also supports small red *Ceriagrion tenellum* and scarce blue-tailed *Ishnura pumilio* damselflies.

The Stour supports nationally rare river invertebrates such as the elmid beetles *Stenelmis canaliculata* and *Macronychus quadrituberculatus*, present at several sites between Holdenhurst and Hampreston, and the rare caddisfly *Leptocerus lusitanicus*. The headwaters of the Stour support very rare caddisflies; *Hydropsyche saxonica* and *H. fulvipes* which have been discovered in a recent survey (Furse 1995), and a population of the white-clawed crayfish *Austropotamobius pallipes* has recently been discovered on the Allen.

Christchurch Harbour is an important site for birds. Rare breeding species include Cetti's warbler and bearded tit, and the Harbour attracts significant numbers of wintering wildfowl and waders. It is also an important migration route.

The Stour catchment continues to provide remnant wetland habitat for breeding birds such as the lapwing, snipe and redshank, but these species have declined both nationally and locally. Yellow wagtail ceased breeding in the catchment by 1980 and curlew are reduced to only a few pairs.

More generally, the catchment provides good habitat for a wide variety of more common wetland species. Significant populations of reed warblers, sedge warblers and kingfishers occur throughout the river valley and minor tributaries.

The Stour is at present the most important river for otters in the South Wessex area, based on records of sightings, signs and corpses (see 4.14.2).

10.3 Richness of freshwater invertebrates

The Biological GQA sampling of freshwater invertebrates in 1995 gives us an indication of the richness of the catchment. The number of BMWP scoring families (see 26.5.1) is noteworthy both in a regional and national context. The values are consistently high (39-45) even in the lower reaches between Wimborne and Holdenhurst, and the total of 48 taxa for the year at Dudsbury is exceptional and may well be the richest site in the country.

10.4 Invasive species

Giant hogweed *Heracleum mantegazzianum* occurs at the confluence of the Avon and Stour in Christchurch and at one or two locations in the catchment. Japanese knotweed *Fallopia japonica* has been recorded from the Harbour, Clockhouse Stream at Canford near Wimborne, on the Cale and on

land in the headwaters. Australian stonecrop *Crassula helmsii* is present in a pond adjacent to the river at Kinson. Himalayan balsam *Impatiens glandulifera* is occasionally recorded throughout the catchment. We will continue to collect data on these plants and will take steps to control these plants where operational maintenance takes place and to offer advice on control methods; we produce a free leaflet on this subject, available from our offices.

Mink are widespread throughout the catchment as are signal crayfish *Pacifastacus leniusculus*; terrapins are in the lakes at Moors Valley and the tidal river, and there are also pumpkinseed in the catchment. Records of terrapins and crayfish are welcomed; a leaflet on the identification of crayfish species is available from our Blandford office. It is of concern that the presence of signal crayfish in the Stour catchment places the native crayfish in the Allen and in the nearby Piddle catchment at some risk from disease.

10.5 Blandford fly

The Stour downstream of Blandford has received publicity in recent years as the home of the Blandford fly, *Simulium posticatum*, which is capable of inflicting painful bites on people. For the past five years, populations of this insect have been controlled by spraying the larval habitat with Bti, a pesticide derived from a specific bacterium. The work has been carried out by the Institute of Freshwater Ecology (IFE) and funded by local authorities, principally North Dorset District Council. IFE hold off-label approval from the Health & Safety Executive to use this pesticide.

10.6 Low flows and headwater streams

The river ecology is at risk from over-abstraction in a number of locations. In particular, invertebrate populations in upper winterbourne and other headwater sections need protection from future abstraction or, in some cases, augmentation schemes, and we should survey the relevant stretches.

10.7 *Phytophthora* disease of alder

Root Alder (*Phytophthora*) disease is now known to be widespread through much of England and Wales. Most of the affected trees are in riparian sites or on land that is subject to flooding from adjacent rivers; however the disease has been found in some alders well away from any watercourse.

In the South Wessex Area the disease has so far only been identified from the Stour, and it has been recommended that landowners should consider a temporary cessation in planting. Also in order to avoid spreading the disease it is advised that it may be wise to restrict machinery and fish movements from where the disease is present to areas where it appears to be absent.

A leaflet on this disease has been produced by the NRA and the Forestry Authority, and is available from our offices.

11. FISHERIES

We consider here the conservation of wild populations of freshwater fish, and the maintenance and development of their environment. We aim to protect fish stocks by maintaining water quality, water resources and other physical features appropriate to the catchment, by protecting the passage of migratory fish, and by managing their exploitation by angling and other forms of fishing.

11.1 Fish populations

Fish populations are important indicators of the overall health of our rivers as they are affected by changes in flow, water quality and the availability of suitable physical habitats. We use special survey equipment and information from catch returns to assess the health of fish populations.

We try to survey the main Stour for fish populations once every five years as part of a rolling programme (Map 16). The last survey took place in 1992 and 30 sites were covered; it was due to be repeated in 1997 but will be delayed until 1998. In Christchurch Harbour we rely on commercial catches for information on fish stocks.

The fish populations of the Stour are dominated by coarse species, although salmonids are common in both the lower catchment and some tributaries. Christchurch Harbour is a migration route for several anadromous and catadromous species for which we have statutory responsibilities.

11.1.1 Salmon and trout

The Allen and Crane are important areas for migratory salmonid production and are monitored regularly. A survey of the Moors River is undertaken every five years as part of an impact assessment study; the next scheduled survey is due in 2000. The upper Stour tributaries have a high priority for survey work.

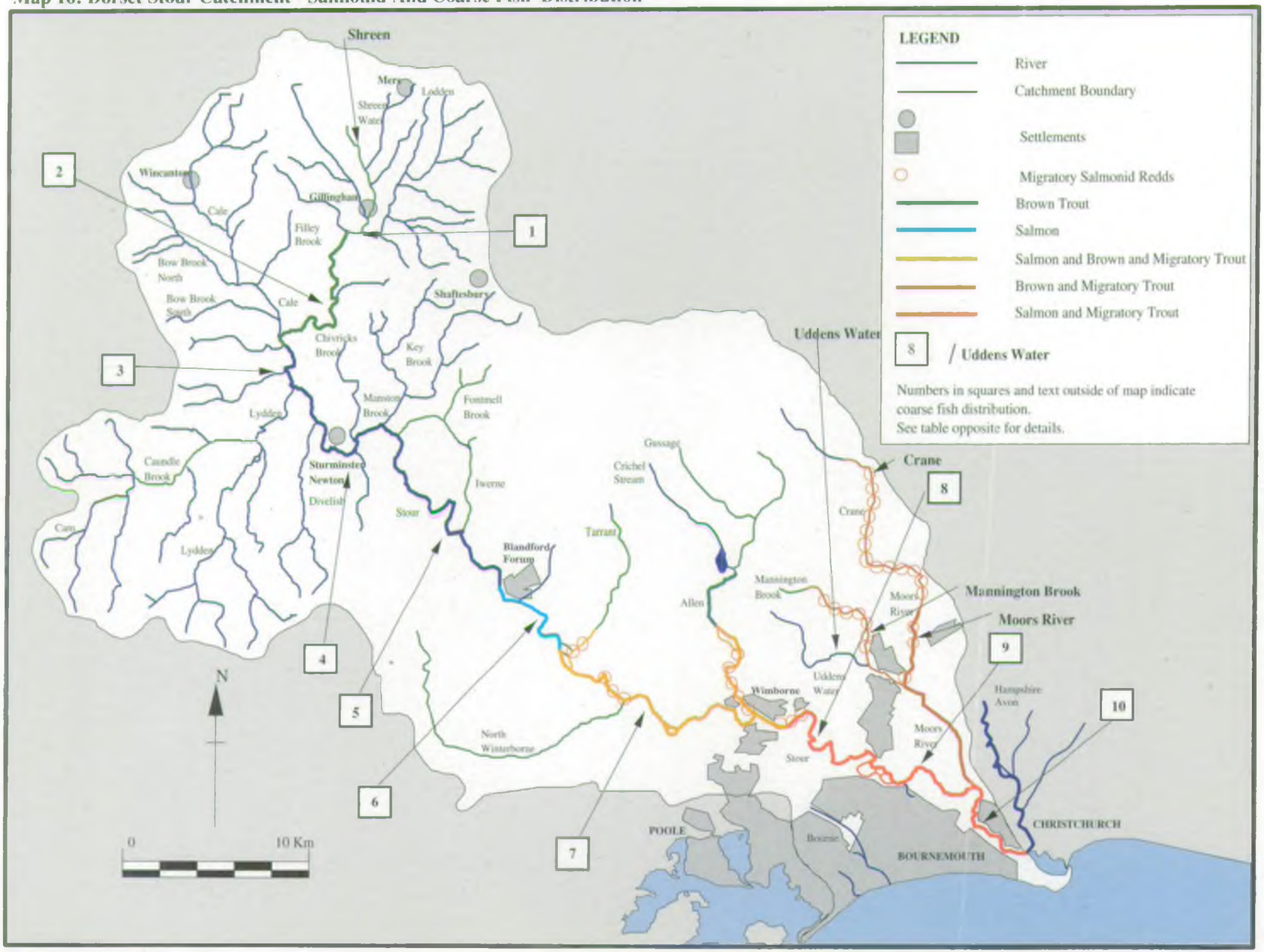
Salmon are found in the lower half of the Stour catchment. Spawning and juvenile habitat is mainly confined to the tributaries, such as the lower sections of the Tarrant and the Allen. Certain stretches of the main river are also used for spawning, in particular around Wimborne and Spetisbury. There are anecdotal, historical accounts of salmon seen upstream of Blandford, although it is believed that salmon have not ascended beyond here over the last 15 years.

The majority of the salmon moving through Christchurch Harbour use the Hampshire Avon. Salmon and migratory trout are moving through the Harbour all year round, the peak of fresh-run fish occurring during May to September. A salmon radio tracking study was carried out between 1986 and 1990, aimed at providing guidelines for the management of large public water supply abstractions to ensure that future movements of salmon could be protected. Based on the small number of tagged fish which subsequently ascended the Stour during the study period it would appear that approximately 6.5% of salmon entering the Harbour are Stour fish.

Brown trout are present in the Stour between Spetisbury and Wimborne and upstream of Marnhull and are thought to inhabit the majority, if not all of the tributaries. The highest densities are found on the chalk stream tributaries, such as the Allen, Crane and Mannington Brook.

In recent years there has been a high degree of stocking of brown trout on the Allen for the provision of catch levels which are deemed acceptable. With this exception, the trout populations of the Stour are probably natural and wild and are therefore important in conservation terms.

Map 16: Dorset Stour Catchment - Salmonid And Coarse Fish Distribution



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11.1.2 Coarse fish

The predominant coarse fish species in the main river are roach, pike, dace, chub, barbel and perch. Roach, pike and eels are ubiquitous, with roach being the most abundant species, though slower growing than equivalent populations on chalk rivers such as the Hampshire Avon. The lower Stour is nationally renowned for its barbel population (Map 16 and table below).

	Roach	Dace	Chub	Pike	Perch	Barbel	Bream	Carp	Grayling	Tench
Stour 1	•	•••	••	••				••		••
Stour 2	•	•	•••	•••	••					
Stour 3	••	•	•••	•••	•••					••
Stour 4	•••	•	•••	•••	•••					•••
Stour 5	•	••	•	•••	•••		•			
Stour 6	••	•	•	•••	••					
Stour 7	••	•••	••	•••					•	
Stour 8	••	••	•••	•••	••	••	•			
Stour 9	••	••	••	•••	•••	••				
Stour 10	•••	•	•••	••	••		••			
Shreen	•								••	
Uddens		•		•						
Mannington			•••							
Moors	•	•••	••	•••	•					
Crane	•								••	

• Rare •• Frequent ••• Abundant

The tributaries have sparser populations of coarse fish but may be important as spawning and nursery areas for some coarse species. Grayling are found in the Crane and Shreen Water, and pike in the more acidic Uddens Water. The only other Stour tributary with a notable coarse fish population is the Moors River where dace, chub and pike dominate.

Eels and the minor species such as minnow, gudgeon, stone loach and bullhead are ubiquitous. Marine species including thick-lipped and thin-lipped mullet, bass and flounder frequent the tidal river downstream of Iford Bridge and on occasion penetrate further upstream.

11.2 Angling

Our byelaws apply throughout the catchment and there are no statutory bag limits, although some private fisheries may set their own.

11.2.1 Salmon and trout

Angling for salmon and migratory trout takes place downstream of Wimborne on the Stour although fishing pressure is light; migratory trout are also fished for on the lower sections of the Allen and Moors River. Brown trout fishing occurs on the Shreen Water and lower catchment tributaries.

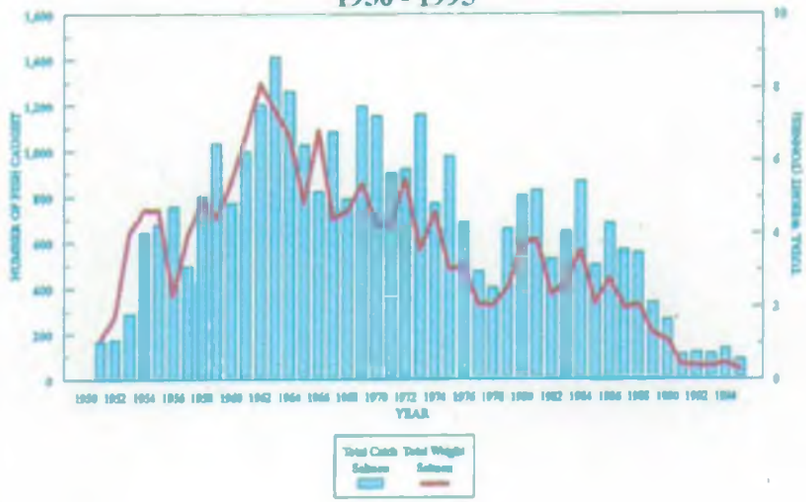
The Stour once sustained a moderate salmon and sea trout rod fishery, but the number of rod-caught salmon and sea trout decreased dramatically in the mid to late 1960s. The number of sea trout caught has varied since 1970, although rarely have more than 20 fish been taken each year in the last ten years. The number of salmon caught annually by anglers on the Stour has decreased to the occasional one or two, if any.

The decline in numbers may have resulted from declining water quality in the Stour when the discharge of effluent from Holdenhurst STW started in 1965 (this has subsequently been improved), and from the loss of spawning habitat, particularly on the Allen, due to increased abstraction since 1970. Angling on the Allen has been demonstrated to be adversely affected by abstraction.

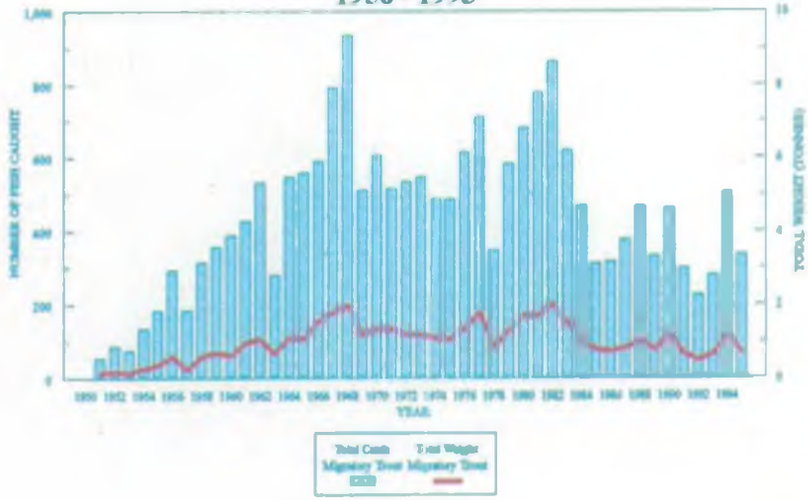
The Crane has extremely high densities of trout, thought to be due to both the large run of relatively fecund migratory trout and the stable flow regime in the stream contributing to good survival to the parr stage. It is one of the principal salmonid spawning sites on the Stour catchment and is largely

Figure 4: Dorset Stour Catchment - Fisheries Statistics

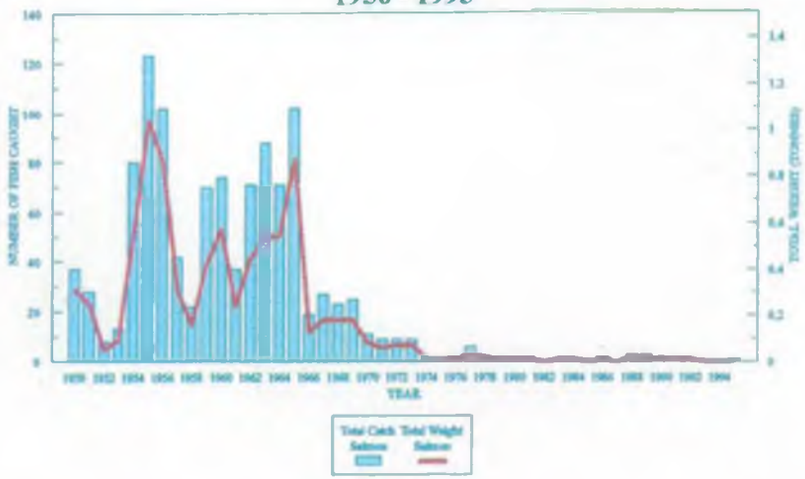
Salmon
Net Catch - Mudeford
1950 - 1995



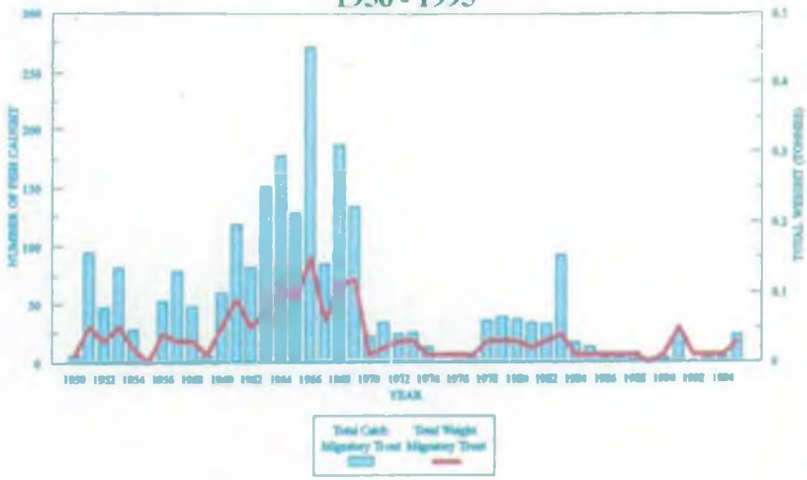
Migratory Trout
Net Catch - Mudeford
1950 - 1995



Salmon
Rod Catch - River Stour
1950 - 1995



Migratory Trout
Rod Catch - River Stour
1950 - 1995



unmanaged, unfished and represents a relatively pristine chalk stream habitat with wild fish stocks.

11.2.2 Coarse fish

Coarse fishing takes place from Gillingham to Christchurch on the main river, as well as on the Moors River and lower part of the Allen. Throop Fisheries in Bournemouth is nationally renowned for its barbel fishing. Where habitat is suitable, good populations of both dace and chub exist.

The section of the Moors River upstream of Palmersford STW supports a coarse fish population which compares favourably with densities elsewhere on the Stour. Downstream of the STW however, densities are lower than those recorded elsewhere, although a slight improvement has been observed since the relocation of the STW outfall from the Moors River to the Stour at Throop. As a whole, however, the coarse fish population of the Moors River lies within the lower end of the expected range of densities and it is believed that other constraints, such as Hurn Weir (see 4.12), are limiting recovery. The Mannington Brook, although principally a trout stream, is thought to play a role on the Moors River system as a nursery area for coarse fish.

The Allen used to have a good population of coarse fish which was culled annually to reduce competition with trout. The coarse fish populations eventually fell to present low levels. Predator and competitor species to trout are still regularly removed by electric fishing by the riparian owners.

The majority of fishing in the catchment is in private ownership, controlled by local estates, syndicates and clubs. Free fishing is permitted on the council owned sites at Longham and Muscliff. There are several trout and coarse stillwater fisheries within the catchment. We own ponds at Little Canford and issue season tickets to fish for roach, rudd, bream, carp, tench, pike, perch and eels.

11.3 Commercial fishing

We are the Statutory Sea Fisheries Authority in Christchurch Harbour and as such have full responsibility for shellfish and fin fish in this area. The Southern Sea Fisheries District Committee is the statutory body responsible for the coastal waters.

Boats operating out of the Harbour constitute a mixed subsistence fishery, with no significant fishery for individual species. The inshore fleet is very versatile using several fishing methods corresponding to seasonal fisheries throughout the year.

The sheltered waters of Christchurch Harbour and Poole Bay enable small boats to work on high value resources, e.g. sole, oyster, bass and lobster. The stocks are consequently heavily exploited and result in very seasonal fisheries. Demand has increased for under exploited species such as velvet crab and cuttlefish as marketing opportunities expand.

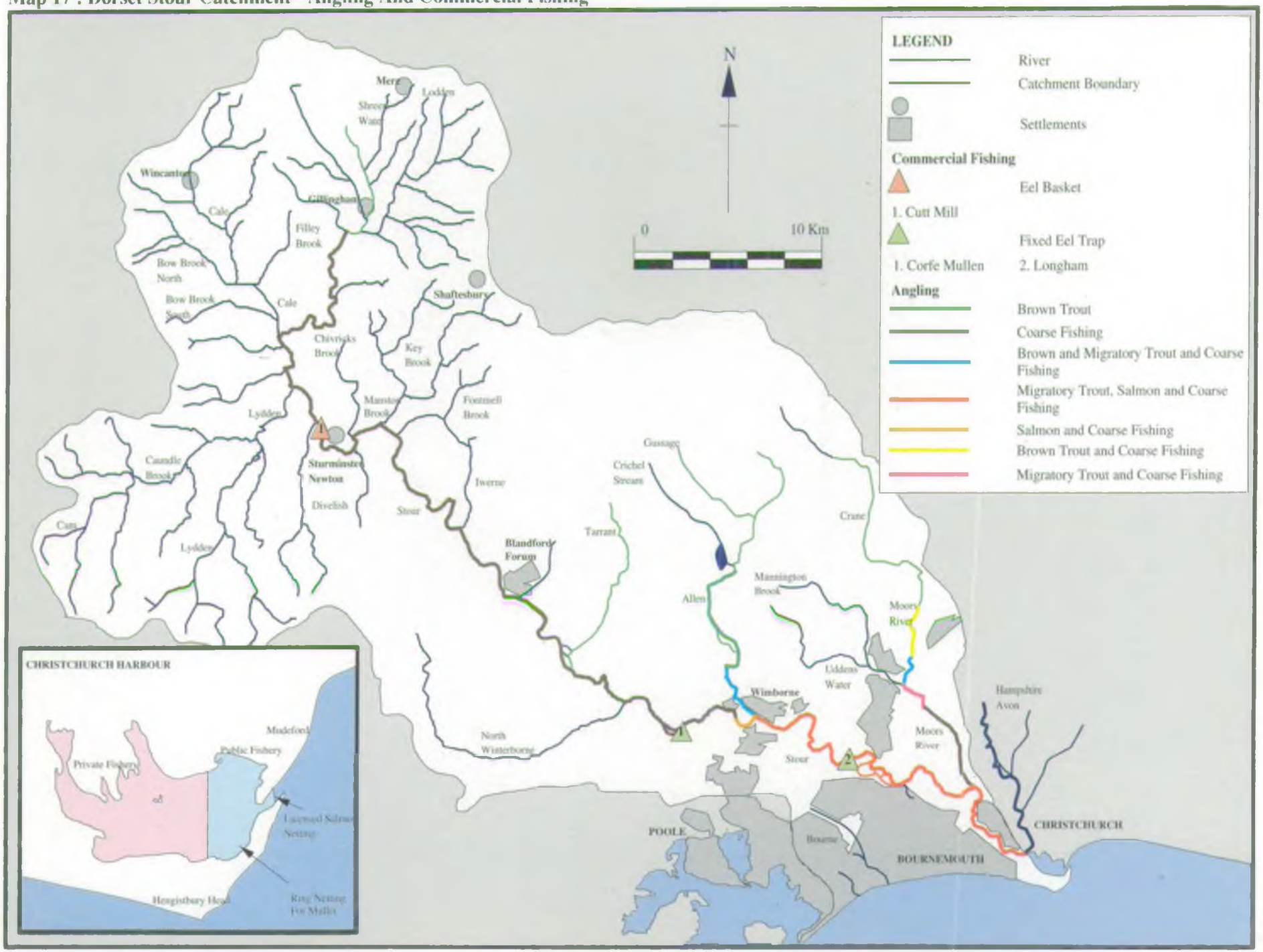
Boats greater than 10m have quotas imposed on their catches and are required to provide returns to MAFF for the quota species. Two such boats are registered in Christchurch Harbour. Boats under 10m are not required to submit returns, although some do on a voluntary basis.

There is concern over the general state of UK fish stocks. Conservation measures such as landing quotas have been set for most fish species other than shellfish, bass, dogfish and skate; bans on undersized fish such as bass and lobsters are difficult to enforce.

11.3.1 Salmon and migratory trout

Licensed netting for salmon and migratory trout takes place in Christchurch Harbour, the joint estuary of the Avon and Stour, in the Mudeford run, the narrow mouth of the estuary, and from the beach within the public fishery part of the harbour. Fishing is solely by means of seine nets and

Map 17 : Dorset Stour Catchment - Angling And Commercial Fishing



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exploits both Hampshire Avon and Stour stocks.

The number of nets is limited to six in accordance with our Poole Harbour and Christchurch Harbour (Limitation of Net Licences) Order 1993; we license these nets, and fishing is only permitted between 15 April and 31 July inclusive, and further restricted by means of weekly close times.

The season was shortened by two and a half months in 1994 so as to protect the early running spring salmon in particular, which have been in decline nationally. Net catches have shown a downward trend since the early 1960s and little netting now takes place before mid-May; the majority of migratory trout are taken in June and July.

As a measure to facilitate the recovery of salmon stocks in the area, live salmon caught by the netsmen during the 1995 net season were purchased by the NRA and the Wessex Salmon Association (WSA). In total 41 salmon were purchased by the NRA and these fish were immediately floy tagged and released initially into Christchurch Harbour, then the Avon as flows dropped, in order to increase spawner escapement to help boost stock recovery rates. The WSA purchased 34 salmon which will contribute to the brood stock for their artificial propagation project.

Illegal netting for salmon and migratory trout in Christchurch can pose a serious threat to stocks. We routinely carry out enforcement and anti-poaching work between April and September.

11.3.2 Shellfish

Shellfish form an important part of the sea fishery with 85% of catches going abroad. Christchurch Ledge is one of the most important lobster habitats on the south coast and boats of 6-8m pot for lobsters and crabs, similar size boats pot for prawns within Christchurch Harbour. The lobster fishery attracts the greatest amount of effort during the summer with the participation of part-time fishermen.

Several boats dredge for oysters; this is regulated by the Southern Sea Fisheries District Committee in Poole Bay. The statutory close season is 1 April to 31 October; other regulations include maximum dredge length, minimum landing size and a ban on night fishing. Pots are used to catch prawns in Poole Bay; the statutory close season is 1 January to 31 July. Cuttlefish are taken in trawls and nets between May and September.

11.3.3 Finfish

There is a significant year round bass fishery attracting boats from outside the area between May and October. At present the bass fishery is very buoyant. Several full time and seasonal boats take bass on hand and long lines along Christchurch Ledge, rod and line fishing also forms an important component. The Minimum Landing Size of bass was raised from 32 to 36cm in January 1990.

Fishing for silver eels (*migratory stage*) takes place at fixed traps located on the Stour at Corfe Mullen and Longham, an eel basket is operated at Cut Mill and there are also several licensed fyke nets. Licensed fyke netting for brown eels (*non-migratory stage*) in Christchurch Harbour used to be common, but in recent years no licences have been issued.

Christchurch Harbour is important as a nursery area for some sea fish and is a rich feeding ground for different species of fish. Bass and mullet are known to use the estuary both as a nursery area and for feeding, and there is some ring netting for them in the public fishery. Red mullet and black bream also appear in the Harbour in spring and summer.

Trawling or netting for sole and bass occurs between The Needles and Poole during November to February, plaice and the occasional turbot are caught as secondary species. The cod fishery has failed during winter in recent years and there is little cod or whiting caught at the present time.

12. RECREATION AND AMENITY

Many people spend their spare time enjoying our rivers and coasts. Where we can, we try to improve facilities for these people but we must always safeguard the environment from the damage they might cause. We work with other organisations such as planning authorities and sports associations to develop recreation facilities.

We aim to develop the amenity and recreational potential of inland and coastal waters and associated land by protecting and maintaining access to beautiful areas or special sites of interest, and making sure that land and water under our control is made available for recreation; at all times we should cater for the needs of the chronically sick or disabled.

12.1 Local perspective

This catchment offers good opportunities for both land-based and water-based recreation; some parts are being heavily used, while other areas remain largely inaccessible.

12.1.1 Stour

Public footpaths and bridleways provide extensive access, either running alongside or crossing the river. The *Stour Valley Way* is a medium-distance footpath of approximately 40km, using public footpaths, public open space and quiet roads between Christchurch and Spetisbury. The National Trust have opened a riverside permissive path from White Mill to Spetisbury adding 3.5 miles to the Way, and there are proposals to extend it to Blandford and beyond; walkers can follow the riverside for virtually the whole stretch in NT ownership from Eye Bridge to Shapwick. The local network of long distance footpaths will eventually link the 20km *Wareham Forest Way* with the *Stour Valley Way* at Sturminster Marshall.

Major tourist attractions along the Stour include the National Trust properties of *Stourhead* at the source of the Stour with landscaped gardens and walks around the lakes and *Kingston Lacy* near Wimborne which has riverside access.

Several historic mills provide interest and a focus for informal recreation. In particular, the working *Sturminster Newton Mill*, an excellent educational resource, *Place Mill* at Christchurch and the recently restored *White Mill* at Sturminster Marshall.

The Stour passes through a number of towns, but with varying degrees of accessibility and amenity value. For example, at Blandford there is limited public open space, but there are proposals to develop amenity use, by extending and linking land south of the river to create *The Stour Park*. North Dorset District Council also have long term plans to develop *Crown Meadows* as an open space. At Gillingham there is poor recreational use of the river. Policies in the District Wide Plan make reference to increasing riverside recreation in these two towns. There is also riverside access via a public open space at Wimborne. The National Trust provide access at Eye Bridge and their riverside walks, and East Dorset District Council provide access at the Walnut Tree Field open space at Sturminster Marshall.

At Christchurch, the lower Stour and the Harbour offer a range of land and water-based recreational activities; from Iford Bridge (the limit of public navigation) to the Harbour, the Stour is accessible for most forms of water-based recreation, such as canoeing, sailing, boardsailing, rowing, boat-hire and yachting, and Christchurch and Bournemouth Borough Councils exercise some control over navigation by means of byelaws.

The Quomps (Christchurch Quay) is a well developed public amenity and is very popular with tourists and locals. There is public access through Stanpit Marsh (part of Christchurch Harbour

SSSI), a scenic area for walking and bird watching as well as an educational resource. The recreational grounds alongside the lower Stour, such as Iford, Tuckton and Jumpers Common provide opportunities for informal, passive and water-based recreation.

One link of the proposed Sustrans cycleway between Bournemouth and Bath, sponsored by Dorset County Council, East Dorset District Council and North Dorset District Council, follows the Stour valley for much of its way. The North Dorset District Council Local Plan also includes a policy for the conversion of the disused Somerset and Dorset railway line to a cycleway.

12.1.2 Tributaries

Recreational use is variable, for example, on the Moors River there is limited public access along the riverside, but Moors Valley Country Park is a major tourist attraction occupying some 750 acres of river valley and forest. On the Allen, a public footpath follows the riverside at Wimborne St Giles, but there is limited public access along much of the corridor. Wimborne is the main focus of recreation on the Allen, both within the town with the riverside footpath and at Walford Mill Craft Centre, a small tourist attraction on the northern edge of the town. The Millhams Stream area, near Longham, has been positively enhanced for recreation and conservation by Bournemouth Borough Council, with provision for streamside walks and an informal recreation/picnic area alongside the watercourse. It is typical of the recreation provision provided on the river through Bournemouth.

Of the Upper Stour tributaries, the Cale at Wincanton and the Shreen and Ashfield Water at Mere are candidates for enhancing informal recreation within a town environment under local initiatives.

12.1.3 Coastline

Bournemouth is a popular tourist resort with sandy beaches, promenade and many opportunities for a variety of watersports. It provides the full range of leisure activities associated with a seaside holiday and commercial centre.

12.1.4 Agency owned sites

We own two sites in the Stour catchment; Little Canford Ponds and Corfe Mullen Mill. The latter has been leased long-term and is therefore out of our control. Little Canford Ponds, near Wimborne, has been the focus of an improvement project over the past two years. It comprises an eight acre site with a coarse fishery (for permit holders) and caters especially for the young and disabled. It includes fishing platforms, footpaths, a picnic area and car parking facilities. Its wildlife value has also been improved through active management.

13. ARCHAEOLOGY

Here we consider how we protect the historic built environment associated with rivers and wetlands in this catchment. We aim to ensure that these features are not degraded through neglect, mismanagement, or insensitive development and, where we can, to take measures to enhance them. We have duties to conserve and enhance sites and objects of archaeological, architectural or historic interest, which are fulfilled through the work of our other Functions. An important part of our work is to influence landuse planners and land managers to look after rivers and wetlands sensitively.

13.1 Local perspective

The catchment contains significant archaeological remains covering several thousand years. There are estimated to be over 300 Scheduled Ancient Monuments (SAM), of which a proportion are associated with watercourses and wetlands; SAMs have an equivalent protection to SSSIs.

Wetland archaeology within the three component counties appears to be largely unexplored; for example, in Somerset waterlogged archaeological remains may survive along the East bank of the Cale at Wincanton, which was a sizeable settlement in the early medieval period. Within Wiltshire there are a number of surviving earthworks of probable medieval settlements adjacent to the rivers, some of which may contain waterlogged remains. However, this is presently unknown. Similarly, Dorset's wetland archaeological resource has not been ascertained, although occasional finds have been documented; for example, on the Allen, undated staging was discovered in 1988 by the BP pipeline excavation, and consisted of large worked timbers, pegs and dowels, whilst a nearby stream was revetted with a hurdle fence.

13.2 Settlements

Settlements in the Western and Northern part of the catchment tend to be large, nucleated villages, often with outlying hamlets and farms. In the East, medieval villages tended to be dispersed, perhaps clusters of hamlets rather than nucleated settlements. Deserted medieval villages include Brockington (Gussage All Saints), Hemsworth (Witchampton) and Minchington (Sixpenny Handley).

Iron Age hill-forts are prominent landscape features today, and include Hambledon Hill, Hod Hill and Badbury Rings. Other hill-forts include Bussey Stool Park (Tarrant Gunville), Dudsbury (Parley Cross), Burbury Rings (Blandford), Penbury Knoll (Pentridge) and Spetisbury Rings.

Badbury Rings was a meeting place for 5 Roman roads; the road to Hamworthy crosses at Lake Gate (Wimborne) where there is the remains of the riverside camp of the 11th Legion, and the Ackling Dyke crosses at Shapwick on the way to Dorchester.

13.3 Historic mills and bridges

Numerous mills were sited along the Stour and its tributaries, some of which survive today as SAMs, others have long-since gone. Silk mills were centred at Gillingham, with a small range of silk mills extending along the Shreen Water as far as Mere.

Corn mills were frequently located along the Stour and tributaries, for example, West Mill (Stalbridge), Kings Mill (Marnhull), Cutt Mill (Hinton St Mary) and White Mill (Sturminster Marshall). Sturminster Newton Mill dates partly from the 17th and 18th centuries, although the existence of a corn mill here is recorded in the Domesday Survey of 1086.

There were weaving mills at Sturminster Newton at or near Rolls Mill, but all have now disappeared. Bidecome Mill at Gussage All Saints, was a bone mill. Paper mills were sited at Witchampton and at Wimborne; the former only ceased to operate in recent years.

Fiddleford Mill is a prominent feature with the present building dating from the 14th and 16th century. The mill house itself is a fine medieval building. Post medieval mills and their leats and ponds occur at Horsington, Charlton Musgrove and to the east of Abbas Coombe and Templecombe.

Several notable historic bridges cross the Stour catchment. The following are Scheduled Ancient Monuments: Town Bridge (Sturminster Newton), Durweston Bridge, Crawford Bridge (Spetisbury) Julian's Bridge (Wimborne) and White Mill Bridge on the Stour; Fifehead Neville Bridge on the Divelish; and Walford Bridge, Witchampton Bridge, and Stanbridge on the Allen.

13.4 Historic towns

Gillingham dates to the medieval or earlier period; there is evidence of an extensive Iron Age/Romano-British settlement at Coldharbour on the western edge of the town. It was a Royal Forest and Chase, and the King's Court Palace, adjacent to the Lodden, was built by King John.

Sturminster Newton castle, an Iron Age Fort is situated adjacent to the south bank of the river, within which stands the remains of a medieval manor house.

At Wimborne, the monastery was founded about 705. The Minster is reputed to have been built by Edward the Confessor; the earliest surviving parts appear to date from the 11th century.

Blandford Forum occupies a natural position for a settlement next to a fording point of the Stour. The town is apparently of medieval origin with an established market in existence by 1217-18. It was largely rebuilt after a catastrophic fire in 1731.

Christchurch was an international port in the Roman Period. Notable features include Christchurch Priory, and the Constable's House and Castle. Hengistbury Head is an Iron Age peninsula fort.

Map 18: Dorset Stour Catchment - Scheduled Ancient Monuments

14. WATER ABSTRACTION AND SUPPLY

Here we consider the abstraction of water from the surface or below the ground for public water supply, industry, and other uses. We aim to manage water resources to achieve the right balance between the needs of the environment and those of the abstractors. We have duties and powers to ensure that water is used properly by regulating abstractions using licences, and to conserve water supplies and protect them from over-use.

14.1 Local perspective

All licensed abstractions in the catchment are summarised in the table below. These figures also include two groundwater sources at Stubhampton and at Mere which form part of a multiple public supply licence; the other sources on this licence fall outside the catchment.

	Number of Licences	Licensed Daily Quantity (Mld)	Licensed Annual Quantity (Mly)	% of Daily Total	% of Annual Total
Groundwater	247	203	62,529	40	49
Surface Water	107	304	65,784	60	51
Impoundments	8	0	0	0	0
Total	362	507	128,313	100	100

Daily licensed quantity represents how much could legally be abstracted per day but is not necessarily a straight multiplication to annual quantity. Where no daily quantity is available, the average of the weekly licensed value is used for indicative purposes

Figure 5 shows a general breakdown of abstraction licensing for both groundwater and surface water in the catchment. The largest licensed groundwater use (by licensed daily volume) is public water supply, although general farming has the largest number of licences but with relatively small volumes. The largest licensed surface water users are fish farming and public supply, although the numbers of licences are well spread between uses, including two for water power.

The daily licensed total for the catchment represents approximately 44% of the long term average (LTA) daily flow at Throop (see 6.4). This is a crude indication of the pressure on resources. Licensed abstractions fall into two basic categories of consumptive and non-consumptive use. Consumptive use generally involves the loss of a proportion of the water abstracted e.g. spray irrigation; non-consumptive use returns virtually all the abstracted water back into the catchment close to the point of abstraction e.g. fish farms. Consumptive uses have more impact on rivers than non-consumptive, although the latter can still have localised impacts depending on the rates of abstraction and local conditions.

If licensed quantities are considered, about 55% of the total daily licensed abstraction is non-consumptive. Figure 5 also gives a broad indication of consumptive and non-consumptive uses.

The data above are based on the worst case where all abstractions are used to the authorised maximum. The table below gives an indication of actual use of water compared with total licensed quantities for the period 1994-1995 based on returns made to us.

	Number of Licences Data Based On	Actual Annual Quantity (Ml)	Licensed Annual Quantity (Ml)	% Use
Groundwater	78 (32%)	41,518	56,698 (91%)	73
Surface Water	49 (46%)	12,167	41,723 (63%)	29
Total	127 (35%)	53,685	98,421 (77%)	47

Figures in brackets indicate % of the total number of licences and authorised annual quantities

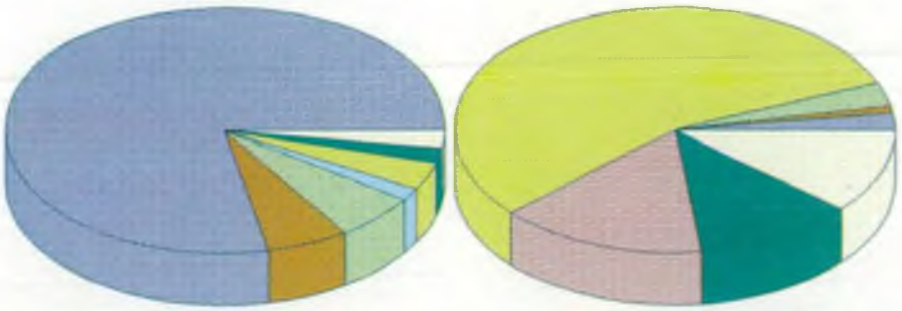
14.2 Public water supply

Demand is centred in the urban areas around Bournemouth and Poole, with other notable demands arising from the smaller towns of Wincanton and Blandford. There is a significant seasonal pattern to demand in the Bournemouth area attributable in part to the large tourist population.

Wessex Water Services (WWS) and Bournemouth and West Hampshire Water (BWHW) provide mains public water supply within the catchment. Both companies supply water within distinct

Figure 5: Dorset Stour Catchment - Licensed Abstractions

Groundwater

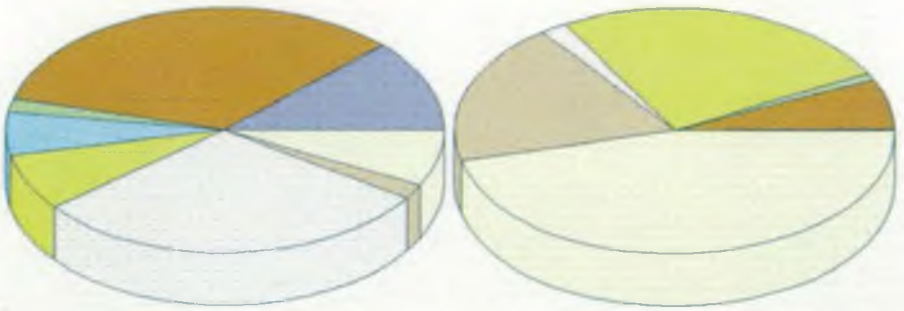


Number Of Licences % Of Abstractions

Agriculture (C) | Spray Irrigation (C) | Industrial (C) | Private Water (C)
Public Water (C) | Stream Support (NC) | Cress (NC) | F F & F (NC)

%'s based on daily licensed quantities (Mld)
F F & F - Fish Farms & Fisheries
C - Consumptive NC - Non-Consumptive

Surface Water

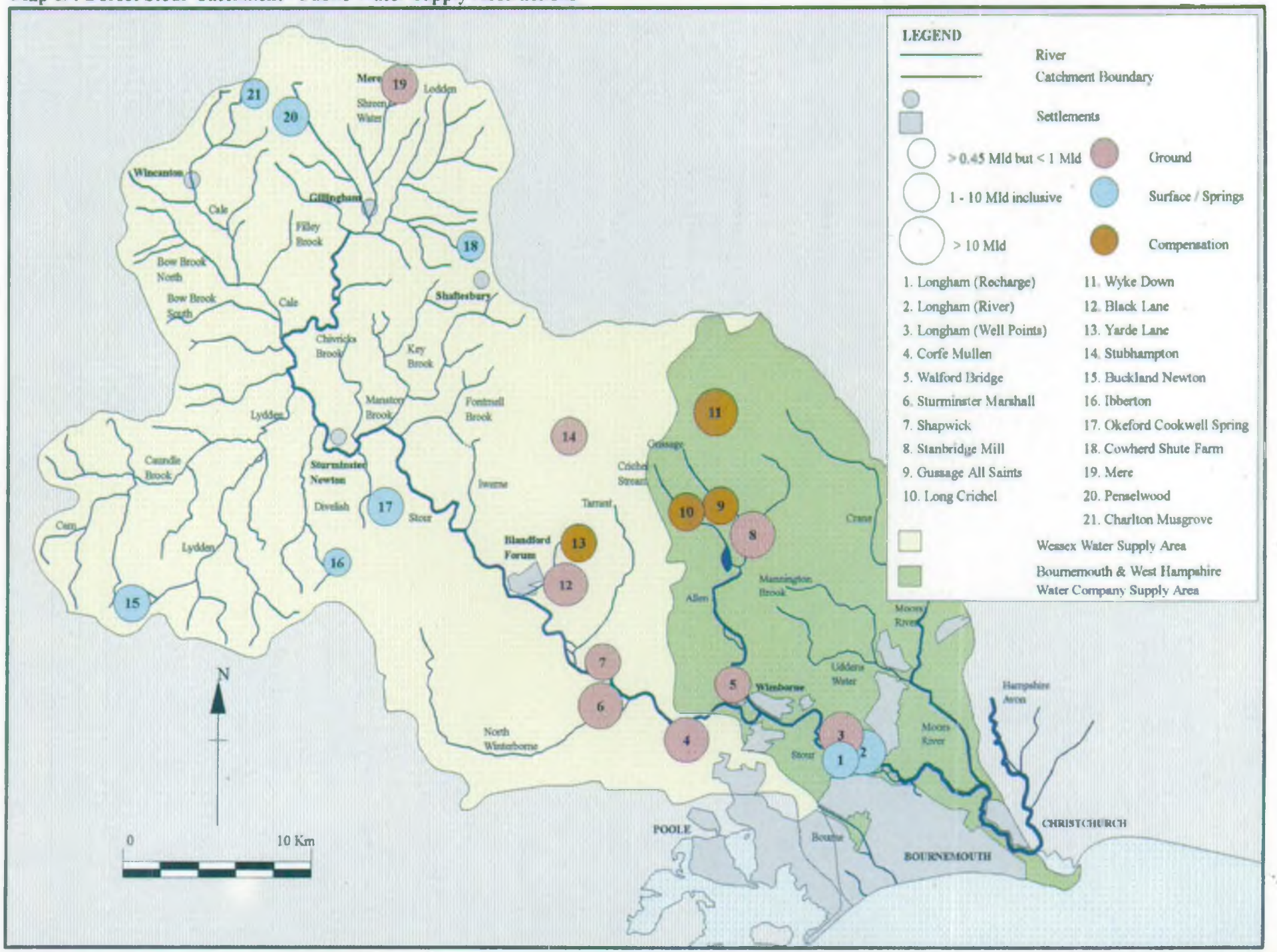


Number Of Licences % Of Abstractions

Agriculture (C) | Spray Irrigation (C) | Industrial (C) | Private Water (C)
Public Water (C) | Leisure (NC) | Water Power (NC) | F F & F (NC)

%'s based on daily licenced quantities (Mld)
F F & F - Fish Farms & Fisheries
C - Consumptive NC - Non-Consumptive

Map 19: Dorset Stour Catchment - Public Water Supply Abstractions



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customer areas.

The Stour catchment upstream of Wimborne Minster is in the WWS Dorset supply zone. WWS abstracts water from sources within the catchment to meet its customer demand both in the catchment and in the wider supply zone. Currently, WWS total resources within the zone exceed customer demand by 22Mld. Of the company's zonal resource of 160Mld, some 68Mld comes from within the catchment.

The catchment downstream of Wimborne Minster is in the BWHW supply zone. The company abstracts water from sources within the catchment mainly to meet demand around Bournemouth and Poole. Currently, the company's total resource of 221Mld exceeds average daily demand by 67Mld; of this total resource some 54Mld comes from the company's sources within the catchment. This apparently secure position is, however, challenged at times of peak demand when the company has limited storage from which to draw.

14.3 Licensed public water supply abstractions

The abstractions represent 55% of the total daily licensed quantity for groundwater and 24% for surface water. The Longham recharge licence represents 1.5% of the daily licensed surface quantity and water pumped to maintain river flows 15% of the daily licensed groundwater.

The locations are shown on Map 19 and the quantities, sources and conditions in the tables below. WWS key sources within the catchment are the groundwater abstractions at Corfe Mullen, Black Lane and Sturminster Marshall. BWHW key sources in the catchment are the groundwater abstraction at Stanbridge and the direct river abstraction from the Stour at Longham.

WWS Source	Ground/ Surface	Daily Licensed Quantity (Ml)	Annual Licensed Quantity (Ml)	Comments
Black Lane	G	10.5	2,920	
Yarde Lane	G	1.5	138	Provided to maintain flows in the Pimperne Brook between 1 June-31 August if it runs dry while the Black Lane source is being used
Sturminster Marshall	G	20	5,820	Extra 10Mld on any 30 days in 12 months provided that average rate of abstraction in any 14 consecutive days does not exceed 25Mld
Shapwick	G	9.08	3,314.2	
Corfe Mullen	G	32.92	8,309.2	
Cowherd Shute Farm	S	0.055	1.66	
Penselwood	S	1.591	499.4	
Charlton Musgrove	S	0.618	50	
Ibberton	S	0.455	72.64	
Okeford Cookwell Spring	S	1.364	385.9	
Buckland Newton	S	1.091	230	
Stubhampton	G	2.18	795.408	These form part of a multiple licence, the other sources are out of catchment. The combined annual quantity from all sources must not exceed 4,190.42Ml
Mere	G	9.08	3,314.2	

BWHW Source	Ground/ Surface	Daily Licensed Quantity (Ml)	Annual Licensed Quantity (Ml)	Comments
Longham (River Licence)	S	-	11,581.81	Main river abstraction. Weekly (seven consecutive days) rate of 222.72Ml with a maximum daily rate of 68.18Ml
Longham (Recharge)	S	4.55	1,660	Recharges valley gravels, source of supply for well points
Longham (Well points)	G	13.6	4,977	In conjunction with and not additional to quantities authorised under main Longham river licence
Walford Bridge	G	4.09	1,497.27	On special occasions pumping rate maybe increased to 4.54Mld
Stanbridge Mill	G	25.00	9,127.27	If full quantity not required for PWS, can be used to maintain flows in Allen
Wyke Down	G	13.63	4,977.27	Sliding scale of prescribed flows set at Loverley Mill gauging station to be met from these sources, provided compensation water pumped upstream of Loverley Mill does not exceed 13.62Mld. When Wyke Down is not required to meet the above up to 2.27Mld can be pumped to maintain a flow of 2.27Mld at All Hallows gauging station. When Gussage All Saints is not required to meet the above up to 2.27Mld can be pumped to maintain a flow of 0.908Mld at Bowerswain gauging station
Gussage All Sts	G	9.09	3,318.18	
Long Crichel	G	6.81	2,490.90	Long Crichel is used to maintain level in Crichel Lake (up to 6.81Mld)

14.4 Other abstractions

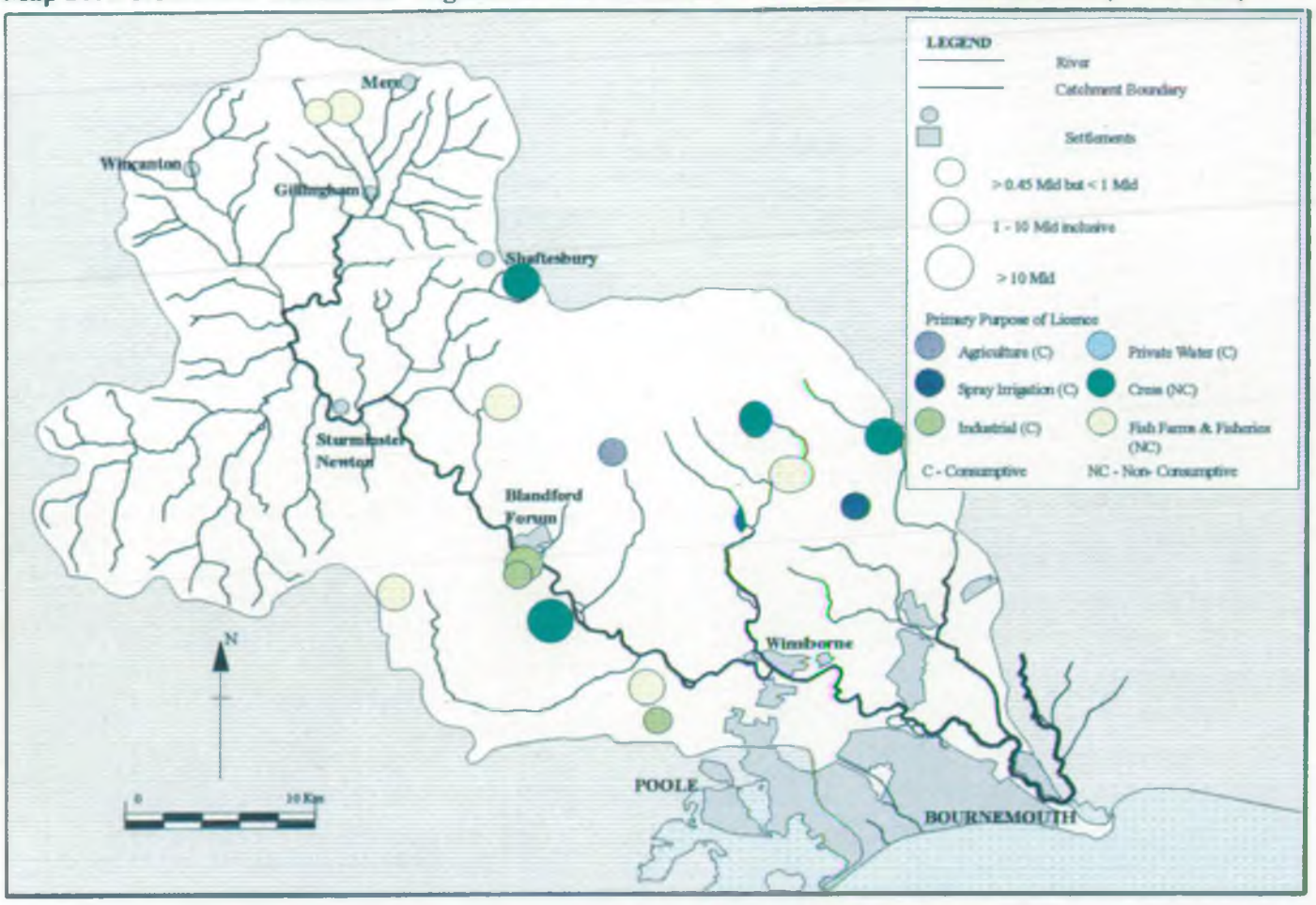
Use	Licensed Daily Quantity (Ml)		Licensed Annual Quantity (Ml)		Comments
	Ground	Surface	Ground	Surface	
Agriculture	4.62	0.66	1,139	81	There are additional abstractions of less than $20m^3/d$ exempt from licencing if from surface water resources
Spray Irrigation	1.86	20.19	95	811	Predicted growth rate from Regional Water Resources Development Strategy: 1.7% (1995-2001) 1% (2002-2021)
Industrial	6.26	2.73	1,510	659	Predicted annual growth rate from Regional Water Resources Development Strategy 0.75%
Private Water Supply	0.04	0.05	13	18	There are many abstractions of less than $20m^3/d$ for household use that are exempt from licencing
Cress	24.03	-	6,705	-	No significant growth predicted
Leisure (including amenity ponds)	-	5.62	-	1,264	
Water Power	-	57.10	-	15,246	
Fish Farms & Fisheries	22.69	139.67	7,046	33,223	No significant growth predicted

14.5 Water resource management

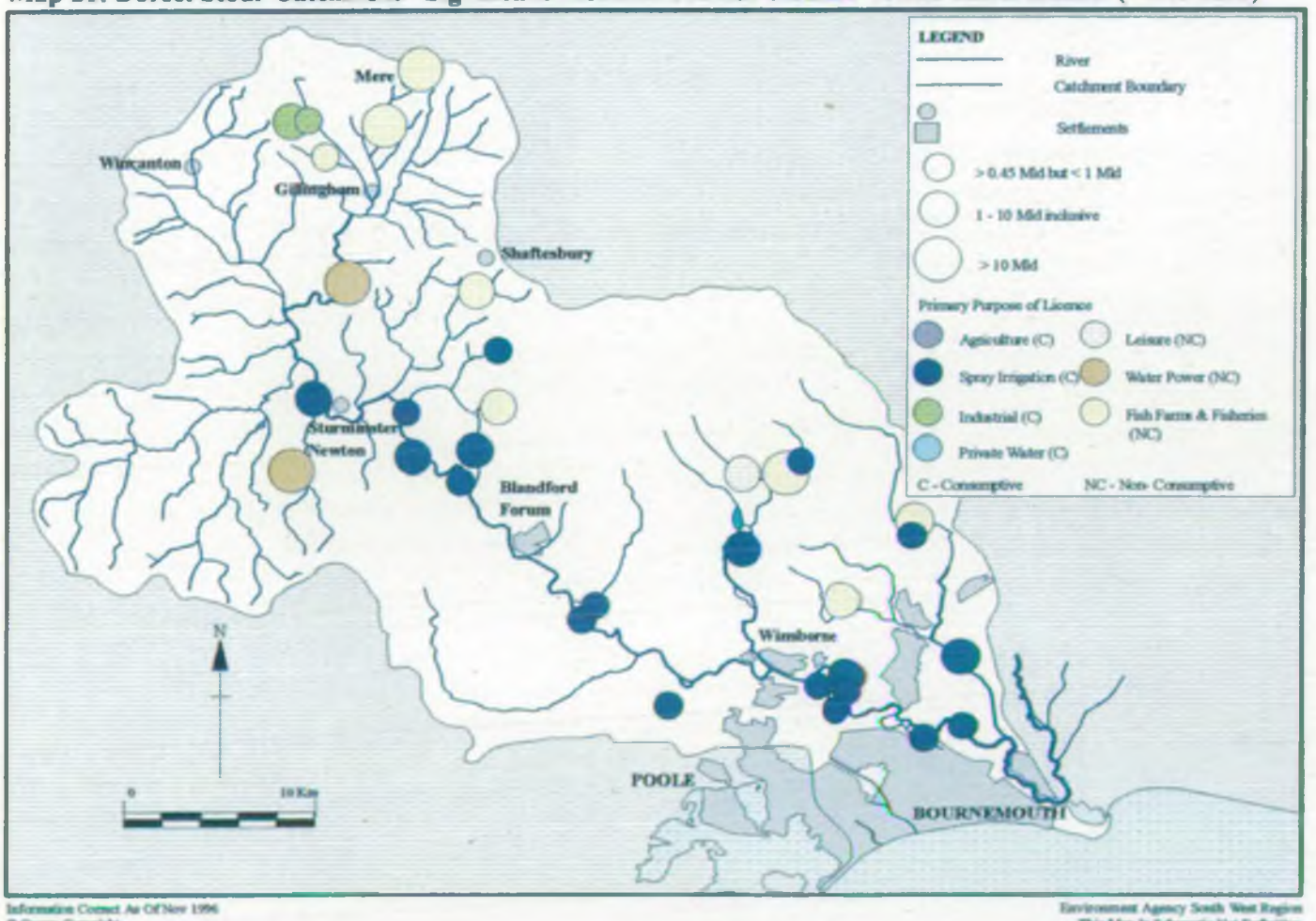
The Water Resource Development Strategy for South Western Region - *Tomorrow's Water* (NRA 1995) sets out how we would like to see water resources developed in the future. Our Strategy follows the principles of sustainable development with proper safeguards for the environment. To promote our strategy for the region we will :

- *encourage the efficient use of water*
- *expect abstractors to use existing sources efficiently before new sources are developed*
- *approve developments that cause the minimum problems for the environment*
- *study rivers stressed by abstraction and solve existing environmental problems where benefits outweigh the costs and funds can be found*

Map 20: Dorset Stour Catchment - Significant Licensed Private Groundwater Abstractions (>0.45 Mld)



Map 21: Dorset Stour Catchment - Significant Licensed Private Surface Water Abstractions (>0.45 Mld)



Here are three examples of our approach to managing water resources in the catchment :

- *we plan for the sustainable development of water resources, developing criteria to assess the reasonable needs of abstractors and the environment*
- *we plan the future use of water on the basis that water supply companies reduce leakage to an acceptable level and make best use of available resources*
- *we study the spending plans of the water supply companies (AMP2), to ensure that these plans do not overlook opportunities to improve flows in rivers which are stressed by abstraction*

In *Tomorrow's Water* we calculated public water supply demand at the company zonal level. Assessment of resources can sometimes be carried out at the catchment scale, but the resource and demand balance for this catchment cannot be precisely calculated because of the coarse resolution of the demand figures. Since the catchment contains sources that are of strategic importance both to WWS and BWHW, the following assessment at the zonal scale illustrates the future water supply target issues that will apply.

In general the scale of abstractions of water resources is not unusual, the largest public supply source being at Longham near the tail of the river. There are, however, some concerns at the sub-catchment scale about the impact of abstractions on tributary flows, notably in the Allen and Tarrant (see 4.6 and 4.8).

Completed studies of the low flow problems in the Allen caused by BWHW groundwater abstractions should result in the setting of an operational agreement between ourselves and the company. Such an agreement would most likely be a reduction in the maximum quantity the company is authorised to abstract from its Stanbridge source. The company has been urged to seek a compensatory increase in abstraction at its Longham source. We favour demand and resource management to remove the potential for company resource stress but the company has signalled its readiness to use the reservoir development at Longham as a means of alleviating the existing problems on the Allen.

14.6 Future demand

The demand in WWS Dorset Supply Zone might rise from the current 138Mld to as much as 193Mld by 2021 without change to the present level of household metering and leakage control, and with high growth in household, industrial and commercial consumption. Should consumption growth be somewhat slower and WWS reduce leakage to 120 litres per property per day then demand is forecast to fall to 137Mld by 2021.

The WWS Dorset supply zone present surplus will be reduced to 23Mld by 2021 under the low demand forecast scenario. A deficit of 33Mld is forecast for 2021 under the high demand scenario.

BWHW needs for water are forecast to rise from 154Mld to 164Mld under the low demand scenario and to 191Mld under the high demand scenario. This means that, by 2021, the BWHW balance will be in a 58Mld surplus under the low demand scenario or a 30Mld surplus under the high demand scenario. BWHW targets are, however, more sensitive to peak rather than average demand.

14.7 Meeting this demand

By 2021, neither company faces a deficit in resources under the low demand scenario; a deficit is forecast under the high demand scenario in the WWS Dorset Supply Zone. To meet any deficit or to alleviate stress on resources, *Tomorrow's Water* lists the following options in descending order of preference :

- *demand management*
- *resource management*
- *resource development*

In the first option, we encourage the installation of water meters in all new households and selective metering of existing properties where there is significant stress on water resources. We will be examining water company demands at the local area scale to identify potential problem areas. We also encourage the more efficient use of water and, in the publication *Saving Water* (NRA 1995), a national forum of interested parties was promoted to secure a common approach.

In the second option, we are keen to see better management of existing resources to increase the quantity of water that is deliverable to customers. Leakage control, where economic, should be actively pursued by the water companies and there is reason to believe that this will be stimulated following the drought of 1995. Conjunctive use of sources can increase the amount of water deliverable without the need for physical development.

We favour the third option least; resource development means the construction of a completely new abstraction infrastructure. The potential for the construction of further bankside storage reservoirs is being considered by WWS at its Blashford Lakes source; this would require careful consideration in respect of the potential effect of new abstractions on migratory fish movement in the Hampshire Avon, the loss of dilution of effluents, and other ecological impacts within the river and the floodplain caused by a changed flow regime. These matters were investigated in some detail by the NRA. New reservoirs are being constructed by BWHW at Longham. The pace of such developments is strongly controlled by the economics of the gravel and excavation industries.

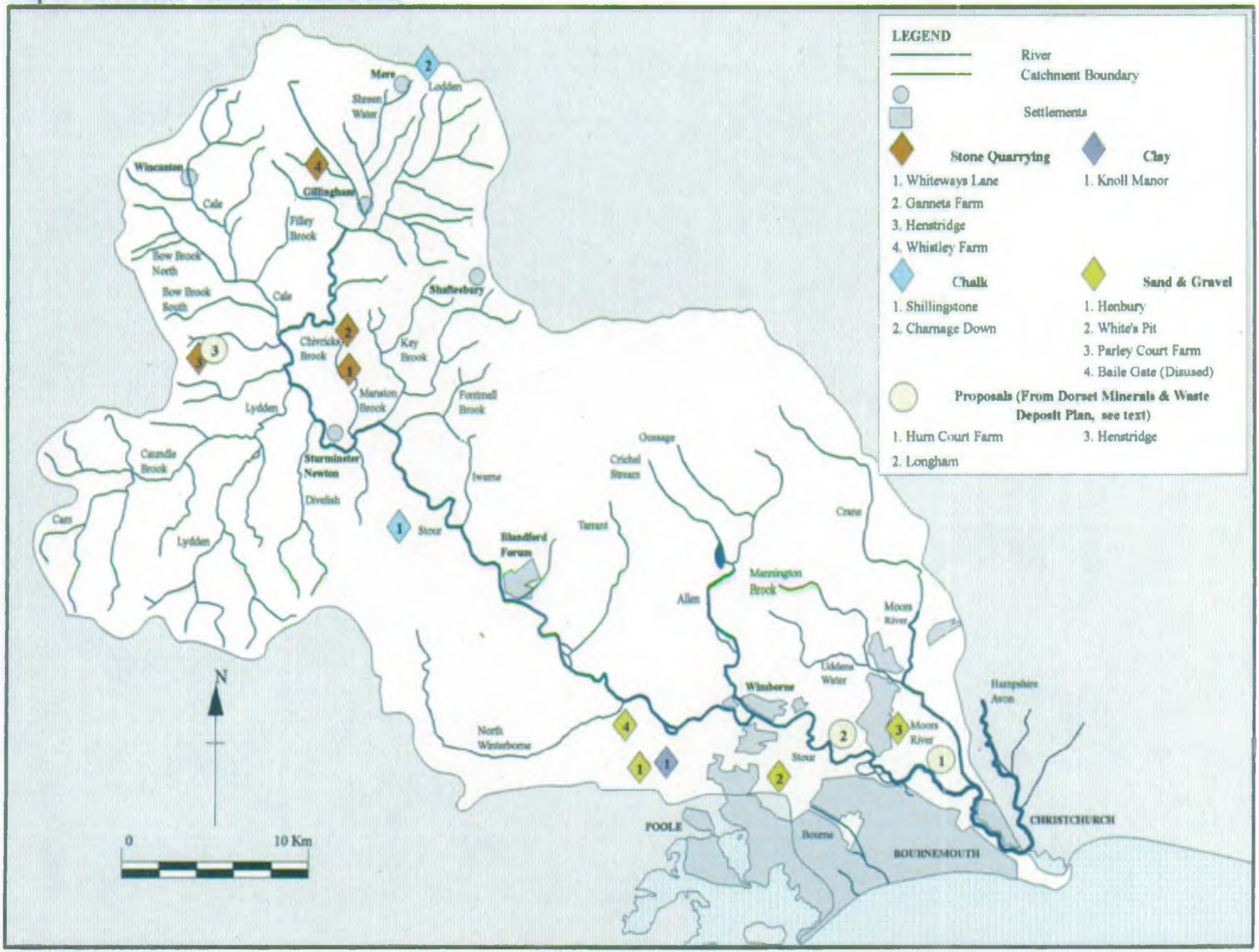
Before further such developments are considered, we would expect progress to have been made by the relevant supply company on demand and resource management or with remedies to river low flow problems before we could offer reasoned support to local planning authorities on the merits of this approach.

14.8 Leakage and pressure control

Where water resources are stressed we expect the water supply companies to set economic target levels for leakage and show us that these targets are being achieved. A national method for setting these targets, which we support, is now available to water companies.

Most non-household demand for water in the catchment is metered, but only 7.4% of household properties are currently metered (8.3% of WWS and 5.2% of BWHW supplied properties). Both WWS and BWHW have a policy to meter all new household properties. There is currently little evident incentive for WWS and BWHW to extend the policy of metering all new household properties to existing householders since both companies enjoy a surplus in resources compared with demand in this catchment. The high daily peak demands in both company areas of supply, however, indicate significant benefits might accrue from a more positive approach to household metering.

Map 22: Dorset Stour Catchment - Mineral Sites



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15. MINERAL EXTRACTION

The extraction of minerals from quarries, mines and pits for sand, gravel or clay can damage underground water resources and rivers and streams. The damaging effects of mineral extraction are often long term and sometimes permanent. The influence of a deep quarry which removes material from below the natural water table may extend many kilometres. Public water supplies and flows from springs that feed streams and rivers can be threatened when aquifers are either removed or disturbed.

Water is purified as it percolates through aquifers and surface layers of soil and rock. Removing these materials can degrade the quality of water in the aquifer and provide an easy route for pollution to reach groundwater.

The closure of a deep sub water-table quarry does not mean that water resources will recover immediately. A large deep quarry may take years to fill with water to the point where springs that it dried up begin to flow again. Until that time pumping will usually be needed in dry weather to support river flows. Some springs may never recover because the stable lake surface in a flooded quarry may be below the highest levels of the sloping pre-quarry water table. Using an abandoned quarry for industry or housing introduces a new risk of contamination to water resources.

We aim to control the impact of mineral winning and quarrying activities on the water environment and to promote suitable after-use activities. We have duties and powers to consent discharges from quarries and operational mines, and to respond to Mineral Plans as a statutory consultee of the planning authority

In considering proposals, we will refer to our Policy and Practice for the Protection of Groundwater (PPPG) (see 18.5). We will object to a new proposal for mineral extraction when there will be demonstrable harm to water resources or to the water environment, unless measures to mitigate any harm can be agreed in planning controls.

15.1 Local perspective

Four active sites are worked for sands, gravels and clays in the lower reaches of the catchment and there is a disused site at Bailie Gate. The Dorset Minerals and Waste Local Plan Deposit Plan identifies two new proposed sites to extract from river valley gravels in the lower catchment, Hurn Court Farm and Longham. Planning permission was granted for Longham in 1994 and work has begun with the ultimate aim to use the site as a pumped storage reservoir (see 4.7).

Many sand and gravel pits are developed in minor aquifers and reduce the amount of groundwater held in temporary storage. This loss can be partly replaced by creating a compensation pond that fills naturally in winter and gradually releases the water to the system in summer.

Chalk is quarried at Charnage Down and Shillingstone and three further sites, Whiteways Lane, Gannets Farm and Whistley Farm, in the upper catchment are worked for limestone. Planning permission (limited to 30 April 2002) has also been granted for a Forest Marble quarry at Henstridge. There is also an undetermined application for additional extraction of Forest Marble at this site.

These small scale quarrying activities would appear to be having no major impact on catchment water resources and consultation on any new planning applications and adherence to the PPPG will ensure the protection of important resources of water.

At present, seabed dredging for sand and gravel is confined to areas outside the catchment.

16. WASTE MANAGEMENT

16.1 Waste regulation

We regulate the recovery, treatment and disposal of controlled waste (household, industrial and commercial waste) through a waste management licensing system, under the Environmental Protection Act (1990). Agricultural waste, sewage sludge and mine and quarry wastes are covered by other legislation.

Different types of waste management facilities include: landfill, transfer stations, civic amenity sites, treatment plants, incinerators, scrap yards and recycling process plants. Planning permission will normally be required for the development of a waste management facility. The siting of waste recovery and disposal facilities is decided by the local planning authorities.

The objective of the waste management licensing system is to provide a separate ongoing control system to ensure that waste management facilities:

- *do not cause pollution of the environment*
- *do not cause harm to human health*
- *do not become seriously detrimental to the amenities of the locality.*

In assessing pollution, waste regulation has regard to the wider environment, and considers the impact of emissions on global climate change and on the local environment including air, water, soil flora and fauna.

16.2 A strategy for sustainable waste management

The DoE's white paper on waste, *Making Waste Work* sets out the government's policy framework for the management of waste. It identifies ways in which waste can be managed in a more sustainable way, and sets targets for achieving that aim.

The Strategy is principally concerned with controlled waste as defined under the Environmental Protection Act 1990. However, many wastes covered in the Strategy are not controlled wastes, and some substances are included such as farm wastes or waste from mines and quarries, that are not wastes as defined in the EC Directive on Waste (1986).

The Strategy is based on three key objectives:

- *to reduce the amount of waste that society produces*
- *to make the best use of the waste produced*
- *to choose waste management practices which minimise the risks of immediate and future environmental pollution and harm to human health*

To help achieve those objectives a waste hierarchy has been developed to give a broad indication of their relative potential risk to the environment. The waste hierarchy comprises:

- *reduction*
- *reuse*
- *recovery, including recycling, composting, energy recovery*
- *disposal*

To achieve more sustainable waste management practices, quantifiable targets are required to focus the way waste management practices should develop in the future. The targets will help to move the emphasis up the waste hierarchy, that is away from disposal and towards reuse and reduction of waste.

An example of legislative change that will assist the process is the Government's new Landfill Tax introduced in October 1996. This is likely to have a significant impact on waste management. The principle behind the tax is to provide a financial incentive for waste producers to minimise the waste

they produce, or to use methods of disposal which have less environmental impact. The charges made to landfill operators are likely to be passed on to their customers.

16.3 Waste management planning

We are involved in waste management planning and assess the consequences of different options in transportation, treatment and disposal of waste. This provides the underlying foundation for sound decision making in waste management. It entails the collection, analysis and periodic presentation of information relevant to the management of waste at the local, regional or national level. This will include information on:

- *the quantities of various types of waste*
- *their sources*
- *costs of different methods of managing waste*
- *their environmental effects*

Waste management planning provides a framework for the private and public sectors to make decisions for the minimisation, recovery and disposal of waste in a way that safeguards the environment. It is concerned primarily with the strategic aspects of reducing, treating and disposing of controlled waste at the regional and national level.

Using this information, the County Councils and local planning authorities are required to produce statutory waste plans to make provision for sufficient and adequate waste management facilities in the area.

16.4 Waste arising - Household waste

Household wastes are defined as the waste produced by domestic residences, campsites, prisons and public meeting halls. The main components are waste food and packaging such as glass, plastics, metal and paper, but it also includes garden and DIY wastes. The table below indicates the quantities (tonnes) of household waste arising, disposed of and recycled in the relevant local authority areas in 1995-96.

Local authority	Household waste arisings	Collected household waste disposed of	Civic amenity waste disposed of	Collected household waste recycled (including the voluntary sector)	Civic amenity waste recycled	Total household waste to landfill (includes litter and sweepings)
Bournemouth BC	95,819	54,761	9,144	2,396	29,518	No licensed sites
Christchurch BC	25,094	10,331	2,860	817	11,086	No licensed sites
Poole BC	63,249	46,188	13,274	2,692	1,095	183,510
East Dorset DC	25,343	18,707	1,157	2,253	3,226	No licensed sites
North Dorset DC	21,730	14,256	1,515	2,147	3,812	No licensed sites
Total	231,235	144,243	27,950	10,305	48,737	183,510

It is the duty of each waste collection authority (usually District, Borough or Unitary Council) to arrange for the collection of household waste in its area. Municipal waste is often used to describe waste collected by the local authorities, and includes household and some commercial waste. Waste disposal authorities (usually County, Metropolitan or Unitary) have a duty to arrange for the disposal of household waste in its area. Local Authorities are also required to provide civic amenity sites where members of the public can deposit waste free of charge.

The way that waste materials are collected and sorted often dictates which waste management option is subsequently used, and whether materials recycling, biological treatment or incineration are

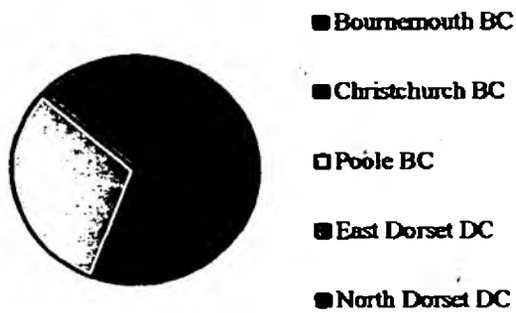
economically feasible. The collection method will significantly influence the quality of recovered material.

16.5 Waste arising - Commercial and industrial waste

Commercial waste is that arising from premises used mainly for the purpose of a trade or business, or the purposes of sport, recreation and entertainment. Industrial waste consists of waste produced from any premises:

- *within the meaning of the Factories Act 1961*
- *used in connection with the provision to the public of transport services*
- *used in connection with the supply of gas, water, electricity or for the provision of sewerage services*
- *used in connection with the provision of postal or telecommunications services*

Figure 6: Industrial and Commercial Waste Arising



It also includes waste produced in the construction and demolition of buildings and other civil engineering structures.

A survey of industrial and commercial waste arisings was carried out in Dorset during 1992-93, and provides an estimate for each local authority area in the catchment. The total arising for 1995-96 was 811,500 tonnes.

The first priority for more sustainable waste management is to reduce the production of waste from all industrial processes. The manufacturing industry is in the best position to play a major role in developing the techniques for reducing resource use and ensuring that end of life products are reusable or recoverable.

16.5.1 Waste minimisation

Waste minimisation is the first priority for more sustainable waste management. Waste minimisation includes:

- *reducing the amount of waste produced that would otherwise need to be processed or disposed*
- *reducing the degree of hazard represented by such wastes*

By adopting good waste reduction practices, industry and commeree have an opportunity to improve their business performance. Many individual companies have successfully introduced waste minimisation practices, and removed hazardous material (e.g. mercury in domestic batteries) from the waste stream.

A seminar was held in October 1996 and approximately 1,200 local businesses were invited. Local examples of firms who have had success when implementing waste minimisation, reuse and recycling initiatives were illustrated. Carrying forward from the seminar it is intended that a waste minimisation group will be set up with us acting as a facilitator to allow firms to come together and exchange views. Help and advice will be available from us in order that waste minimisation becomes a key component of company policy.

16.5.2 Life cycle assessment

Life cycle assessment is an environmental management tool used to predict and compare the

environmental impacts of a product or service from *cradle to grave*, and would highlight areas for waste minimisation. The technique examines every stage of the life cycle, from the winning of the raw materials, through manufacture, distribution, use, possible waste reduction, reuse or recycling and to the final disposal and release of wastes into the environment.

16.5.3 Producer responsibility

The producer responsibility initiative will be a key tool for promoting the recovery of value from waste. It is designed to ensure that industry assumes an increased share of the responsibility for the waste arising from the disposal of its products. The most advanced producer responsibility scheme is found in the packaging industry. The producer responsibility powers set out in the Environment Act 1995 will enable regulations to be introduced concerning the legal obligation for the recovery of packaging and the targets that will need to be met. The target is to recover 50-65% of packaging waste by 2001.

The Producer Responsibility Obligations (Packaging Waste) Regulations, which translate the EU Directive on Packaging and Packaging Waste (94/62/EC) into UK law, are due to come into force in early 1997. We will play a lead role in implementing, monitoring and enforcing these regulations. Businesses will have to start meeting interim recovery and recycling targets in 1998, and full targets by 2001. All businesses involved in the packaging chain will share the responsibility if they handle more than 50 tonnes of packaging materials or packaging per year.

In addition, a number of other industries have been invited to set recovery targets.

16.5.4 Priority waste streams

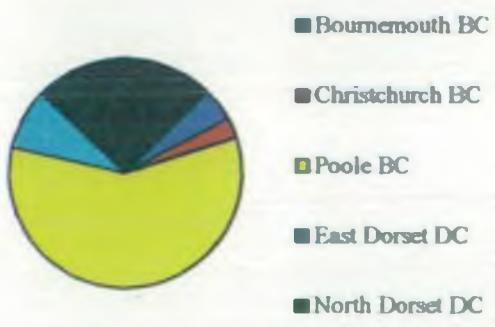
Some of the larger waste streams have presented particular waste management problems. Six priority waste streams have been identified from work carried out by project groups on European Priority Waste Streams:

- *end-of-life vehicles*
- *tyres*
- *chlorinated solvents*
- *electrical and electronic equipment*
- *construction and demolition (C&D) waste*
- *health care waste*

16.5.5 Waste arising - Special Waste

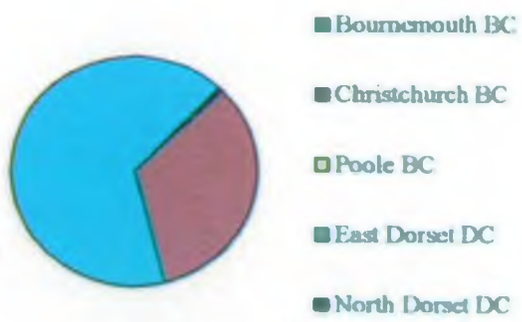
The Control of Pollution (Special Waste) Regulations 1980 defined the term Special Waste as any controlled waste which either contains a listed substance and, by reason of the presence of such a substance, is dangerous to life, has a flash point of 21°C or less, or is a medicinal product available only on prescription.

Figure 7: Special Waste Arising



These regulations have now been replaced by the new Special Waste Regulations 1996 (under Section 62 of the Environmental Protection Act 1990) which came into force on 1 September 1996, and the definition of special waste is extended to include, amongst others, waste oils and some photographic chemicals. Special waste arisings in 1995-96 amounted to 4,439 tonnes.

Figure 8: Mining and Quarrying Waste Arising



16.5.6 Mining and quarrying waste

These are presently not controlled wastes; a survey of disposals was carried out in 1992-93; the arisings in 1995-96 were 52,950 tonnes.

16.6 Waste disposal

Waste disposal can be regarded as the returning of unwanted materials into the environment. If carefully managed, the substances that comprise wastes can be safely dispersed and returned to the environment.

If waste disposal is badly managed, wastes and substances derived from them are liable to give rise to environmental pollution, which can be serious and long lasting.

16.6.1 Landfill

Landfill sites can affect the environment in a number of ways. The aquatic environment may be affected by surface water becoming contaminated as it flows over or beside a site. Alternatively the ground may become contaminated and water may become contaminated as it percolates through the ground, or the waste itself may produce leachate.

Wastes breaking down under anaerobic conditions can form landfill gas, a combination of methane and carbon dioxide with traces of other organic gases and vapours. In enclosed spaces it may be an asphyxiant or explosive, and it is a strong greenhouse gas.

Problems may also be caused through odour or the escape of wastes, for example litter or fumes, or a site may become a nuisance through noise or dust. Nuisance is regulated by local Environmental Health Officers, and we liaise closely with them on these issues.

The vast majority of waste (excluding Special Waste) within the Stour catchment is disposed of to landfill which involves permanent incorporation of the waste into the land. Landfill therefore represents the largest potential source of pollution from waste management activities in the catchment.

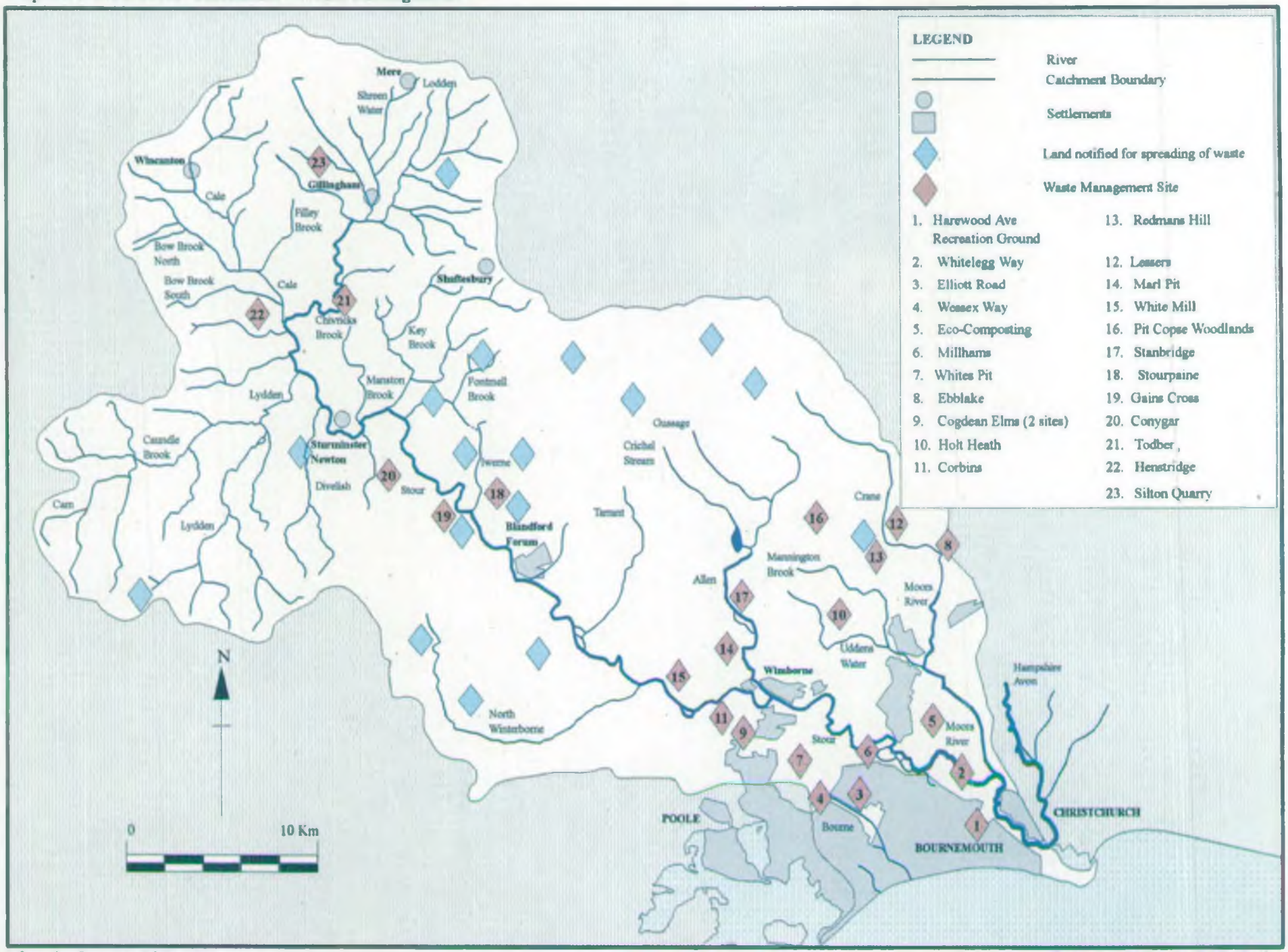
As well as the sites that are currently licensed, the catchment also contains sites which are now closed. Under the Control of Pollution Act 1974 there was no control over whether a licence holder surrendered their licence; this made it difficult to control closed sites. Under the Waste Management Licensing Regulations 1994, a licence holder has to apply to us if they wish to surrender their licence. This application may be refused if it is felt that the site poses a threat to the environment.

There are over 120 landfill sites in the Stour catchment that have either operated prior to licensing, held a waste disposal licence, or that currently hold a waste management licence. This reflects the fact that the area incorporates a large part of the Poole and Bournemouth conurbation. The sites with the potential to impact on the environment beyond their immediate boundary are shown on Map 23; a brief outline of notable sites is given below.

Whites Pit is by far the largest landfill in the South Wessex Area and it features active, closed and unlicensed areas. The site has taken household, commercial and industrial wastes including small quantities of Special Wastes which consists almost entirely of asbestos.

The active part of the site is constructed on a containment basis and features an impermeable clay

Map 23: Dorset Stour Catchment - Waste Management



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liner. The closed and unlicensed areas were filled as unlined sites. Groundwater monitoring shows that the groundwater at the perimeter of the closed part of the site is being contaminated; this is at a low level and is to be expected around an unlined site where leachate is expected to dilute and disperse. We are currently pursuing the installation of additional boreholes further from the unlined site so that the fate of contaminants can be monitored to ensure effective dilution and dispersal.

There is one particular location near the perimeter at which contamination by leachate and landfill gas is apparent in the opinion of the Environment Agency. A geophysical investigation has been funded and we have pursued the matter through modification of the waste management licence. The licence holder has appealed and we are awaiting an outcome from the Secretary of State.

Certain issues of surface water contamination through one of the lagoons requires final resolution. The site is being progressively capped and the gas is being flared and utilised for power generation.

The closed Stourpaine landfill site took non-special household, commercial and industrial wastes. The site was run on a dilute and disperse basis and it no longer holds a licence. The groundwater table is at some depth giving a large unsaturated zone and groundwater monitoring has shown no contamination. The landfill gas is collected and flared off.

The closed Holt Heath (Whitesheet) landfill site took non-special household, commercial and industrial waste. The site has been causing deterioration in the quality of the adjacent land, which is an SSSI and a proposed SAC, through contamination of surface water in a nearby culvert. We have advised on the effectiveness of remediation schemes and a scheme to excavate waste, replace and protect the surface water culvert is being implemented. The excavated waste is being screened and re-profiled to provide more effective capping; the waste screening process is licensed and conditions protect the environment from the excavation and processing activities.

The closed Conygar landfill site took household waste; historically the site had caused surface water pollution and was subsequently fitted with a leachate treatment facility. The leachate treatment plant is consented and discharges to the Stour. The plant also has a waste management licence as it may receive leachate from other landfill sites.

Millhams was originally a landfill site but is now closed. Consequently it is unlicensed and part of the site has subsequently been redeveloped as a civic amenity site. The site is located particularly close to the Stour, however, no pollution has been recorded recently.

16.6.2 Incineration

A new incinerator adjacent to the Bournemouth Hospital was commissioned in late 1995 for disposal of clinical wastes arising from the former Wessex Health care region. Between October 1995 and March 1996 the total quantity of clinical waste disposed of at the incinerator was 1450 tonnes. The total burnt was between 350-450 tonnes per month, with approximately 100 tonnes per month from the South Wessex area.

The site holds a waste management licence controlling the transfer and keeping of the wastes, and a radioactive substances authorisation (see section 24). The combustion and emission processes are subject to control by the local Environmental Health Department under the Environmental Protection Act 1990 (Part I).

16.6.3 Transfer stations

There are waste transfer stations at Hurn and Henstridge. Waste from the Nuffield Road (Poole) transfer station, which is outside the catchment, is transferred to White's Tip (Canford Heath) for disposal.

16.6.4 Biological treatment (e.g. composting & anaerobic digestion)

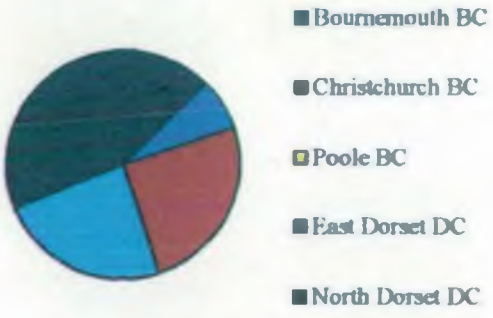
Chapel Lane, West Parley is licensed for the composting of botanical wastes, by a windrowing process to produce a soil conditioning mulch. Effluent disposal from the process is closely monitored to protect the aquatic environment and the nearby SSSI. The operation is being relocated to a larger site.

16.6.5 Material recycling facilities

Corbin's Scrap Metal Recycling site receives a large proportion of the scrap metal within the South Wessex Area; it handles heavy and light scrap including vehicle bodies. A fragmentising process is carried out on site. The site is licensed and is provided with an impermeable concreted surface. A stream is culverted beneath the site which has been monitored, with no sign of contamination.

There is a recycling station for naturally excavated subsoil, construction and demolition waste, metals, tyres and household waste at Henstridge.

Figure 9: Disposal of Sludge to Land



16.6.6 Spreading on land

Under the Sludge (Use in Agriculture) Regulations 1989, Wessex Water Services must keep a register of land used for the spreading of sewage sludge and the amounts deposited. They also take sludge and soil samples regularly for analysis, and we have access to this information. Before spreading, WWS informally consult with us to ensure that groundwater supplies will not be adversely affected. The chart shows how the 163,792 tonnes were disposed within the area during 1994-95.

Operators who intend to spread industrial waste sludges, such as those from dairies, breweries and septic tanks, to agricultural land must notify us and provide evidence of agricultural benefit of the sludge and an assessment of the suitability of the land to ensure that there is no risk of pollution.

Map 23 shows the approximate location of land notified for spreading of industrial sludges and septic tank waste (not sewage sludges) within the Stour Catchment.

All waste from agriculture premises (as defined in the Agriculture Act 1948) is controlled by MAFF; this includes manures and silage effluent, sheep dips and pesticides. Discharges of agricultural wastes are controlled under the Water Resources Act 1991. Further guidance on handling, storage and disposal of these wastes is contained in the MAFF Codes of Good Agricultural Practice.

Control over the disposal and recovery of mineral waste is provided under Town and Country Planning legislation and the Mines and Quarries (Tips) Act 1969.

Redman's Hill is a licensed site where septic tank sludge and sewage is placed in a lagoon before it is spread to agricultural land. Current groundwater monitoring has not shown any sign of contamination, but we have detected some deterioration in the water quality of an adjacent stream feeding the Crane. We are currently trying to trace the source of the contamination.

16.6.7 Fly tipping

Local authorities continue to have an enforcement role in relation to fly tipping and unauthorised land use. It is possible that waste may be disposed of at unauthorised sites to avoid the rise in costs associated with the new Landfill Tax; this could result in pollution and harm to wildlife.

16.7 The suitability of the catchment for future waste sites

New waste sites may be needed in the catchment to cater for increased need, or to replace filled landfill sites. Waste local plans are likely to give information on the estimated future capacity requirements, the possible location of future sites, and the preferred type of waste site.

The remaining landfill void space as at September 1995 for four local authority areas within the plan are, Christchurch BC 470,000m^3, Poole BC 2,300,000m^3, East Dorset DC 318,000m^3 and North Dorset DC 53,200m^3.

The Dorset Minerals and Waste Local Plan Deposit Plan identifies one proposal for waste disposal in the catchment. There is a proposal for infilling with inert wastes at Henbury Sand Pit.

17. FLOOD DEFENCE AND LAND DRAINAGE

The river network carries surplus water from land to the sea as part of the natural water cycle. Rivers and watercourses can only cope with a certain maximum flow and when this is exceeded flooding occurs. Flooding can be caused by prolonged rainfall, thunderstorms or rapid snowmelt. The peak flow of a flood is measured and expressed in terms of the frequency at which that flow is statistically likely to recur, for example 1 in 10 years or 10% chance in any one year.

Seemingly similar types of watercourse respond differently to the same rainfall conditions due to variations in catchment areas and landuse. An urbanised catchment with a high proportion of paved surfaces and drains will have rivers whose levels respond relatively quickly to rainfall. The more open countryside of a rural catchment will often allow more of the rain to soak into the ground and thus slow down runoff, so river levels will rise less rapidly but remain at the higher level longer.

Localised flooding may also occur where watercourses become blocked at particular points such as under bridges or in culverts. Often debris gathering at these points includes garden waste and other rubbish which has been deposited on river banks, and this can be a major problem in urban areas. Flooding can also occur where surface water drains are unable to discharge into swollen watercourses, or further back in the surface water drainage system where their capacity is exceeded.

When watercourses flood, water flows into the floodplain. These natural floodplains (which are as much a part of the river system as the channel which carries normal flows) provide extra capacity for the storage and passing downstream of flood water. This capacity is reduced if significant areas of floodplain have been raised, embanked, or built upon. This loss of storage volume can lead to higher river levels elsewhere and for this reason it is not possible (or desirable) to alleviate flooding in all areas. The priority for flood alleviation lies in urban areas as undeveloped floodplains should be allowed to play their natural role as the continuity between the river and its floodplain is an essential part of the water cycle.

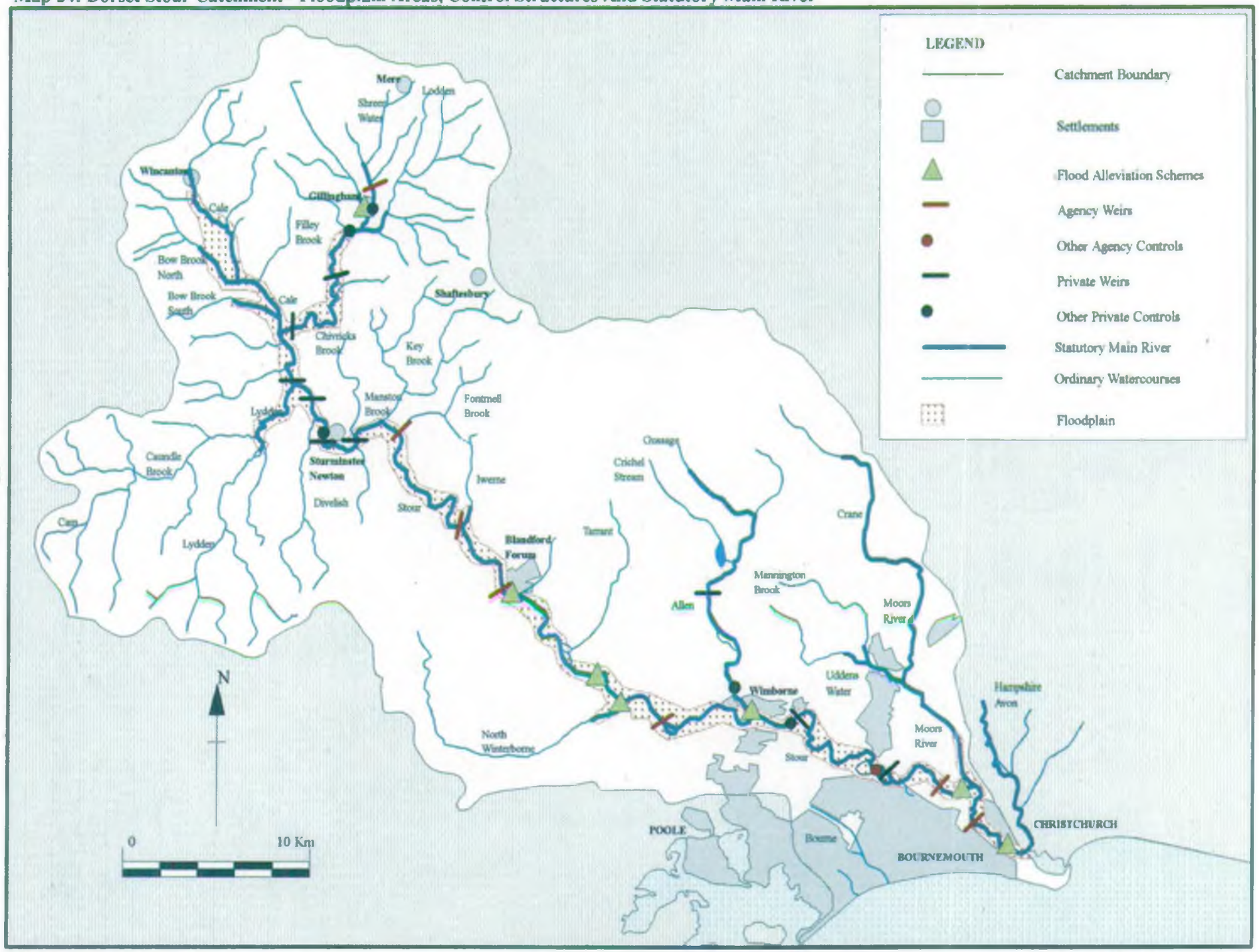
Adjacent landuse is predominantly agricultural above Wimborne. The river responds fairly rapidly to heavy rainfall, although lakes in the upper reaches at Stourhead, Gasper and Bourton store some floodwater along this section of *ordinary watercourse*. Careful checks by the owners need to be made of the structural integrity of these sites. The Allen responds more slowly to rainfall and is more typical of other chalk catchments. Below Wimborne, the catchment is more heavily urbanised, especially along the coastal strip.

Historically, agricultural land drainage schemes were carried out on the Stour and its tributaries up to the early 1970s; the last of these was carried out between Throop and Longham and consisted mainly of improvements to channel capacity to aid drainage of farm land. Since that time urban flood alleviation has taken priority prompted by the severe property flooding in December 1979. Most of the vulnerable towns and villages have now been provided with schemes; it is now only small conurbations, areas where schemes are not financially viable, and isolated properties and farms that are dependent on flood warning.

Flooding can also occur when meteorological conditions like low atmospheric pressure, wind speed and direction combine with topography to produce tide levels that are greater than the defence levels. In estuaries a combination of freshwater river flows and tidal surges can also cause flooding.

Sea defences are constructed to alleviate the flooding of land by the sea. We have powers for carrying out sea defence works except where defences are privately or local authority owned. Local authorities have powers for protecting the coast from erosion by the sea. It is recognised that sea defence and coast protection cannot be in isolation of one another, as each has an effect on the other,

Map 24: Dorset Stour Catchment - Floodplain Areas, Control Structures And Statutory Main River



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hence the recent move to Shoreline Management Plans now being produced by responsible bodies for defined coastal cells.

A key aim of the Agency is to provide effective protection for people and property against flooding from rivers and the sea and to provide adequate arrangements for flood forecasting and warning.

17.1 Regulation

We are responsible for advising planning authorities on the planning and control of development with respect to flood risk issues. Also the majority of development proposals which are likely to affect the flow of water or impede any drainage work, such as culverting and bridging, require our formal consent under the Land Drainage or Water Resources Acts. When exercising these roles we must have due regard to fisheries and conservation requirements, and other general duties.

17.1.1 Main river

All watercourses are classified as either *main river* (which is defined on maps held by the Agency and MAFF) or *ordinary watercourse* (sometimes referred to as *non-main river*). In broad terms main river includes all watercourses which contribute significantly to a catchment's drainage though ordinary watercourses may be more significant locally. The legislation dealing with main river is The Water Resources Act 1991 and is supplemented by local Byelaws. We supervise all flood alleviation matters but have special powers to carry out or control work on main rivers and sea defences.

Local authorities (and in some areas internal drainage boards) have powers for flood defence on ordinary watercourses, and also have powers for protecting the coast from erosion by the sea. The appropriate legislation relating to ordinary watercourses is to be found in The Land Drainage Act 1991. Proposed revisions to main river are dealt with through a consultation and advertising process with the decision whether to main a river, or not, being made by MAFF.

In this catchment there is 191.2km defined as main river (Map 24).

17.1.2 Flood risk areas - DoE Circular 30/92 and Section 105 Surveys

It is preferable to avoid increased risk from flooding through control of development than to have to carry out works to alleviate problems once they occur. The relevant authority for controlling development in the floodplain is not the Agency but the local planning authority through the Town and Country Planning Act 1990 process.

Local planning authorities and ourselves are required by the Department of the Environment in Circular 30/92, on Development and Flood Risk, to liaise closely on flooding and surface water runoff matters. The aim is to ensure that flooding risks that might arise from a development are recognised and made an integral part of the decision making process undertaken by local planning authorities. Flooding and drainage issues are also to be taken fully into account during the preparation of landuse development plans. In this respect we have responsibility to prepare surveys under Section 105 of the Water Resources Act 1991 to define the nature and extent of flood risks.

Known flooding problems at Hammoon, Stourpaine, Fiddleford, Colesbrook, Sturminster Newton, Spetisbury, Corfe Mullen and Charlton Marshall concern individual or small numbers of properties, roads and farm buildings.

In the Bournemouth and Christchurch areas, Iford Home Park and Beaulieu Gardens caravan sites, and the Old Mill Tea Rooms and those homes off Willow Way are unprotected and Grove Farm caravan park has a reduced level of protection. This is as a result of discussions and agreements with

landowners and householders during the design of the Lower Stour Flood Alleviation Scheme (FAS) to leave these properties out of the main scheme.

Considerable numbers of surface water problems exist behind our raised flood defences; we provide sufficient flapped outlets in our schemes to ensure that there is no increase in this source of flooding but local authorities should consider pumped schemes when flaps are shut by high river level.

A Section 24 (Water Act 1973) survey of the flooding and land drainage problems of the Stour catchment was published in March 1979 for use by planning authorities. Additional aerial flood surveys and ground investigations have been carried out, especially for the May 1979 (1 in 12 year flood) and December 1979 (1 in 60 year flood) events. These have provided a basis for development planning and control since 1979.

The Stour catchment Section 105 survey is proposed for 1996/1997 with final reporting during 1997; this will include an indicative floodplain together with computer modelling predictions for *high risk* areas. The survey will also include information on the remaining properties at risk.

17.1.3 Land drainage consents

Our consent is required for works on or near the bank of a main river. This includes construction in, over, under or within 8m of the watercourse, including such activities as mineral extraction, and within 7m for the planting of trees. On ordinary watercourses, consent is only required for building any structure that would affect the flow. These powers are used to ensure that people both upstream and downstream of the proposed works are not exposed to an increased risk of flooding.

Access along river banks for staff and equipment needs to be preserved wherever possible especially for emergency works, and to ensure this access is kept clear we will not grant a consent to any development on a main river watercourse which would compromise flood defence work activities.

In deciding whether to issue a consent we will also take into account whether the proposed works conserve and enhance the environment.

17.1.4 Surface water control

Surface water runoff is likely to be increased to some degree as a result of development as more impermeable surfaces such as roofs and pavements are created. The impacts of such development, however small, add up and can lead to significant problems in due course. Increases in both the amount and rate of water reaching rivers can, if not managed, lead to greater risk of flooding. We will seek to ensure new development is carefully located and designed. Where appropriate we will require measures to control surface water to be incorporated into the overall development.

17.1.5 Water Level Management Plans

The government has recently issued guidance on the preparation of Water Level Management Plans for Sites of Special Scientific Interest or other areas of high ecological or landscape importance. Where we are the operating authority, we will liaise with English Nature to prepare a plan to ensure appropriate key water levels are safeguarded. We will prepare a Water Level Management Plan as part of the conservation strategy for the Crane/Moors River pSSSI (see 4.9) by March 1997.

17.1.6 Reservoirs Act supervision

The supervision of large non-natural bodies of water is laid down under the requirements of the Reservoirs Act (1975). From April 1997 we will become the enforcement authority for all reservoirs holding over 25,000m^3 above the lowest adjacent ground level. There is a duty to supervise reservoir inspection by a qualified engineer twice each year to ensure they are in a safe condition.

17.2 Operations

17.2.1 Survey of Assets

A comprehensive survey has been undertaken during 1995-96 for all river control structures situated on statutory main river whether owned and operated by us or not. It includes the present condition of assets which will be considered in future capital or revenue expenditure either for maintenance, refurbishment or replacement programmes.

17.2.2 Agency owned structures

River control structures generally control water levels upstream but can be adjusted to allow storm water to pass downstream. We and our predecessor organisations have constructed a significant number of gates, weirs, pumping stations and other such structures to complement river channel improvements. These are shown on Map 24.

17.2.3 Privately owned structures

Privately owned structures are common on watercourses, for a variety of traditional water uses such as operation of mills, creation of navigation channels, fish farming and amenity. By law these must be maintained and operated properly by their owners if they affect river levels and flows. The condition of privately owned structures can be of concern to us, and we have powers to give *reasonable directions* under our byelaws.

17.2.4 Flood defence Standards of Service

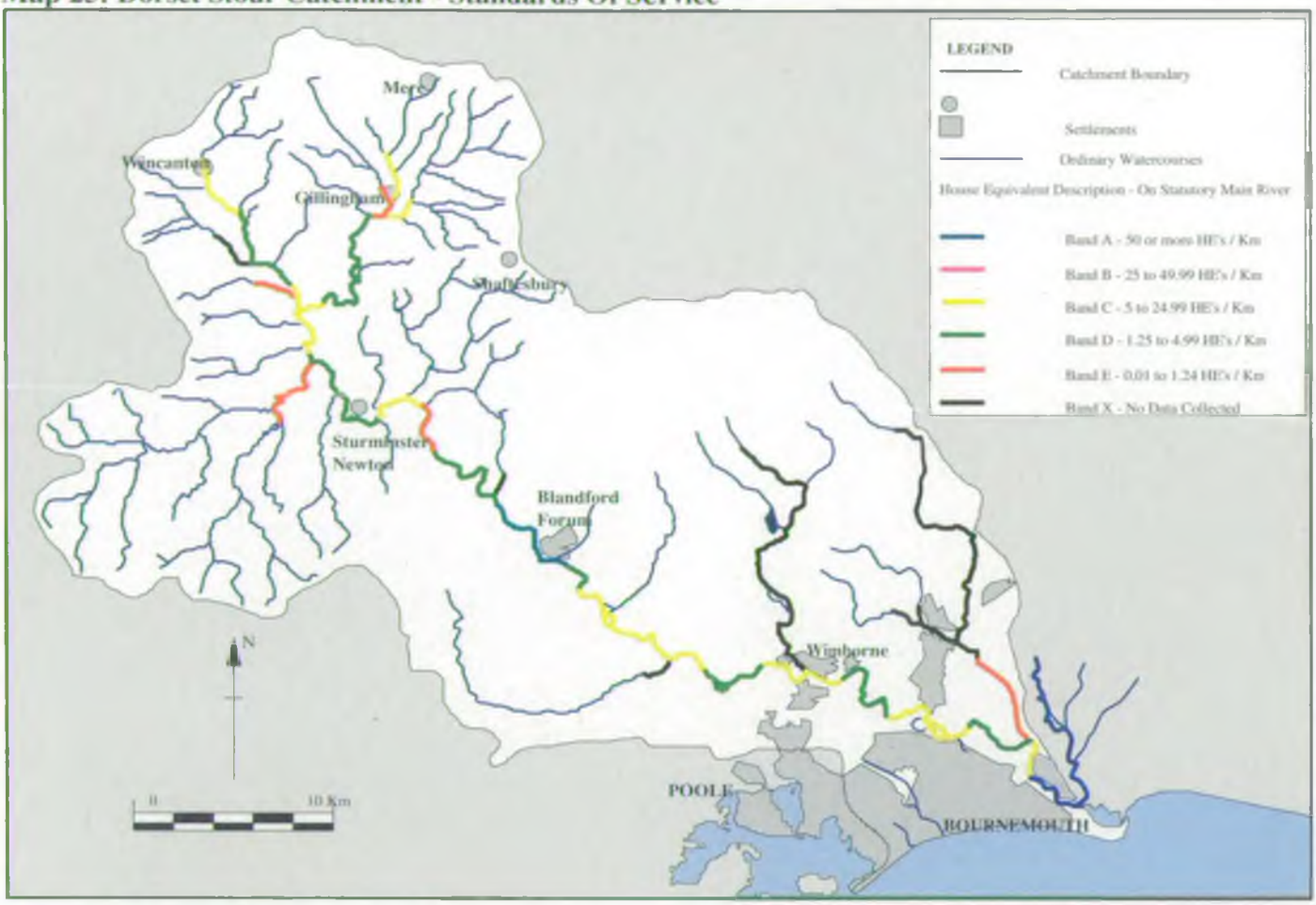
As an aid to decisions on priorities for works we have determined Standards of Service for flood alleviation based on land usage within the floodplain. Five *land use bands* have been established, based on the presence and concentration of certain features of landuse. These include housing, commercial property, agriculture and transport networks. Such features are each allocated a financial value (based on the potential losses that would ensue if the features were subject to flooding) which allows comparison of different features on the same basis, using standard units called House Equivalents (HE).

Each land use band has a target for the maximum flood risk to which it should be exposed. The standards are expressed as a frequency which reflects the likelihood that during any year a flood event may occur which exceeds the magnitude for which protection is available or should ideally be provided. Hence a 1 in 10 year flood can be expected to be equalled or exceeded once every ten years on average. This is also described as the return period, although the interval before another similar event returns is subject to chance and only averages out over a long period.

Band	Current Land Use	Return Period (years) in Tidal Waters	Return Period (years) in Non-Tidal Waters
A	High density urban, containing significant residential and non-residential property	200	100
B	Medium density urban	150	75
C	Low density or rural communities	50	25
D	Generally arable farming with isolated properties	20	10
E	Low productivity land with few properties	5	1

River reaches were classified by this methodology in 1990. Map 25 shows the various land use bands for main river in this catchment. An adequate or target Standard of Service at a location is expressed as a range between 0.5 to 1.0 HE per kilometre per year.

Map 25: Dorset Stour Catchment - Standards Of Service



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Different types of land and property need different levels of protection. We use the following indicative standards to design schemes. A comparison of the target and actual standards of service allows improvement and maintenance works to be prioritised towards those rivers which do not meet their target standards. Indicative standards are only a guide; they may not always be appropriate. It is also important to note that flood alleviation schemes alleviate flooding up to a design period, but a worse event may still occur.

Standards of service land use bands and targets

Land use band	Description of typical land use	Target standard of protection (return period)	
		Fluvial	Saline
A	Urban	1:50-1:100	1:100-1:200
B	Lower density urban	1:25-1:100	1:50-1:200
C	Isolated rural communities	1:5-1:50	1:10-1:100
D	Isolated properties/intensive farming	1:1.25-1:10	1:2.5-1:20
E	Low grade agricultural land	<1:2.5	<1:5

17.2.5 Our maintenance regime

We do not own watercourses, except in a few specific locations where flood alleviation structures have been constructed and their ownership retained. The ultimate responsibility for the upkeep of a watercourse rests with the person who owns the land on the side of the river (the riparian owner).

We have permissive powers, on main river, to undertake works and exercise our powers in this

respect according to available resources and priorities. Regular maintenance is essential if the river system and sea defences are to operate properly at times of high water levels. Such maintenance works include vegetation control, repairs to earth embankments and other floodwalls, obstruction and blockage removal and dredging. Maintenance can contribute significantly to reducing the risk of flooding. Approximately £300,000 was used to fund routine (i.e. annual) and non-routine maintenance works in the catchment during 1995-96, the split being roughly two thirds routine (including emergency work) and one third non-routine.

At times of heavy rainfall our operational priorities are to check and operate our own water level control structures and clear debris and identified obstructions where possible.

17.2.6 Routine maintenance

Routine maintenance is carried out throughout the catchment and is summarised below.

Location	Nature of Work
Cale - Wincanton to Marnhull Weir	Removal of weed and vegetation and occasionally silt. Work is carried out upstream to downstream during autumn and winter. Material is placed on the bank
Bow Brook (North) - Bow Bridge to Cale	Working practice and timing as Cale
Bow Brook (South) - Templecombe to Nyland	Working practice and timing as Cale
Lodden - Lodden Bridge to Madjeston Bridge	Weed and vegetation removed and placed on the bank during the autumn
Millhams Stream - Bear Cross to Manor Farm	Work practice and timing as Lodden. Other debris e.g. bicycle frames and washing machines, are collected and placed at a convenient location for the BC to dispose of
Flood Alleviation Scheme Maintenance	Maintenance works carried out throughout the year; including vegetation removal to inspect structural integrity and checks for vermin damage Built in or associated conservation features require a degree of maintenance Schemes normally require a low level of channel maintenance; desilting will be undertaken to return schemes to design level if required. The Lower Stour scheme has a higher priority as channel capacity was increased as part of the scheme and cross sections need to be checked regularly to ensure capacity is maintained
Various Locations	Checks (majority on a weekly basis), to ensure flapvalves, penstocks, sluice and radial gates, and hatches will operate properly in a flood event

17.2.7 Non-routine maintenance

Sections of channel are identified which are in need of maintenance to reduce the risk of flooding; this work is done relatively infrequently and may involve dredging, tree trimming and debris removal. Work is undertaken in consultation with our fisheries and conservation staff, and landowners and conservation bodies, where possible enhancements to the river corridor are carried out. These works often return a semi-urban scheme to its design standard; in some instances a reduced level of service is acceptable if landuse has changed.

Dredged material is normally disposed of on site, but in urban areas it is sometimes necessary to remove material to a licensed tip. Where dredging and disposal of material takes place our waste management colleagues have to be informed and the site registered exempt providing the bulk removed does not exceed the exempt limit.

It is also necessary to maintain channel capacity by clearing collected debris, for example fallen trees, at sites throughout the catchment including the bridges at Blandford and Tarrant Crawford, Sturminster, Barnaby, Durweston and Fiddleford Mills, Canford School and Longham. This requires regular inspections especially in periods of wet weather.

Supermarket trolleys cause an obstruction to flow and are a problem in and around all the main towns in particular Blandford and Wimborne. Where possible they are removed and returned to the supermarket to which they belong. In other places, self-help groups are encouraged so that

maintenance is frequently carried out. It is an offence to deposit debris in or near any watercourse.

17.2.8 Emergency response

At times of high water levels in addition to our floodwarning role (see 17.4) we patrol the defences, operate flood alleviation structures, remove blockages and carry out any emergency repairs needed. Our operational response is concentrated on closing flood gates at locations where a flood alleviation scheme is dependent on them, for example Blandford, Christchurch and Shapwick. Additionally, during times of raised river levels coinciding with high groundwater conditions and/or surface water flow, an operational presence is necessary at Blandford pumping station. Conditions also need to be monitored on-site at Christchurch in order to aid predictions of tidal surges, waves and high fluvial flood conditions coming together. Our workforce also responds to remove blockages, such as fallen trees, to ensure that flood water can pass safely downstream.

Our priorities are to:

- *ensure that FASs, both river and coastal, operate to their design standard*
- *manage high flows on the main river within the catchment*
- *respond to flood situations on ordinary watercourses, where resources allow, in support of local authorities*

District councils have permissive powers to offer assistance during floods. This may include placing sandbags, moving possessions, evacuating people. Each Council has a different policy on the type and amount of help they give. The County Council are responsible for public highways and would deal with any flooding problems associated with road drainage. All County Councils have Emergency Planning Officers who may become involved in more serious flood events.

The fire service provides help in flood emergencies if they are able to do so. The local station will be able to advise the public on what help is, or is likely to be, available and whether or not a charge will be made. Public surface water sewerage systems are the responsibility of the local Water Company, who may sometimes use District Councils as their agents.

17.3 Improvements

17.3.1 Capital works

In addition to general maintenance work, we can build new flood defences if flooding is a serious problem in a particular area. Nowadays we usually only build new defences to protect built up areas from flooding. All schemes must be technically, economically and environmentally sound. We keep a list of schemes called a Programme of Capital Works which helps us to plan for the future.

After major flooding along the Stour during 1979 a programme of flood alleviation schemes (FAS) were carried out (Map 24). Continuous liaison with planning authorities at these locations is carried out to ensure that development does not create new flood risk problems or reduce the effectiveness of the FASs. Liaison with planning authorities is also undertaken throughout the rest of the catchment whenever flood risk issues arise. An example is where surface water disposal from development to the Moors River and its tributaries has been controlled, primarily by attenuation, to prevent any increase in flood risk and to safeguard the flow regime for the protection of wildlife habitat.

17.3.2 Shoreline Management Plans (SMPs)

A Shoreline Management Plan is a document which sets out a strategy for coastal defence for a specified length of coast taking account of natural coastal processes and human and other environmental influences and needs.

Recent research has suggested that the coastline of England and Wales can be divided into 11 major sediment cells. A sediment cell is defined as a length of coastline which is relatively self contained as far as the movement of sand and shingle is concerned and where interruption to such movement should not have a significant effect on adjacent sediment cells.

SMPs provide the vehicle for the long term sustainable protection of our coastlines, by:

- *improving our understanding of coastal processes*
- *working in partnership with all interests and organisation*
- *preparing an agreed framework for the long term planning of coastal defences*

SMPs are part of an initiative on the future planning of our coastline, backed by MAFF, Association of District Councils, English Nature and ourselves. The Durlston Head to Hurst Spit SMP is discussed in section 5.3.

17.3.3 Duty of care for conservation

All new schemes and maintenance works are carried out after consultation with our conservation staff to ensure that the work is done in an environmentally acceptable manner. Under the legislation, three main areas have to be considered, namely to take into account the impact of proposals on natural features, to have regard to protection features of historic interest, and to further the conservation and enhancement of flora, fauna and other natural features.

17.4 Flood warning

17.4.1 Flood warning responsibilities

We recognise that irrespective of attempts to minimise the risk from flooding through the implementation of various policies and actions, flooding can occur and on occasion represents a risk to human life. With regard to public safety we operate a flood forecasting service in the catchment which uses raingauge and river level data from a number of sites, radar and rainfall forecast data from meteorological agencies, and information from flood defence staff in the field.

From 1 September 1996, the Agency will take the lead role in passing flood warnings to people who are at risk, so that they can take action to protect themselves and their properties. Over the next five years the Agency will be improving the warning service so that more information reaches those who need it. Where there is a risk that flooding could occur, flood warnings will be issued for the area affected. These warnings are issued to the Police, local authorities and the media, and in places directly to those at risk.

Flood warning is not an exact science. The Agency uses the best information available to predict the possibility of flooding, but no warning system can cover every eventuality. It is the responsibility of those who live in flood prone areas to be aware of any risk and to know what action they should take to protect themselves if flooding occurs. Warnings are issued for flooding from most major rivers and the sea. There are other types of flooding for which a warning service cannot be provided, for example, road flooding caused by blocked drains.

There are three principal means of issuing floodwarnings:

- *high risk properties receive a recorded telephone message directly when a floodwarning is issued*
- *floodwarnings will be broadcast by most local BBC and commercial radio stations*
- *the Floodcall Warning Information Line (telephone 0645 881 188) is a recorded information service which provides regularly updated information on floodwarnings in the Area*

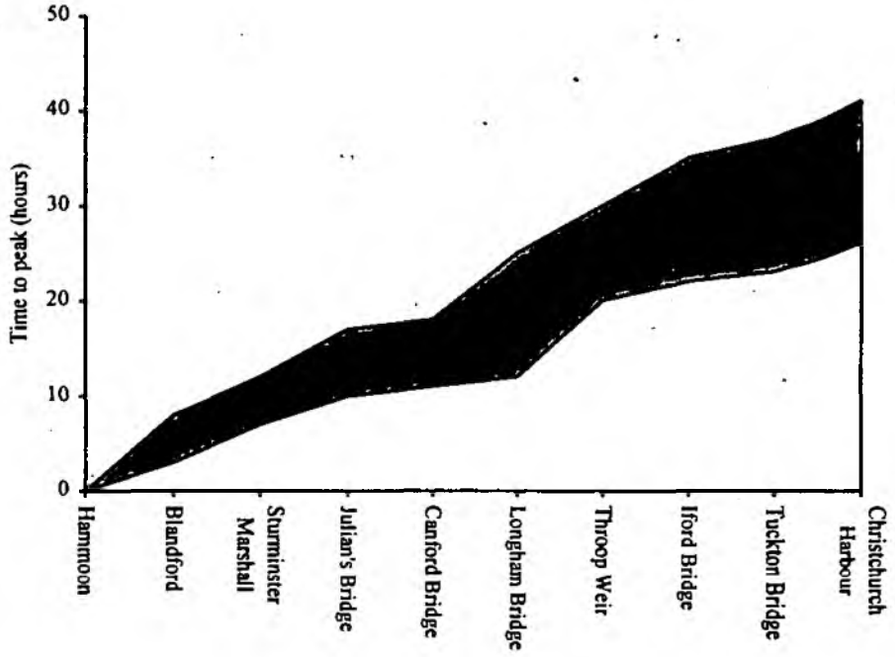
A leaflet containing further information is available from your local Agency office.

As well as issuing flood warnings we have the lead role in making sure that they actually get through to the people at risk. Arrangements are agreed in consultation with local authorities and the emergency services. Annual flood warning seminars are also held to review the effectiveness of the flood forecasting and warning process.

The nature of the geology in the upper catchment gives a fast response to rainfall, especially in the vicinity of Gillingham which is the confluence of the Stour, Lodden and Shreen Water. Rainfall, of say 50mm in a few hours over the Shreen catchment can result in an almost instantaneous rise in river levels at Gillingham with flooding of agricultural land and some isolated properties throughout the valley. If river levels are already high, then 25mm of rainfall can result in the issuing of yellow flood warnings.

Rapid runoff generates a *flood hydrograph wave* which is detected further downstream at gauging stations and from gauge board readings. The speed of this wave varies, depending on prevailing conditions; the Figure below gives an indication of travel times.

Figure 10: Passage Time of Peak Flood Flows on the Stour (based on May & December 1979; times may vary outside this range depending on flows)



17.4.2 Flood warning Standards of Service

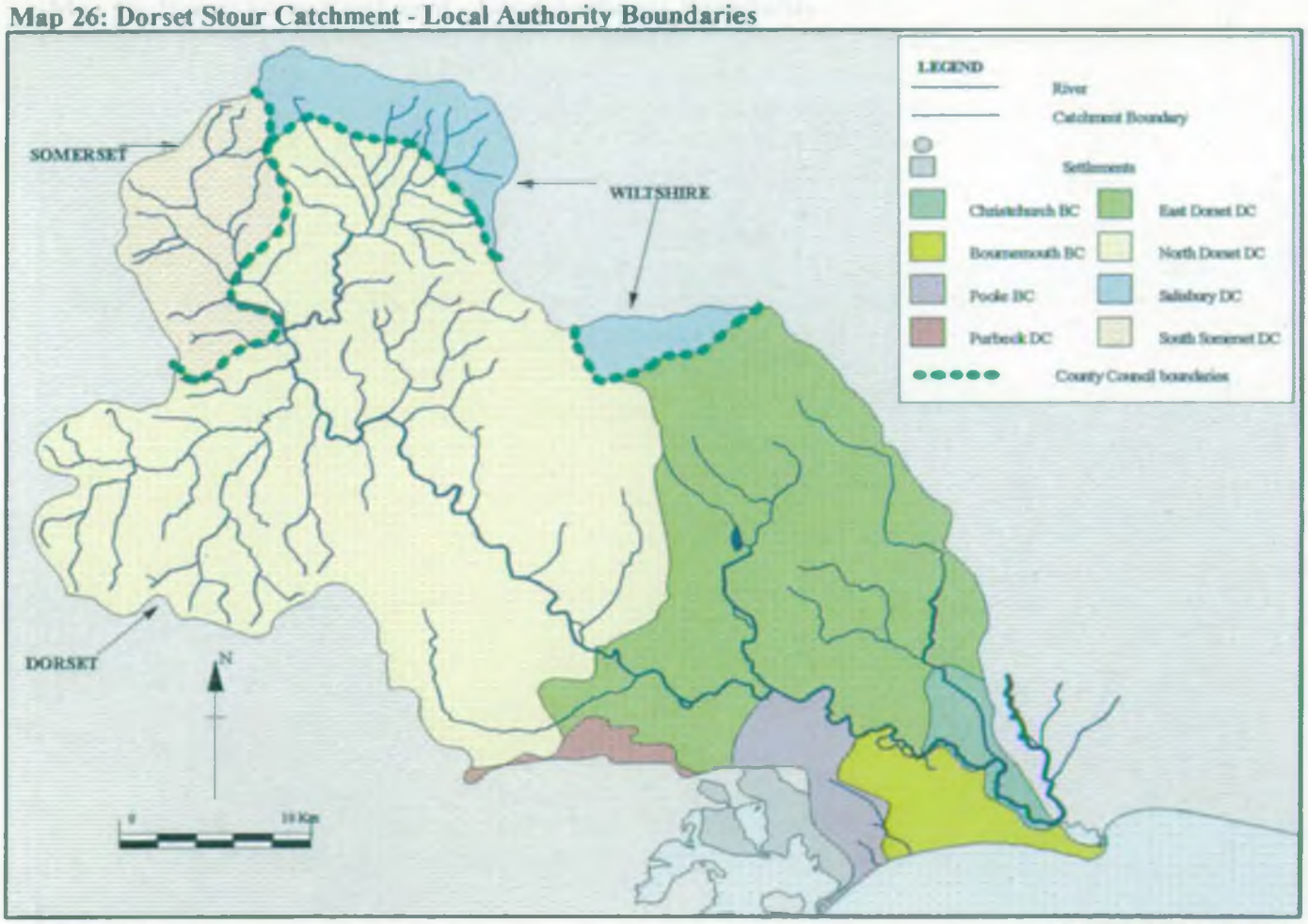
In order to ensure that timely warnings are issued to the right people, we operate a system of Flood Warning Standards of Service. By defining lengths of river, or reaches, with common landuse interests, those areas with a high population concentration can be treated as priority. It is our aim to provide a two hour warning of commencement of flooding wherever practicable.

18. THE BUILT ENVIRONMENT AND DEVELOPMENT PLANS

The Agency and local authorities both have statutory responsibilities for the environment. Many of these responsibilities are complementary such that one cannot be properly implemented without the contribution of the other. Often, local authority development control powers are the principal means of delivering our aims and objectives with regard to flood defence and pollution control. In addition, there is overlap in the use of local authority development control powers and our licensing powers to achieve environmental control. This can be a source of confusion, even conflict, or an opportunity for cooperation.

Other areas of overlap include responsibilities for air quality, contaminated land, waste and pollution control. It is therefore important that we develop effective working relationships with local authorities.

Map 26: Dorset Stour Catchment - Local Authority Boundaries



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On 1 May 1996, we hosted a seminar for Chief Executives of local authorities and their chief officers, aimed at introducing our aims and objectives and discussing areas of common interest. There is a need for ongoing dialogue so that issues of common interest can be pursued in a way that makes effective use of resources.

18.1 Population and settlements

Development is concentrated in the south of the catchment, around the conurbation of Poole, Bournemouth and Christchurch. The activity in the rest of the catchment is related to agriculture apart from light industrial and commercial development at the smaller centres.

No specific population growth rates are available for the catchment, but forecasts for relevant local authority areas are given below. The catchment is within these areas but does not wholly coincide with them.

Council Area	Population Estimate - 1994	Population Forecast - 2001	Population Forecast - 2011
Bournemouth BC	160,100	161,000	163,700
Christchurch BC	42,700	44,100	46,200
Poole BC	137,900	140,000	145,400
East Dorset DC	80,600	81,300	82,500
North Dorset DC	55,400	60,100	64,500

18.2 Structure Plans and District Wide Local Plans

Dorset and Wiltshire County Councils are preparing structure plans which determine the framework for development within the county and allocate development to each District Council. These plans are strategic, and provide the framework for Districts to produce their own detailed development plans. District Councils are currently preparing these plans; once adopted they have a statutory basis and provide a key reference for the local authorities in determining planning applications.

We are a consultee in the production of these plans and have the opportunity to influence the selection of sites for development and to ensure that plans contain policies which will help protect and enhance the environment, for example to ensure that development within river valley areas (as defined on proposals maps) does not adversely affect water quality, wildlife and their habitats, and landscape features. Development will be discouraged within or in the vicinity of an area liable to flood, as flood risk could endanger life and cause damage to property, or result in unnecessary expenditure on remedial works.

Other policies ensure that development only takes place where satisfactory arrangements can be made for disposal of all foul/combined and/or surface water discharges. Additionally development which will have an adverse impact upon groundwater resources will not be permitted, especially within Source Protection Zones.

18.3 Development control

In addition to our work on development plans, we are consulted by local authorities on planning applications which may affect the environment or our own interests. We are statutory consultees on a number of types of development, and there is a statutory instrument requiring planning authorities to consult us on development in flood risk areas. The Department of the Environment have issued guidance to planning authorities on a number of planning issues where our views should be sought. To assist the planning authorities, we have compiled a schedule identifying the types of development we would wish to be consulted on.

18.4 Planning and flood risk

The Government view is that development should be guided away from areas that may be affected by flooding, and should be restricted where it would increase the risk of flooding. To achieve this it expects local authorities to use their planning powers, and for the Agency to assist by providing advice on development and flood risk. The work that is underway on preparing floodplain maps is an example of this advice (see 17.1.2).

18.5 Groundwater protection

The protection of aquifers from pollution is of great importance, as the contamination of groundwater may put public supplies at risk. Contamination of groundwater may impact on river water quality where the baseflow is entirely dependent on groundwater.

The Policy and Practice for the Protection of Groundwater (PPPG) (NRA 1992) contains policy statements on the following aspects of groundwater protection:

- *physical disturbance of aquifers affecting quality and quantity*
- *waste disposal to land*
- *contaminated land*
- *disposal of sludges and slurries to land*
- *discharges to underground strata*
- *diffuse pollution*
- *other activities affecting groundwater quality*

We commit substantial resources to groundwater protection, and apply the PPPG through our own authorisations (discharge consents and abstraction licences). We also seek to protect groundwater quality in our role as a statutory consultee to the planning authorities.

An integral part of the policy is the publication of Groundwater Vulnerability Maps. The maps show the location of aquifers and classify their vulnerability according to the properties of the soil and underlying strata. These maps allow planners, developers and regulatory bodies to make better informed judgements on the location of new developments, avoiding potentially polluting activities in high vulnerability areas. The published maps for Dorset, North West Hampshire, and South Hampshire and the Isle of Wight cover the majority of the catchment. The remainder of the upper catchment will be covered by a map due for publication in 1998.

The second part of the policy is the drafting of Source Protection Zones (SPZs) for major groundwater sources. Local plans do and will contain policies relating to groundwater source protection and SPZs are being produced on the proposals maps. However at present the SPZs are schematic rather than definitive. It must be noted that all aquifers need protection not just those falling within SPZs.

18.6 Fisheries protection

The chalk stream tributaries of the Stour catchment are still areas of migratory salmonid production and therefore require a high degree of protection. Engineering works that release suspended solids to the river are not normally permitted between 1 November and 1 May where habitat is of importance for salmonid spawning. In areas important for coarse fish, engineering works are normally restricted to outside of the period 15 March to 1 August in order to protect spawning fish and fry.

18.7 Significant development at Bournemouth International Airport

The main proposal is to develop the land around the airport with possible employment for several thousand people. Currently a considerable number of non-related industries operate within the airport perimeter and although no major pollution problems have been detected there is concern about the disposal of waste water. The existing sewage works currently discharges to the Moors River and would be inadequate to cope with the anticipated developments around the airport. The development will need to include appropriate sewage treatment facilities.

The airport owners have engaged consultants to comment on the economic and conservation interests of the area. We have met with the consultants/airport manager and the planners to explain our

position and interests and to request that we are contacted early on so that comments can be made. To date we have not received any firm proposals for consideration.

18.8 Stour and Langton Meadows, Blandford

The current proposal is to open up Langton Meadows, immediately upstream of the A350 Blandford bypass, as a recreational area. To date we have commented on proposals for two footbridges, a car park and possible enhancements which may include a conservation lake. The start date for the projects are as yet unknown.

18.9 Road schemes

We are a statutory consultee to the Department of Transport for new trunk roads and advise County and District Councils on their own road schemes. We are involved throughout the process, from route choice to design and construction. Through consultation and negotiation we seek to protect all our interests, and where appropriate to secure enhancements for the environment.

Particular areas of concern are pollution risks during and after construction, flood risk from surface water runoff, damage to the amenity and wildlife value of rivers and wetlands.

Major improvements to the strategic highway network identified from the Dorset County Structure Plan (Deposit Plan) in the catchment include the A350 Higher Shaftesbury Road improvement and Melbury Abbas bypass.

We have commented on various route options for the following schemes which have been identified for construction in conjunction with major development:

- *Bournemouth International Airport link road/B3073 improvements*
- *B3072 West Moors bypass*

19. EFFLUENT DISCHARGES

Here we consider the disposal of effluent directly to rivers, estuaries, the sea or into the ground; the term effluent includes sewage, industrial or farm wastes. Rivers can naturally render the main constituents of many effluents harmless. With proper controls over the disposal of effluent the environment will not be harmed.

We regulate the disposal of effluent by issuing consents to control discharges, monitoring their impact, and taking action if a river is affected. We consider applications for consents to discharge on a case-by-case basis, and can refuse to consent a discharge if it will cause an unacceptable deterioration in water quality. It is illegal to discharge sewage effluent or trade waste without a consent; surface water discharges do not normally require a consent, but in exceptional circumstances we can regulate them by prohibition control. We also work with OFWAT to influence investment in sewerage and sewage treatment by the water companies.

19.1 Sewage treatment funding plans

Improvement schemes to Wessex Water Services' (WWS) Sewage Treatment Works (STWs) over the next ten to fifteen years are subject to available funding approved by OFWAT, the water industry's regulator. A strategic business plan, known as an Asset Management Plan (AMP2) was developed based on guidelines agreed between the NRA (National Rivers Authority), Department of the Environment (DoE), WWS and OFWAT in 1994. In order of priority, schemes included are:

- *those required to meet and maintain current EC and domestic statutory obligations*
- *those required to meet and maintain new EC and domestic statutory obligations and future legal obligations*
- *those which have been justified separately to maintain river quality relative to the 1990 NRA survey of water quality or to achieve river or marine improvements*

OFWAT declared the associated customer charging base in July 1994. The NRA agreed improvement plans for the following STW schemes: Kinson Phase 2 and Tarrant Crawford (under the investment driver *works in progress*), Bourton (*flow conditions not met and impact on water quality*), and Edmondsham and Mere (*containment of effluent load*).

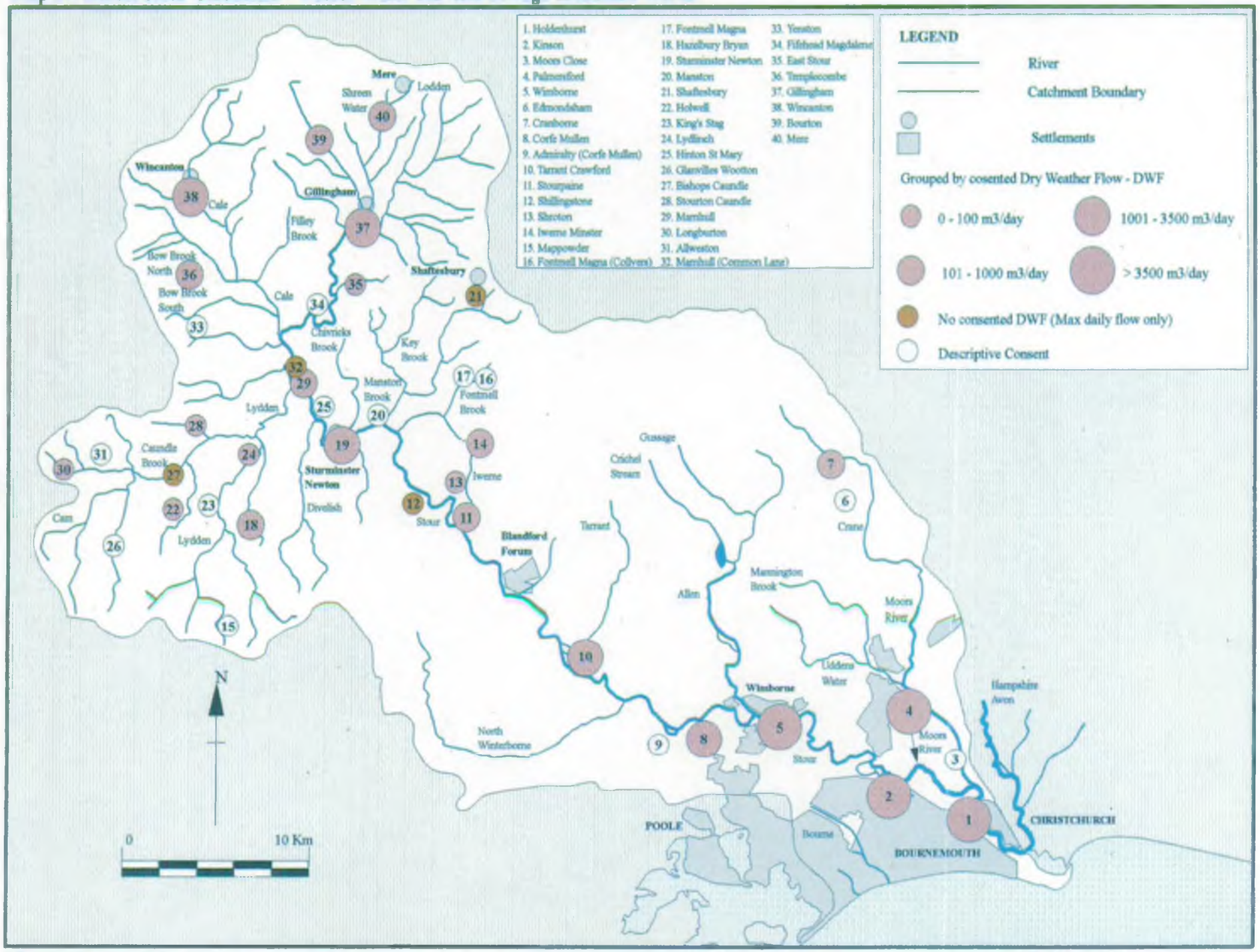
19.2 Continuous discharges

There are 40 WWS works in this catchment (Map 27). The majority of these works receive domestic effluent with only a small component of trade effluent, and therefore the consent conditions are primarily aimed at controlling the loads of biochemical oxygen demand (BOD), suspended solids and ammonia which are discharged. There are also a large number of private sewage treatment works in the catchment.

Eight works in the catchment receive a significant trade effluent component. The works and type of effluent are shown in the table below. Bourton and Wincanton STWs previously received milk wastes, and Kinson STW until recently received cosmetic and chemical wastes.

Works	Trade Effluent Received
Gillingham	Pre-treated wastes from a bacon factory
Shaftesbury	Laundry and vegetable preparation wastes
Tarrant Crawford	Brewery effluent, pretreated electroplating wastes
Corfe Mullen	Effluent from a chemical works
Wimborne	Pre-treated electroplating wastes
Kinson	Small volumes of pre-treated plating wastes
Holdenhurst	Laundry and laundrette drainage, pig farm waste, hotels

Map 27: Dorset Stour Catchment - Wessex Water Services Sewage Treatment Works



During the 1980s, development in the Verwood, Ferndown, West Moors and Three Legged Cross areas resulted in a substantial increase in the volume of sewage being treated at Palmersford STW and effluent discharged to the Moors River. By 1992, the river water quality was at an unacceptable level, so the discharge was re-routed to the Stour where there is sufficient flow for dilution purposes. Wimborne, Kinson and Holdenhurst STWs also discharge treated effluents into the lower reaches of the Stour. It is vitally important that these works maintain a high level of effluent quality so as not to harm the health of the river.

The most significant private works is at Bournemouth International Airport where any future significant development (see 18.7) would overload the existing treatment facilities. However there is an outstanding policy issue to connect the foul drainage and any trade effluent into one of WWS sewerage systems. It is still to be decided at what stage this connection is to be made.

Effluent quality discharged from the private works at Her Majesty's Young Offenders Institution, Guys Marsh, has deteriorated due to infiltration problems, food macerators and possibly effluent from the laundry. We have been working closely with consultants and are carrying out their recommendations, having already achieved some improvements in effluent quality.

A small private works discharges into the stream adjacent to Arrowsmith Road near Poole. On occasions this gives rise to complaints from neighbouring properties; the owner is taking steps to uprate the treatment facilities. Other properties in Arrowsmith Road use septic tanks but due to the heavy soil and high groundwater table many soakaways do not operate satisfactorily. The majority of problems are contained within the curtilage of the properties with no known discharges to the stream. It is unlikely that Poole BC will allow further development in this location as it is contained within the green belt.

Discharges from the two MoD sites in the catchment are currently being consented. At West Moors Petroleum Depot, consents will predominantly control the discharge of site drainage. Consents at Blandford Camp will be for the STW, site drainage and trade effluent e.g. vehicle wash. A full hydrogeological impact assessment has been undertaken for the STW, owing to its proximity to the Shapwick and Black Lane public water supply borehole's Source Protection Zones, and a private groundwater supply.

19.3 Trade effluent

There are six trade effluent discharges with flows greater than $5m^3$/day; the brewery at Blandford discharges cooling water, Sturminster Newton market discharges treated cattle market wastes, treated abattoir waste is discharged at Manston, treated dairy wastes at Todber, treated poultry wastes are discharged at Okeford Fitzpaine, and treated tip leachate is discharged from Conygar Coppice near Okeford Fitzpaine.

19.4 Intermittent discharges

Sewer and pumping station overflows exist on most sewerage systems in the catchment, and are subject to consents which aim to limit the frequency of the discharge to occasions when intense rainfall occurs. On many sewerage systems, particularly the older ones, sewers may be overloaded and overflows may occur at greater than acceptable frequency.

The four main Combined Sewer Overflows (CSOs) at Bournemouth, *Bournemouth No1 (Pier)*, *Hengistbury Head*, *Boscombe (Pier)* and *Fisherman's Walk* pump directly to the Coastal Interceptor Sewer (CIS), which was completed in 1976. The CIS intercepted all former crude outfalls and allows transfer of wastewater to Holdenhurst STW. The sewer also provides a considerable storage volume.

The respective overflows of the pumping stations come into operation when incoming flows are greater than pumping capacity or if storage in the system is exceeded. The discharges are all 500m offshore. The frequency of operation of storm overflows has been reduced by increasing the storm capacity at Holdenhurst STW (work completed in 1994), and by changes in the operation of the CIS.

Iford pumping station and *Tuckton High Street* CSOs both discharge to the Stour, but only infrequently to prevent flooding of properties during storm events. The frequency of operation of the *Sheepwash* (*Cooper Dean*) CSO has reduced following the construction of an attenuation tank, with the contents being pumped to Holdenhurst STW. Calculations indicate that the tank should overflow on no more than five occasions per year.

A number of sewerage systems within the catchment become infiltrated with groundwater during the winter months when the water table is high, resulting in intermittent discharges. WWS are working with us to systematically survey sewerage systems, and to identify and improve or eliminate unsatisfactory overflows. Cranborne sewerage system suffers from infiltration, and overflow onto adjacent farmland gives rise to complaints. WWS are preparing a plan to solve this problem.

19.5 Surface water discharges

Urban watercourses in the catchment suffer from vandalism, illegal connections to the surface water drain instead of the foul drain, spillages, and deliberate disposal of waste into the surface water drainage system. Household and trade waste is regularly deposited in these streams; this is unsightly, a potential flood risk, and can cause pollution as the rubbish degrades. Some surface water outfalls serving large urban areas still do not have oil interceptors fitted, and periodically discharge oily water e.g. Redhill in Bournemouth.

Waste oil should be recycled where possible; we publish an Oil Care Code, and provide a telephone helpline on 0800 663366 to supply the location of oil recycling banks. Oil storage areas should be regularly checked for leaks and signs of corrosion. New legislation will soon be available to ensure that relevant oil storage tanks are adequately bunded and, that drums of oil and chemicals are safely and securely stored.

19.6 Discharges to ground

Groundwater pollution can arise from a number of sources including disposal of wastes to land, septic tank discharges and fuel spills. Polluting substances can remain in the ground long after the spillage has occurred and appear in boreholes and springs.

Our current policy (see 18.5) is to consent septic tanks and soakaways where appropriate, taking into consideration the nature of the underlying aquifers and the large number of public and private groundwater abstractions used for potable supply. With a consent, the owner is responsible for the quality of any discharge, and this gives us a measure of control.

In some areas of the catchment, soakaways do not work well due to ground conditions, and sealed cesspools have to be installed. Sewage sludge and septic tank emptyings can be disposed of into licensed sludge holding lagoons prior to being spread onto farmland (see 16.6.6); cesspool emptyings must be disposed of at sewage treatment works.

19.7 Pollution incidents

During 1995 there were 362 substantiated pollution incidents in the Stour catchment; only one was classed as a major incident. Oil, algal blooms, foaming, land runoff and natural causes were the most common cause of reported incidents.

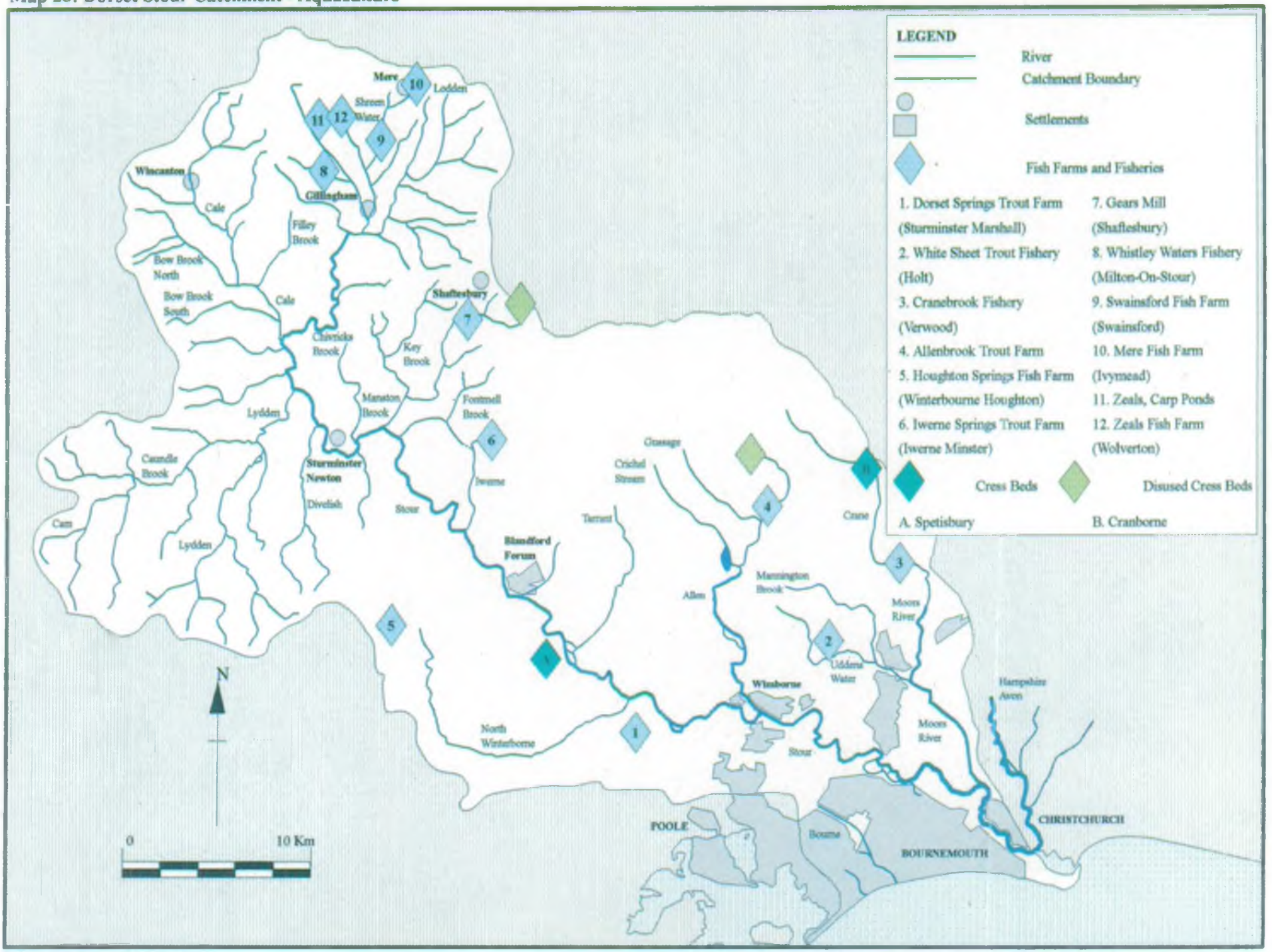
Road traffic accidents can result in spillages of petrol, diesel, milk, chemicals and liquid wastes into

surface water drainage systems and watercourses. Incidents also commonly involve discharges of oil, vehicle washings and paint from industrial estates in the catchment, usually due to the lack of storage facilities, poor maintenance of interceptors and lack of responsibility for overall drainage requirements.

We investigate all reported pollution incidents and, where appropriate, collect the necessary evidence to support prosecution. Post-investigation work includes follow-up visits to ensure that the necessary remedial actions are taken to mitigate the effect of any pollution, and that the necessary pollution prevention measures are taken.

Pollution incidents are expensive to clean up, but these costs can now be passed on to the polluter to pay. Prevention is better than cure, and we commit substantial resources to site visits to advise local businesses and farmers on the best ways to avoid pollution.

Map 28: Dorset Stour Catchment - Aquaculture



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20. AQUACULTURE

We consider here the use of riverside beds or ponds to rear fish or crayfish, or to grow watercress. We aim to ensure there is no impact from this use on groundwater or surface water quality or quantity, and the associated fauna, flora and wild fish stocks.

We exercise control by issuing abstraction licences to protect the water environment and legal uses, and by issuing discharge consents to protect the river from pollution caused by fish food or chemicals used to control pests or diseases.

In some situations we can control the movement of some fish to prevent the spread of diseases. However MAFF are responsible for registered fish farms.

20.1 Local perspective

There are two cress farms, nine fish farms and three fisheries operating within the catchment (Map 28). Cress farms are typically located on chalk streams, raising plants from seedlings on sand and gravel beds. Sources of water include springs, artesian boreholes and pumped boreholes. If cress is grown in compliance with the industry's own Code of Practice, it must be supplied solely with groundwater to ensure that it is pest free. Discharges from cress farms can help to maintain river flow at times of low flow.

Activities such as bed cleaning, disinfection, fertiliser application and pest control can cause pollution problems. Changes in the biology of watercourses have been detected immediately downstream of cress farm discharges. All discharges in the catchment have now been consented and routine monitoring will start shortly.

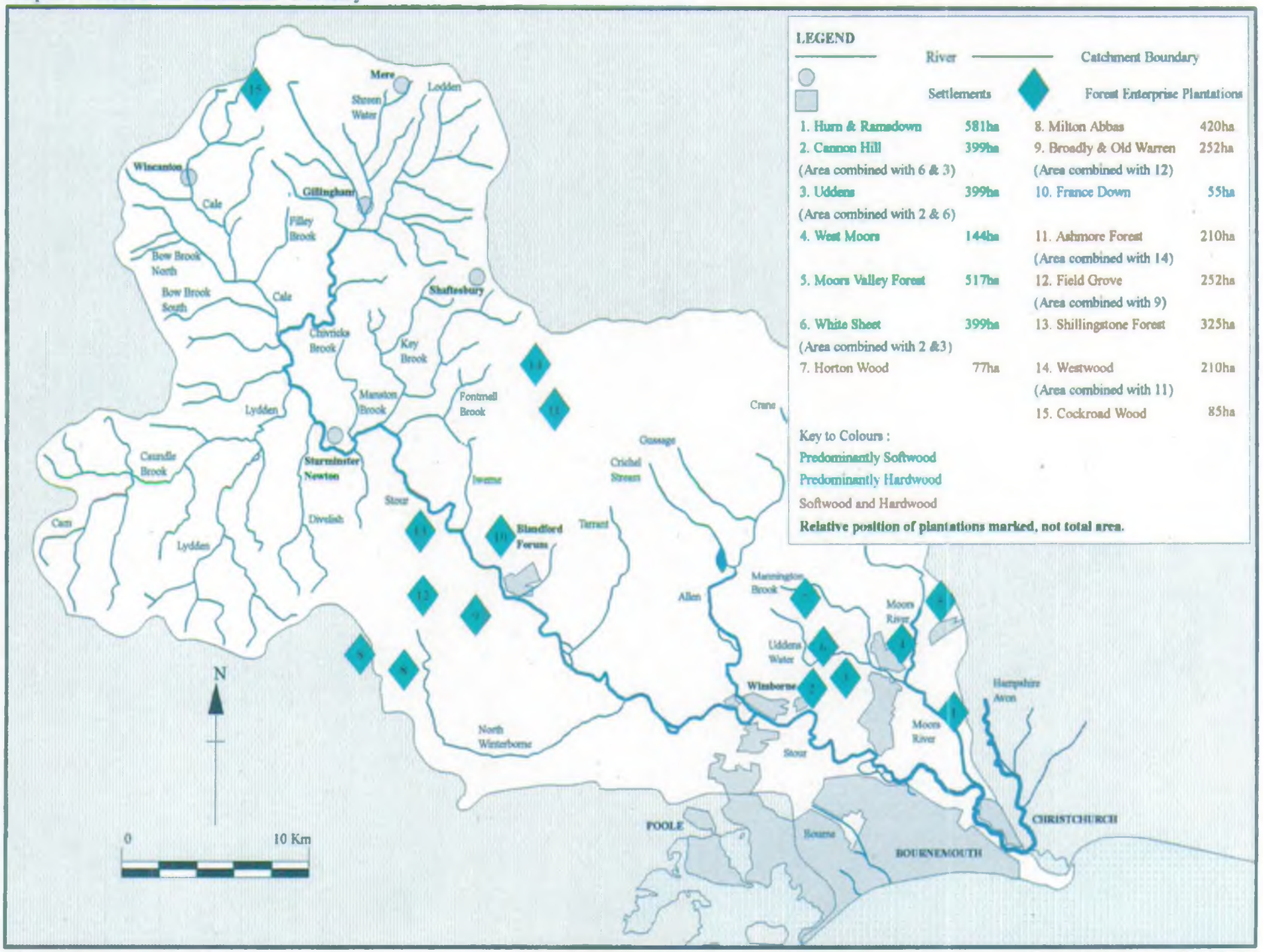
The consents will ensure the protection of quality in the receiving waters, including a substantial reduction in loadings of silt and silt-bound zinc from the effluent and the elimination of free chlorine discharges. Consents will also limit malathion discharges to achieve the DoE's proposed standard. At present no conditions will be set for other MAFF approved off-label use pesticides. This would be subject to review in the light of any standards imposed under the EC Dangerous Substances Directive.

The application of pesticides should be carried out in accordance with the Code of Good Agricultural Practice for the Protection of Water (HMSO 1993) and the Code of Practice for the Safe Use of Pesticides on Farms and Holdings (HMSO 1990) which incorporates Ministry requirements for the Food and Environmental Protection Act 1985 and Regulation 5 of the Control of Pesticide Regulations (HMSO 1986). These conditions are proposed for incorporation into the NFU Watercress Growers Association Code of Practice.

The effluent discharges from fish farms can be contaminated by organic wastes, ammonia and antibiotics from the large concentrations of fish, and may impact on the quality of the receiving water. As a result of the large volumes of effluent, considerable loads of these substances can be discharged into the river, and can cause pollution if insufficiently diluted. All effluents are controlled by consents to discharge.

The fish farms and fisheries in the catchment mainly use surface water, and all abstractions are licensed; these may reduce flows in bypassed reaches.

Map 29: Dorset Stour Catchment - Forestry



21. FORESTRY

Well-managed woodland in the right places does not harm the environment and will often bring benefits. However, in some circumstances woodland planting and management can cause problems. Acidification, soil erosion, pollution, water yield, increased flood risk and damage to wildlife habitats concern us in some parts of England and Wales but in this catchment the planting and management of new woodland does not usually cause problems for the environment.

The Forestry Authority regulates forestry in the UK by licensing some operations using felling licences and providing grant aid through the Woodland Grant Scheme. The Forestry Authority has published a series of guidelines on forests and; water, nature conservation, landscape design, archaeology and recreation. The Guidelines encourage environmentally sympathetic planting, management and harvesting. The Farm Woodland Premium Scheme operated by MAFF also provides grant aid for new woodlands on farms.

We aim to protect the environment from the negative effects of forestry activities and to encourage forestry practices that improve the environment. We have duties and powers to regulate some forestry works using land drainage legislation and to deal with pollution incidents. Much of our work involves working with the Forestry Authority and local authorities to ensure that the most significant forestry schemes consider effects on the water environment. We welcome the opportunity to comment on these schemes and on Indicative Forestry Strategies where they are being developed.

21.1 Local perspective

There are approximately 3,065ha of forest managed by Forest Enterprise within the catchment, and in excess of 1,000ha of private woodland. MAFF statistics indicate 2,252ha of farm woodland (1994).

The source of the Stour drains from forested areas near to Stourton and tributaries of the Cale from Cockroad Wood. Further downstream forested land in the Sturminster Newton, Shillingstone, Dorchester and Blandford areas drain to the Stour. Forested areas near Ashmore drain to the Tarrant and Chase Woods to the Allen.

In the lower catchment the Uddens Water, a tributary of the Moors River, drains from and through several forested areas including Uddens and White Sheet Plantations. Hurn and Ringwood Forests drain into the Moors River and the forests in the Cranborne and Edmondsham areas drain into the Crane.

There are no designated acid sensitive areas in the catchment.

We would wish to be consulted about any future development of forestry within the catchment which might impact on the water environment. The Forests & Water Guidelines (HMSO 1993) detail potential problems for the water environment, and the Forestry Authority will only grant aid schemes which fully comply with these Guidelines.

22. FARMING

Over 80% of the land in England and Wales is farmland and the way this land is used affects the quality of our environment. We are concerned about the pollution of surface and groundwater from animal wastes, fertilisers and pesticides. Soil erosion, land drainage and other forms of intensification, and stock damage to riverbanks can also lead to problems. A sustainable farming system that conserves the soil and minimises and recycles wastes will reduce the risk of damage to the water environment.

We aim to protect the environment from potentially damaging farming activities and to encourage agricultural practices that improve the environment. There are a limited number of ways we can influence how farmers use land. Other agencies such as MAFF can encourage sensitive farming practices using financial incentives (see 10.1). However we can control and prevent pollution in the same way as we do with any other industry.

We control pollution by issuing consents to discharge from farms, and by issuing authorisations to regulate the abstraction of water for use on farms. We encourage farmers to dispose of farm wastes to land rather than discharging treated waste directly to rivers.

22.1 Local perspective

Dairy farming has been largely responsible for influencing the economy within the catchment over the centuries. Beef, sheep and pig farming are becoming more common. Maize is increasingly common, being grown on 4,382ha of the catchment, and this may have an influence on water quality.

Broad changes over the 1984-94 period include an increase in cattle and sheep farming and, since its introduction, an increase to over 4,500ha of set aside land on which agricultural activity is severely limited. Farm systems continue to specialise and intensify with an increasing number of part time farms.

1994 Land Uses	hectares	%
Total agricultural land (% catchment area)	88,908	68
Grassland (% total agricultural land)	49,413	56
Arable (crops & fallow) (% total agricultural land)	27,670	31
Set aside (% total agricultural land)	5,005	6
Farm Woodland (% total agricultural land)	2,252	2.5

Changes in Use 1984-1994	hectare/units	%
Changes in cattle and calves	-12,384	-10
Change in number of holdings	55	4
Change in sheep and lambs	5,107	11
Change in pigs	799	1
Change in fowl	20,848	2
Change in cereal (ha)	-5,214	-22
Change in set aside (ha)	5,005	N/A

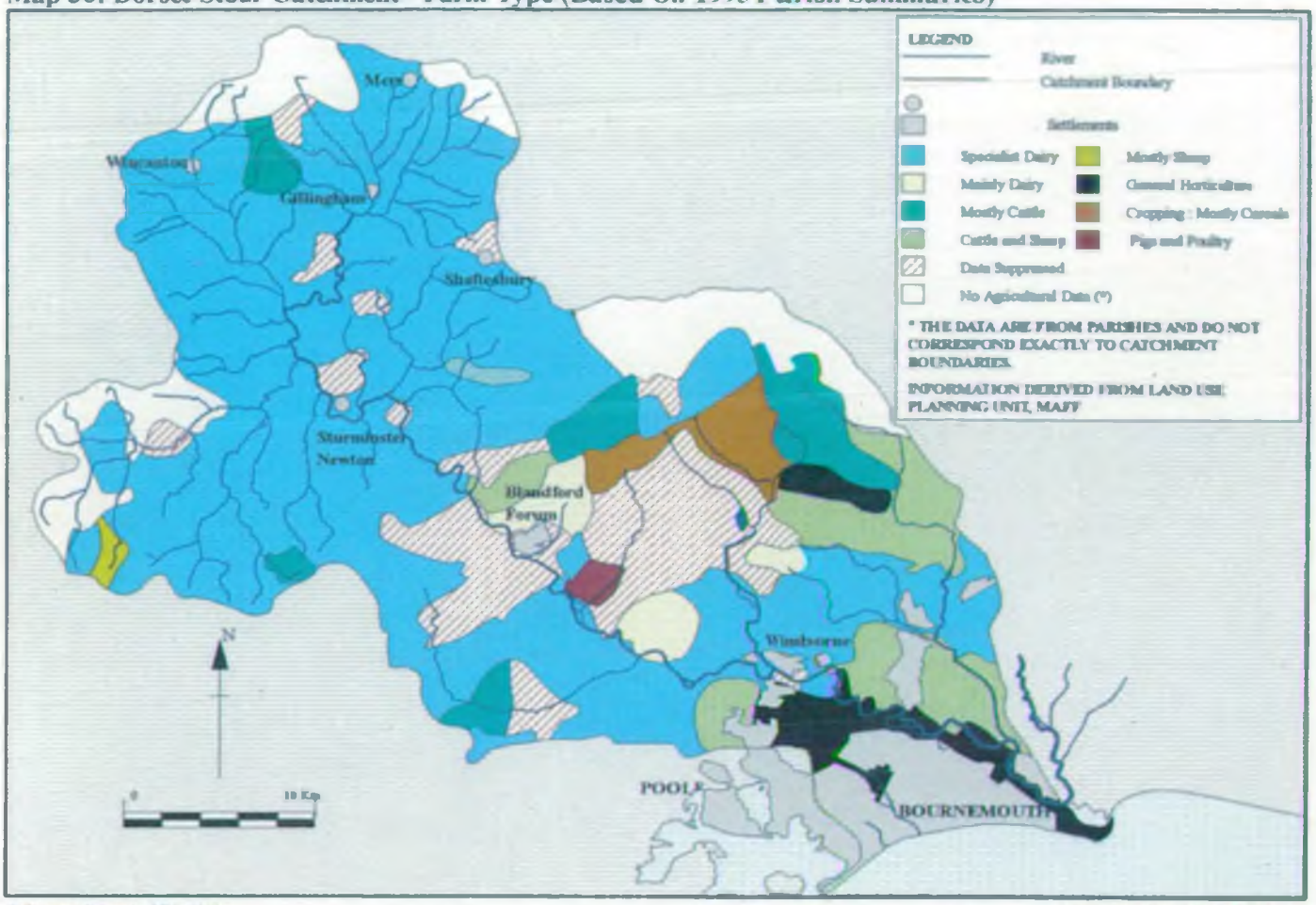
This information was taken from census statistics provided by MAFF Land Use Planning Unit. The data are derived from parishes and do not correspond exactly to catchment boundaries.

The table below summarises landuse information for three catchment areas, divided along broad geological boundaries (see Map 3).

Catchment Sub-Section	Comments
Upper Catchment Area	Soils give rise to highly fertile pasture suitable for some of the most productive dairy farming in the country. Some cereals are grown. 90%+ of area in agricultural use, of this 70% is grassland/rough grazing, and cereals and set-aside account for 24%. Dairy, cattle and sheep farms dominate; over the last 10 years there has been a 15% reduction in dairy cow numbers, a 40% increase in sheep figures and a significant increase in beef cattle. Maize is increasing, primarily at the expense of cereals.
Central Catchment Area	Dairies continue in the valley with arable chalkland farming extending onto the downs. 90% of area in agricultural use, of this 60% is in crops and fallow with a significant increase in set-aside over the last 10 years. During the period there has been a reduction in the numbers of dairy cows and an increase in the (relatively small) beef herd (116%), and the area of cereals has declined by over 20%. Dairy farming has continued to intensify.
Lower Catchment Area	Dairies continue in the valley with arable chalkland farming extending onto the downs. 25% of area in agricultural use, of this 67% is under grass with livestock dominating. Over the last 10 years the intensity of stocking on dairy farms has increased, with an overall decrease in cropped land.

This information was taken from census statistics provided by MAFF Land Use Planning Unit. The data are derived from parishes and do not correspond exactly to catchment boundaries.

Map 30: Dorset Stour Catchment - Farm Type (Based On 1995 Parish Summaries)



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22.2 Pollution risk

The Codes of Good Agricultural Practice for the Protection of Water (MAFF 1993) and Soil (MAFF 1993) provide farmers with advice on how to avoid pollution; the disposal of slurry and sludge should comply with these codes. The geology of most of the catchment allows waste to be spread on the land at most times of year; during wet or cold weather farmers should provide adequate storage for their farm waste.

The nature of the soil and topography in the upper catchment can cause significant waste application problems; impermeable or partially permeable soils do not readily assimilate irrigated slurry. Unless applications of slurries are made onto suitable ground under favourable conditions, there is a great risk of release from the land.

Up to the mid 1980s, under-investment in waste containment, handling facilities and animal housing led to significant pollution incidents and persistent low level water pollution. Particular pollution problems have arisen in the Lydden, Caundle Brook and Key Brook catchments. Land runoff in the clay dominated upper catchment above Sturminster Newton can also cause discoloration and turbidity to clearer downstream waters.

Since that time there has been a concerted programme of activity in the farm community, coupled with intensive monitoring of surface waters in the catchment. The Farm and Conservation Grant aid Scheme benefited farms greatly in this catchment; this is now much reduced with the removal of grants for installing or improving waste handling facilities. The positive response of the farming community in investing in buildings and equipment suitable for the task and in using precise waste management techniques has led to major quality improvements. Free advisory visits will continue to be made available funded by MAFF.

The lower part of the catchment brings different threats to water quality, specifically from fertilisers and pesticides; the permeable nature of the geology means that groundwater contamination is a risk.

Part of the South Wessex Downs Environmentally Sensitive Area (ESA) is in the middle and upper catchment areas (see Map 15). This scheme offers voluntary management agreements to farmers and landowners who agree to farm in more traditional ways. Its influence will gradually increase as more land is brought under agreement. Additionally, European agri-environment measures such as set-aside will have some influence on water quality in the catchment.

22.3 Agrochemicals

The use of chalk downland for arable crops means that the application and storage of herbicides and pesticides poses a risk to groundwaters used for public and private drinking water.

There are a small number of approved agrochemicals stores in the catchment which comply with the British Agrochemical Standards Inspection Scheme (BASIS) regulations; this means that pollution prevention measures are incorporated into their design.

The Code of Good Agricultural Practice for the Protection of Water (HMSO 1993) contains advice for farmers on the safe application and disposal of pesticides, herbicides and sheep dips.

23. INTEGRATED POLLUTION CONTROL

We are the statutory authority in England and Wales for regulating the largest and most complex industrial processes which discharge potentially harmful waste to air, water and land. We regulate controlled processes by considering discharges to land, air and water in the context of the effect on the environment as a whole.

We use a system known as Integrated Pollution Control (IPC) which requires the use of *best available techniques not entailing excessive cost* (BATNEEC) to prevent the release of particular substances into the environment or, where not practicable, to minimise their release and render them harmless.

Two lists of processes have been prescribed by regulations made under the Environmental Protection Act (1990)(Part 1): we control Part A processes under IPC, operators of these controlled processes are required to have an authorisation to discharge waste. Authorisations also cover plant design and operation. Part B processes are controlled at a local level under a system of Local Authority Air Pollution Control (LAAPC).

23.1 Local perspective

There are two current IPC authorisations in the Stour catchment; Moore's (Wallisdown) Ltd Metal Treatment Division and Flight Refuelling Ltd (Wimborne). These authorisations are for cadmium plating, with treated effluent from both sites discharged to sewer. Filter press cake and any dragouts from the effluent treatment plants are disposed of to landfill. Flight Refuelling also make titanium alloy components; there are emissions to air and discharges to sewer from this process.

We are also required to determine referrals for discharges of special category effluent to sewer; there are no sites within this catchment where such referrals have been made.

24. THE STORAGE, USE & DISPOSAL OF RADIOACTIVE MATERIAL

We are the principle regulator in England and Wales under the Radioactive Substances Act (1993). This is concerned with the storage, use and disposal of radioactive substances, and in particular, the regulation of radioactive waste. Radioactive substances are present in the environment as a result of both natural processes and of human technological developments. The uncontrolled and incautious use of these substances can pose both immediate and long-term effects.

We ensure that registrations for keeping and using radioactive substances are granted on the basis that their use is justified and that operators are prepared to abide by conditions to safeguard human health and protect the environment. We also issue certificates of authorisation for the accumulation and disposal of radioactive waste.

We embrace the concept of best practicable environmental option (BPEO) in our regulation of radioactive substances.

24.1 Local perspective

There are two authorisations for the accumulation and disposal of radioactive waste in the Stour catchment. White Rose Environmental, who operate the incinerator at the Royal Bournemouth Hospital, and at the same site the Royal Bournemouth and Christchurch Hospitals NHS Trust. These authorisations limit the quantity of radioactivity that may be released and establish the method of disposal and techniques to ensure that actual releases do not exceed the limit. The relevant details are shown in the table below.

Radioactive Waste Authorised For Accumulation

Organic Liquid Waste
Very Low Level Waste
Solid Waste

Very Low Level Waste
Solid Waste

The radioactive waste included in the provisions of the certificate for the Hospital results from the use of registered open sources. A variety of radioactive waste is generated including laboratory waste e.g. tissues and disposable gloves, and residues of the registered open sources.

There are thirteen sites in the catchment registered for the holding of radioactive material. These registrations constrain the amount of and type of radioactivity which may be kept, and regulate the facilities and management systems necessary to ensure safe-keeping.

25. THE AREA ENVIRONMENT GROUP

Alan Swindall (Chairman)

Giles Sturdy (Wessex Regional Flood Defence Committee)

Charles Tarver (Wessex Regional Fisheries Advisory Committee)

Susan Caito (Regional Environmental Protection Advisory Committee)

Roger Harrington (water resources)

Michael Webster (industry)

Timothy Palmer (agriculture)

John Davies (recreation)

Brian Chandler (flood defence)

John Reid (local authority)

Barbara Smith (local authority)

Tim Moore (other)

John Cardwell (waste management)

Peter Colling (tourism)

Laura Hirst (conservation)

Michael Park (fisheries)

Annette Brooke (local authority)

Sheila Poupard (local authority)

Andy Stillman (education)

John Day (other)

26. OUR ENVIRONMENTAL STANDARDS

There is a great deal of legislation that determines the way we operate and carry out our enforcement duties. The Environment Act 1995 provides some harmonisation of powers, but we also rely on existing legislation, including the Control of Pollution Act (1974), the Control of Pollution (amendment) Act (1989), the Environmental Protection Act (1990), the Radioactive Substances Act (1993), the Salmon and Freshwater Fisheries Act (1975), the Water Resources Act (1991), and the Land Drainage Act (1991).

We are the competent Authority for over 25 European Community environmental Directives whilst a further 70 Directives affect our policies and activities. These include the Quality of Bathing Waters, Dangerous Substances, Industrial Plant Emissions, Waste Management Framework, Quality of Water to Protect Freshwater Fisheries, and the Urban Waste Water Treatment Directives.

Operational Standards are the technical, scientific and engineering procedures which are necessary to put legislation and our policy into practice. These take many forms, including policy statements, procedural manuals, and a suite of quantitative output and performance measures that we monitor quarterly or annually. Details of our operational standards are published in technical handbooks, research & development reports, and information leaflets. Further details are available from our local offices.

26.1.1 Public Registers and access to environmental information

We maintain several public registers which can be inspected at most Environment Agency offices. Information is usually provided free of charge, but for large and complex requests we may charge for staff time and materials. There are also standard charges for some specific searches. Confidential information, incomplete or draft reports, and information where disclosure may lead to

environmental damage are generally not available.

Further details about our public registers and the types of information we hold are available in our leaflet *A Guide to Information Available to the Public*. Copies are available at our Blandford office, or you can telephone and we will send one to you in the post.

At present, offices may have information relevant only to their local area; please call before you visit to ensure that the information you want is available at your local office. Our staff will be happy to help you with any queries you may have and if you call before you visit we will ensure that they are on hand to help you with your query.

Some environmental details and information about our public registers are available on the Internet on http://www.environment-agency.gov.uk

26.2 EC Directives

There are six EC Directives which currently apply to the Dorset Stour catchment, and the designated stretches and sites are shown on Map **.

26.2.1 EC Freshwater Fish Directive

The EC Directive *on the quality of waters needing protection or improvement in order to support fish life* (78/659/EEC) ensures that water quality in designated stretches of water is suitable for supporting certain types of fish.

This Directive contains two sets of quality standards. One set of standards protects cyprinid or coarse fish populations. The other set of standards that are stricter, protects salmonid fish populations for example, salmon and trout. There are two sets of standards for each fishery type: imperative standards (I) which must be achieved, and guideline standards (G) that Member States should aim to achieve.

We are responsible for monitoring the quality of identified fisheries and reporting the results to DoE who decide whether the standards in the Directive have been met. Where the requirements of this Directive are not met, we are responsible for identifying sources of pollution and making sure that improvements are made.

Determinand		Salmonid Waters		Cyprinid Waters	
		G	I	G	I
Dissolved Oxygen as mg/l O_2		100% > 7	50% > 9	100% > 5	50% > 7
pH as pH units		-	6.0-9.0	-	6.0-9.0
Suspended Solids as mg/l		25	o	25	o
BOD (Total) as mg/l O_2		5	o	8	o
Nitrite as mg/l N		0.15	o	0.46	o
Non-ionised Ammonia as mg/l N		0.004	0.021	0.004	0.021
Ammonia (Total) as mg/l N		0.03	0.78	0.16	0.78
Total Residual Chlorine as mg/l HOCl		-	0.005	-	0.005
Zinc (Total) as mg/l Zn	Hardness (mg/l $CaCO_3$)				
	0-50	-	0.03	-	0.30
	50-100	-	0.20	-	0.70
	100-250	-	0.30	-	1.00
	>250	-	0.50	-	2.00
Copper (Dissolved) as mg/l Cu	0-50	0.005	o	0.005	o
	50-100	0.022	o	0.022	o
	100-250	0.040	o	0.040	o
	>250	0.112	o	0.112	o

For dissolved oxygen, 50% median and 100% minimum standard.
For suspended solids, the 'G' value is an annual average concentration.

26.2.2 EC Bathing Waters Directive

The EC Directive *concerning the quality of bathing water* (76/160/EEC) seeks to protect public health and the amenity value of popular bathing waters by reducing pollution. The Directive contains standards for nineteen microbiological, physical and chemical parameters to assess bathing water quality. Compliance is assessed mainly by standards for bacteria (total and faecal coliforms) found in sewage.

We are responsible for monitoring the quality of identified, popular bathing waters and providing the results to DoE who decide whether the standards in the Directive have been met. Where identified bathing waters fail to meet the Directive, we are responsible for identifying sources of pollution that are causing failures, and making sure that improvements are made.

Microbiological standards

Parameter	Units	Value (1)		Status	
Imperative or Guideline Standards		I	G	I	G
Total coliforms	no/100ml	10,000	500	95% of samples	80% of samples
Faecal coliforms	no/100ml	2,000	100	95% of samples	80% of samples
Faecal streptococci	no/100ml	0	100	0	95% of samples
Salmonella	no/l	0	:	All samples	-
Enterovirus	PFU/10l	0	:	All samples	-

PFU = Plaque Forming Units

There is currently no imperative standard for faecal streptococci; however, it has been proposed that the Directive should be revised and should include an imperative standard for faecal streptococci of 400/100ml.

Aesthetic criteria

Parameter	Analysis Method	Description/Standard
Colour	Visual inspection	No abnormal change
Mineral oils	Visual inspection	No visible surface film
	Olfactory inspection	No odour
	mg/l after extraction and weighing dried residue	≤0.3
Surface-active substances (methylene-blue active)	Visual inspection	No lasting foam
	mg/l as lauryl sulphate	≤0.3
Phenols	Olfactory inspection	No specific odour
	mg/l	≤0.005
Transparency	m	1
Tarry residues, solid floating material, effluent slicks	Visual inspection	Absent

26.2.3 EC Dangerous Substances Directive

The EC Dangerous Substances Directive *on pollution caused by certain substances discharged in the aquatic environment of the community* (76/464/EEC) protects the water environment by controlling discharges to rivers, estuaries and coastal waters.

This Directive describes two lists of compounds. List I contains substances regarded as particularly dangerous because they are toxic, they persist in the environment and they bioaccumulate. Discharges containing List I substances must be controlled by Environmental Quality Standards (EQSs) issued through Daughter Directives. List II contains substances which are considered to be less dangerous but which still can have a harmful effect on the water environment. Discharges of List II substances are controlled by EQSs set by the individual Member States.

We are responsible for authorising, limiting and monitoring dangerous substances in discharges. We are also responsible for monitoring the quality of waters receiving discharges which contain dangerous substances and reporting the results to DoE who decide whether the standards in the Directive have been met. Where the requirements of this Directive are not met, we are responsible for identifying sources of pollution and making sure that improvements are made.

EQSs for List I Substances (Inland Waters)

Parameter	Units	Value	Status (1)
Mercury	µg Hg/l	1.0	AA,T
Cadmium (2)	µg Cd/l	5.0	AA,T
		1.0	AA,T,B (4)
Hexachlorocyclohexane (HCH) (2)	µg/l	0.1	AA,T
		0.05	AA,T,B (4)
Tetrachloromethane (CTC)	µg/l	12	AA,T
DDT (para-para DDT isomer) (2)	µg/l	0.01	AA,T
Total DDT (2)	µg/l	0.025	AA,T
Pentachlorophenol (PCP) (2)	µg/l	2	AA,T
'The Drins' (from 1 Jan 1989)	µg/l	0.03 (3)	AA,T
Aldrin (from 1 Jan 1994)	µg/l	0.01	AA,T
Dieldrin (from 1 Jan 1994)	µg/l	0.01	AA,T
Endrin (from 1 Jan 1994)	µg/l	0.005	AA,T
Isodrin (from 1 Jan 1994)	µg/l	0.005	AA,T
Hexachlorobenzene (HCB) (2)	µg/l	0.03	AA,T
Hexachlorobutadiene (HCBD) (2)	µg/l	0.1	AA,T
Chloroform	µg/l	12	AA,T
1,2-dichloroethane	µg/l	10	AA,T
Trichloroethylene	µg/l	10	AA,T
Perchloroethylene	µg/l	10	AA,T
Trichlorobenzene (TCB)	µg/l	0.4	AA,T

Proposals have been published for the following List I substances but these have not, so far, been adopted: trifluralin, endosulphan, simazine, triorganotin compounds (tributyltin oxide, triphenyltin acetate, triphenyltin oxide, triphenyltin hydroxide), atrazine, organophosphorus substances (azinphos-methyl, azinphos-ethyl, fenitrothion, fenthion, malathion, parathion and parathion-methyl, dichlorvos).

(1) AA=Annual Average, T=Total, B=Background Monitoring

(2) A 'standstill' provision exists for concentrations in sediments and/or shellfish and/or fish

(3) Maximum of 0.005 for Endrin

(4) B=Background Monitoring: only applies at designated end of catchment sites

EQSs for List II Substances (Inland Waters) (1)

Parameter	Units	Value (3) A Std	Value (3) B Std	Hardness (mg $CaCO_3$/l)	Status (2)
Lead	µg Pb/l	4	50	0 to 50	AA,D
		10	125	50 to 100	
		10	125	100 to 150	
		20	250	150 to 200	
		20	250	200 to 250	
		20	250	>250	
Chromium	µg Cr/l	5	150	0 to 50	AA,D
		10	175	50 to 100	
		20	200	100 to 150	
		20	200	150 to 200	
		50	250	200 to 250	
		50	250	>250	
Zinc	µg Zn/l	8	75	0 to 50	AA,T
		50	175	50 to 100	
		75	250	100 to 150	
		75	250	150 to 200	
		75	250	200 to 250	
		125	500	>250	
Copper	µg Cu/l	1	1	0 to 50	AA,D
		6	6	50 to 100	
		10	10	100 to 150	
		10	10	150 to 200	
		10	10	200 to 250	
		28	28	>250	
Nickel	µg Ni/l	50	50	0 to 50	AA,D
		100	100	50 to 100	
		150	150	100 to 150	
		150	150	150 to 200	
		200	200	200 to 250	
		200	200	>250	
Arsenic	µg As/l	50		All	AA,D
Boron	µg B/l	2000		All	AA,T
Iron	µg Fe/l	1000		All	AA,D
pH	pH values	6 to 9		All	95% of samples
Vanadium	µg V/l	20	20	0 to 200	AA,T
		60	60	200+	
Tributyltin	µg/l	0.02		All	M,T
Triphenyltin	µg/l	0.02		All	M,T
Polychlorochlormethyl-sulphonamidodiphenyl ether (PCSDs)	µg/l	0.05		All	T, 95% of samples
Sulcofuron	µg/l	25		All	T, 95% of samples
Flucofuron	µg/l	1.0		All	T, 95% of samples
Permethrin	µg/l	0.01		All	T, 95% of samples
Cyfluthrin	µg/l	0.001		All	T, 95% of samples

(1) National environmental quality standards recommended for the UK.

(2) AA=Annual Average; D=Dissolved; T=Total; M=Maximum Allowable Concentration

(3) A Std denotes standards for the protection of sensitive aquatic life, B Std denotes standards for the protection of other aquatic life

EQSs for List I Substances (Tidal Waters)

Parameter	Units	Value	Status (1)
Mercury (2)	µg Hg/l	0.3	AA,D
Cadmium (2)	µg Cd/l	2.5	AA,D
Hexachlorocyclohexane (HCH) (2)	µg/l	0.02	AA,T
Tetrachloromethane (CTC)	µg/l	12	AA
DDT (para-para DDT isomer) (2)	µg/l	0.01	AA
Total DDT (2)	µg/l	0.025	AA
Pentachlorophenol (PCP) (2)	µg/l	2	AA
'The Drins' (from 1 Jan 1989)	µg/l	0.03 (3)	AA,T
Aldrin (from 1 Jan 1994)	µg/l	0.01	AA
Dieldrin (from 1 Jan 1994)	µg/l	0.01	AA
Endrin (from 1 Jan 1994)	µg/l	0.005	AA
Isodrin (from 1 Jan 1994)	µg/l	0.005	AA
Hexachlorobenzene (HCB) (2)	µg/l	0.03	AA
Hexachlorobutadiene (HCBD) (2)	µg/l	0.1	AA
Chloroform	µg/l	12	AA
1,2-dichloroethane	µg/l	10	AA
Trichloroethylene	µg/l	10	AA
Perchloroethylene	µg/l	10	AA
Trichlorobenzene(TCB)	µg/l	0.4	AA

Proposals have been published for the following List I substances but these have not, so far, been adopted: trifluralin, endosulphan, simazine, triorganotin compounds (tributyltin oxide, triphenyltin acetate, triphenyltin oxide, triphenyltin hydroxide), atrazine, organophosphorus substances (azinphos-methyl, azinphos-ethyl, fenitrothion, fenthion, malathion, parathion and parathion-methyl, dichlorvos).

(1) AA=Annual Average, T=Total, B=Background Monitoring

(2) A 'standstill' provision exists for concentrations in sediments and/or shellfish and/or fish

(3) Maximum of 0.005 for Endrin

(4) B=Background Monitoring: only applies at designated end of catchment sites

EQSs for List II Substances (Tidal Waters)

Parameter	Units	Value (1)	Status
Lead	µg Pb/l	25	AA,D
Chromium	µg Cr/l	15	AA,D
Zinc	µg Zn/l	40	AA,D
Copper	µg Cu/l	5	AA,D
Nickel	µg Ni/l	30	AA,D
Arsenic	µg As/l	25	AA,D
Boron	µg B/l	7000	AA,D
Iron	µg Fe/l	1000	AA,D
pH	pH values	6 to 8.5 (3)	95% of samples
Vanadium	µg V/l	100	AA,T
Tributyltin	µg/l	0.002	M,T
Triphenyltin	µg/l	0.008	M,T
Polychlorochlormethyl-sulphonamidodiphenyl ether (PCSDs)	µg/l	0.05	T, 95% of samples
Sulcofuron	µg/l	25	T, 95% of samples
Flucofuron	µg/l	1.0	T, 95% of samples
Permethrin	µg/l	0.01	T, 95% of samples
Cyfluthrin	µg/l	0.001	T, 95% of samples

(1) National environmental quality standards recommended for the UK.

(2) AA=Annual Average; D=Dissolved; T=Total; M=Maximum Allowable Concentration

(3) A Std denotes standards for the protection of sensitive aquatic life, B Std denotes standards for the protection of other aquatic life

26.2.4 EC Urban Wastewater Treatment Directive

The EC Directive *concerning urban wastewater treatment* (91/271/EEC) specifies minimum standards for sewage treatment and sewage collection systems.

This Directive specifies secondary treatment for all discharges serving population equivalents greater than 2,000 to inland waters and estuaries, and greater than 10,000 to coastal waters. Discharges below these population equivalents receive appropriate treatment as defined in the AMP2 guidance note (see 19). We are responsible for making sure that discharges receive the level of treatment specified in this Directive.

This Directive also allows higher standards of treatment for discharges to *sensitive* areas, and/or lower standards of treatment to *less sensitive* areas. Sensitive areas are those waters that receive discharges from population equivalents of greater than 10,000, and are or may become eutrophic in the future.

We carry out monitoring to find out whether a watercourse is a sensitive area. We present this information to DoE who decide whether the watercourse is sensitive. We then ensure that discharges to the sensitive area receive a higher level of treatment.

Less Sensitive Areas or *High Natural Dispersion Areas* (HNDAs) are those estuarine or coastal waters which are naturally very dispersive. In these areas a lower level of sewage treatment is required. However, dischargers must demonstrate that no harm will be caused to the environment by the lower level of treatment. We are responsible for ensuring that these studies are carried out correctly.

26.2.5 EC Nitrates Directive

The EC Directive *concerning the protection of waters against pollution caused by nitrates from agricultural sources* (91/676/EEC) protects waters from pollution by nitrates used in agriculture. This Directive requires Member States to identify waters that are or could be affected by pollution from nitrates. The land draining to these polluted waters must be designated as *nitrate vulnerable zones* (NVZ). Action plans must be established to reduce existing nitrate pollution and prevent further pollution. Outside NVZs, Member States must establish and promote a code of good agricultural practice.

We are responsible for advising on the selection and boundaries of NVZs. The designation of NVZs and agricultural measures to be adopted is the responsibility of Government.

Indicative standards for the identification of Sensitive Waters (Eutrophic) and Polluted Waters (Eutrophic): Inland Waters

Determinand	Indicative Standard		Notes (1)
	Running Water	Still Water	
Orthophosphate (µg P/l)	>100	≥50	AA
Nitrate (µg NO_3/l)	>50	≥50	P, At major public water supply abstractions
Dissolved oxygen (% saturation)	>150 daytime < 50 nighttime	Excessive supersaturation in surface layers, depletion in hypolimnion	
Chlorophyll a (µg/l)	>25	≥30	
Algal Biomass	>100 g/m²		Excessive growth of attached algae esp. *Cladophora*
Water Clarity (m)		<3, predominantly green colour	AA, Secchi Disc
Water Retention Time (days)	>5		Sufficient retention time for algal multiplication
Effects on fauna	Reduction in abundance of fish and invertebrate fauna		Attributed to nutrient enrichment
Effects on macroflora	Substantial adverse changes in macrophyte abundance and diversity		
Effects on microflora	Exceptional increases in plankton, and/or biomass leading to blooms, scum or discoloration		Includes blue-green algae

It is not necessary that adverse effects should be found in all factors. Evidence should be considered on a site specific basis.
(1) AA: Annual average (Geometric Mean)
P: 95%ile (parametric)

Indicative standards for the identification of Sensitive Waters (Eutrophic) and Polluted Waters (Eutrophic): Tidal Waters

Determinand	Indicative Standard: Estuaries	Indicative Standard: Coastal Waters	Notes
Nitrate (mg N/l)	>0.21	≥0.21	Winter concentrations
Phosphorus (µg P/l)	>6.2	≥6.2	DAIP (1), Winter concentrations
Chlorophyll a (µg/l)	>10	≥10	
Algal Bloom Cell Density (cells/l)	>5x10^5	≥5x10^5	
Dissolved Oxygen	Daytime O_2 depletion		Linked to algal decay NOT organic inputs from discharges
Effects on fauna	Invertebrate, shellfish, fish mortalities		NOT associated with organic pollution
Effects on macroalgae	>10 hectares (>25% of available intertidal area) in which algal cover exceeds 25%		Especially *Enteromorpha* and *Ulva*
Effects on microalgae	Presence of significant blooms leading to accumulation of scum/foam on beaches; public complaints/concern		
Estuary Flushing Times (weeks)	>1 to 2		

(1) DAIP Dissolved available inorganic phosphorous

The assessment of whether a stretch of water is actually or potentially eutrophic is not possible simply by reference to numeric chemical criteria, however, they do provide an indication of symptoms, and the importance of each of the criteria should be assessed on a local basis.

Indicative Standards for identifying HNDAs, and defining *No Adverse Affects* (1)

Any site designated as an HNDA must be subject to Comprehensive Studies to be carried out by the discharger, and we audit them before a consent can be issued for a lower level of treatment.

The comprehensive studies must show that no adverse effects will be caused by discharging a primary rather than a secondary treated effluent within the HNDA. In addition, protection of Bathing Waters and other recognised uses must be considered separately within the scheme design.

Determinand	Indicative Standard: Estuaries (2)	Indicative Standard: Coastal Waters	Notes
Minimum Initial Dilution	50	50	Dependant of location of discharge
Dissolved oxygen: change caused by discharge (mg/l)	≤1	≤0.5	• Based on a predicted median DO of ≥7mg/l
BOD: deviation from background (mg/l)		<1.5	
Area must not be eutrophic		<1µg/l of chlorophyll ascribed to discharge	
Marine Communities		No change ≥100m from outlet	

(1) Comprehensive Studies for the purposes of Article 6 of Directive 91/271/EEC. The Urban Waste Water Treatment Directive. Marine Pollution Monitoring Management Group. February 1994.
(2) The difference in loading from a primary treated effluent compared to a secondary treated effluent from works in the range 2,000 to 10,000 pe is very small. Therefore only DO is likely to be significantly affected. Therefore this is the main criterion for assessing *no adverse affect* in estuaries.

26.2.6 EC Surface Water Abstraction Directive

The EC Directive *concerning the quality required of surface water intended for the abstraction of drinking water in the Member States* (75/440/EEC), protects the quality of surface water used for public supply. This Directive ensures that water abstracted for public supply meets certain quality standards and is given adequate treatment before entering public water supplies.

The Directive sets out imperative standards that must be achieved, and guideline standards that Member States should aim to achieve, for water for public supply which is to be given different levels of treatment.

We are responsible for monitoring the quality of designated surface water abstractions and reporting the results to DoE who decide whether the standards in the Directive have been met. Where standards are not met, we are responsible for identifying sources of pollution and making sure that improvements are made.

Definition of the Standard Methods of Treatment for Transforming Surface Water of Categories A1, A2 and A3 into Drinking Water

Category A1	Simple physical treatment and disinfection, e.g. rapid filtration and disinfection.
Category A2	Normal physical treatment, chemical treatment and disinfection, e.g. pre-chlorination, coagulation, flocculation, decantation, filtration, disinfection (final chlorination).
Category A3	Intensive physical and chemical treatment, extended treatment and disinfection, e.g. chlorination to break-point, coagulation, flocculation, decantation, filtration, absorption (activated carbon), disinfection (ozone, final chlorination).

Characteristics of Surface Waters Intended for the Abstraction of Drinking Water

	Parameters		Categories A1 G	A1 I	A2 G	A2 I	A3 G	A3 I
1	pH		6.5 to 8.5	-	5.5 to 9	-	5.5 to 9	-
2	Coloration (after simple filtration)	mg/l Pt scale	10	20 (0)	50	100 (0)	50	200 (0)
3	Total suspended solids	mg/l SS	25	-	-	-	-	-
4	Temperature	°C	22	25 (0)	22	25 (0)	22	25 (0)
5	Conductivity	µs/cm^{-1} at 20°C	1000	-	1000	-	1000	-
6	Odour	(dilution factor at 5°C)	3	-	10	-	20	-
7	Nitrates	mg/l NO_3	25	50 (0)	-	50 (0)	-	50 (0)
8	Fluorides	mg/l F	0.7 to 1	1.5	0.7 to 1.7	-	0.7 to 1.7	-
9	Total extractable organic chlorine	mg/l Cl	-	-	-	-	-	-
10	Dissolved Iron	mg/l Fe	0.1	0.3	1	2	1	-
11	Manganese	mg/l Mn	0.05	-	0.1	-	1	-
12	Copper	mg/l Cu	0.02	0.05 (0)	0.05	-	1	-
13	Zinc	mg/l Zn	0.5	3	1	5	1	5
14	Boron	mg/l B	1	-	1	-	1	-
15	Beryllium	mg/l Be	-	-	-	-	-	-
16	Cobalt	mg/l Co	-	-	-	-	-	-
17	Nickel	mg/l Ni	-	-	-	-	-	-
18	Vanadium	mg/l V	-	-	-	-	-	-
19	Arsenic	mg/l As	0.01	0.05	-	0.05	0.05	0.1
20	Cadmium	mg/l Cd	0.001	0.005	0.001	0.005	0.001	0.005
21	Total Chromium	mg/l Cr	-	0.05	-	0.05	-	0.05
22	Lead	mg/l Pb	-	0.05	-	0.05	-	0.05
23	Selenium	mg/l Se	-	0.01	-	0.01	-	0.01
24	Mercury	mg/l Hg	0.0005	0.001	0.0005	0.001	0.0005	0.001
25	Barium	mg/l Ba	-	0.1	-	1	-	1
26	Cyanide	mg/l Cn	-	0.05	-	0.05	-	0.05
27	Sulphates	mg/l SO_4	150	250	150	250 (0)	150	250 (0)
28	Chlorides	mg/l Cl	200	-	200	-	200	-
29	Surfactants (reacting with methyl blue)	mg/l (laurylsulphate)	0.2	-	0.2	-	0.5	-
30	Phosphates	mg/l P_2O_5	0.4	-	0.7	-	0.7	-
31	Phenols (phenol index) paranitraniline 4 aminoantipyrine	mg/l C_6H_5OH	-	0.001	0.001	0.005	0.01	0.1
32	Dissolved or emulsified hydrocarbons (after extraction by petroleum ether)	mg/l	-	0.05	-	0.2	0.5	1
33	Polycyclic aromatic hydrocarbons	mg/l	-	0.0002	-	0.0002	-	0.001
34	Total pesticides (parathion, BHC, dieldrin)	mg/l	-	0.001	-	0.0025	-	0.005
35	Chemical oxygen demand (COD)	mg/l O_2	-	-	-	-	30	-
36	Dissolved oxygen saturation rate	% O_2	> 70	-	> 50	-	> 30	-
37	Biochemical oxygen demand (BOD_5) (at 20°C with nitrification)	mg/l O_2	< 3	-	< 5	-	< 7	-
38	Nitrogen by Kjeldahl method (except NO_3)	mg/l N	1	-	2	-	3	-

Characteristics of Surface Waters Intended for the Abstraction of Drinking Water			Categories					
			A1		A2		A3	
	Parameters		G	I	G	I	G	I
39	Ammonia	mg/l NH_4	0.05	o	1	1.5	2	4 (0)
40	Substances extractable with chloroform	mg/l SEC	0.1	o	0.2	o	0.5	o
41	Total organic carbon	mg/l C	-	o	-	o	-	o
42	Residual organic carbon after flocculation and membrane filtrations (5 μ) TOC	mg/l C	-	o	-	o	-	o
43	Total coliforms 37°C	/100 ml	50	o	5,000	o	50,000	o
44	Faecal coliforms	/100 ml	20	o	2,000	o	20,000	o
45	Faecal streptococci	/100 ml	20	o	1,000	o	10,000	o
46	Salmonella		Not present in 5,000 ml	o	Not present in 1,000 ml	o	-	o

I = mandatory
G = guide
O = exceptional climatic or geographical conditions

26.2.7 EC Shellfish Waters Directive

The Shellfish Waters Directive *on the quality required of shellfish waters* (79/923/EEC) protects shellfish populations (defined as bivalve and gastropod molluscs) from harm caused by pollution. We are responsible for monitoring the quality of designated shellfish waters and reporting the results to DoE who decide whether the standards in the Directive have been met. Where standards are not met, we are responsible for identifying sources of pollution and making sure that improvements are made.

Designated sites in South West Region are in the Fal Estuary (three sites), Portland Harbour and Poole Harbour; there are none in this catchment.

26.2.8 EC Shellfish Hygiene Directive

The EC Shellfish Hygiene Directive *laying down the health conditions for the production and the placing on the market of live bivalve molluscs* (91/492/EC) protects the health of consumers of live bivalve molluscs such as mussels and oysters. This Directive defines standards for shellfish quality required in the end product. It also classifies bivalve mollusc shellfish harvesting areas into four categories according to the concentrations of bacteria found in the shellfish flesh.

The Ministry of Agriculture, Fisheries and Food (MAFF) and the Department of Health (DoH) share responsibility for this Directive in England and Wales. We have only a minor role in implementing this Directive. Although we provide information on the location of discharges that may affect harvesting areas, we cannot control the quality of polluting discharges under this Directive.

26.2.9 EC Groundwater Directive

The EC Groundwater Directive (80/68/EEC) *controls the release of certain substances to groundwater*. There are two lists of substances: List I substances, which should not be released and List II substances, which can only be released in limited amounts. We ensure that the principles of the Groundwater Directive are implemented through our waste management activities and by controlling the discharge of effluents to soakaways. There are no statutory standards for the quality of groundwater, and because of the difficulties in obtaining and interpreting information we have only a limited understanding of groundwater quality. However in drought conditions most of the flow in rivers is derived from groundwater and our river monitoring data indicate that throughout most of the region there are no known major areas of contaminated groundwater.

26.3 The RQO Classification

The water quality targets that we use in all rivers are known as River Quality Objectives (RQOs). RQOs are used for managing water quality and are based on the River Ecosystem (RE) classification scheme (NRA 1994), which replaces the former NWC scheme. We eventually plan to introduce statutory Water Quality Objectives (WQOs) to supersede these River Quality Objectives.

These classes reflect the chemical quality needed by different types of river ecosystem including the types of fishery they can support. We set RQOs based on the need to protect current water quality and future use.

Use Class.	DO % sat 10%ile	BOD (ATU) mg/l 90%ile	Total Ammonia mgN/l 90%ile	Un-ionised Ammonia mgN/l 95%ile	pH 5%ile & 95%ile	Hardness mg/l $CaCO_3$	Dissolved Copper µg/l 95%ile	Total Zinc µg/l 95%ile	Class Description
1	80	2.5	0.25	0.021	6.0 - 9.0	≤10	5	30	Water of very good quality suitable for all fish species
						>10 and ≤50	22	200	
						>50 and ≤100	40	300	
						>100	112	500	
2	70	4.0	0.6	0.021	6.0 - 9.0	≤10	5	30	Water of good quality suitable for all fish species
						>10 and ≤50	22	200	
						>50 and ≤100	40	300	
						>100	112	500	
3	60	6.0	1.3	0.021	6.0 - 9.0	≤10	5	300	Water of fair quality suitable for high class coarse fish populations
						>10 and ≤50	22	700	
						>50 and ≤100	40	1,000	
						>100	112	2,000	
4	50	8.0	2.5		6.0 - 9.0	≤10	5	300	Water of fair quality suitable for coarse fish populations
						>10 and ≤50	22	700	
						>50 and ≤100	40	1,000	
						>100	112	2,000	
5	20	15.0	9.0						Water of poor quality which is likely to limit coarse fish populations

26.3.1 *Set aside* of data

In certain circumstances we can *set aside* data, that is we will not take into account some or all the results for a particular determinand when we assess compliance with an RQO. We have published a manual (NRA 1994) which describes how data may be set aside.

In slower-flowing, nutrient-rich rivers, substantial growth of planktonic algae can occur. During laboratory analysis the algal cells can exert a high BOD. However, these elevated values do not necessarily represent the BOD exerted in rivers, or that resulting directly from effluent discharges. If these results are not discounted when we assess compliance, there is a risk that we will falsely identify a river as being non-compliant, and therefore investment to improve discharges may not be targeted efficiently.

26.3.2 Our RQO targets

The table below details the 49 river reaches in the Stour catchment and the RQO and Long Term RQO targets we have set for them.

River	Stretch	Proposed RQO	Proposed Long Term RQO
Stour	Gasper to confluence with Shreen Water	RE3	RE2
Stour	Confluence with Shreen Water to downstream Gillingham	RE2	
Stour	Downstream Gillingham to confluence with Lodden	RE2	
Stour	Confluence with Lodden to Eccliffe Mill	RE2	
Stour	Eccliffe Mill to Trill Bridge	RE2	
Stour	Trill Bridge to Confluence with Cale	RE2	
Stour	Confluence with Cale to Twinwood Coppice	RE3	RE2*
Stour	Twinwood Coppice to confluence with Manston Brook	RE3	RE2*
Stour	Confluence with Manston Brook to confluence with Fontmell Brook	RE3	RE2*
Stour	Confluence with Fontmell Brook to confluence with Iwerne	RE2	
Stour	Confluence with Iwerne to Durweston	RE2	
Stour	Durweston to confluence with Tarrant	RE2	
Stour	Confluence with Tarrant to confluence with North Winterborne	RE2	
Stour	Confluence with North Winterborne to confluence with River Allen	RE2	
Stour	Confluence with River Allen to upstream of A348	RE2	
Stour	Upstream of A348 to downstream of Longham bifurcation	RE2	
Stour	Downstream Longham bifurcation to Palmersford	RE3	RE2
Stour	Palmersford to Holdenhurst	RE3	RE2
Stour	Holdenhurst to Jumpers Common	RE3	RE2
Stour	Jumpers Common to Iford Bridge	RE3	RE2
Shreen Water	Swainsford fish farm to confluence with Southbrook tributary	RE2	
Shreen Water	Southbrook to confluence with Stour	RE1	
Lodden	Lower Mere Park Farm to confluence with Stour	RE4	RE3
Cale	Wincanton to confluence with Bow Brook (north)	RE3	
Cale	Confluence with Bow Brook (north) to confluence with Stour	RE3	RE2
Lydden	Hazlebury Bryan to confluence at Lydden House	RE2	
Lydden	Cannings Court to confluence at Lydden House	RE3	RE2
Lydden	Confluence at Lydden House to confluence with Caundle Brook	RE3	RE2
Lydden	Confluence with Caundle Brook to confluence with Stour	RE2	
Caundle Brook	Middlemarsh to Bishops Caundle	RE3	RE2
Caundle Brook	Bishops Caundle to confluence with Lydden	RE2	
Cam	Holnest to confluence with Caundle Brook	RE3 (2000)	RE2
Divelish	Kitford to confluence with Stour	RE3	RE2
Manston Brook	Confluence with Stirchell Brook to confluence with Stour	RE3	
Key Brook	Marsh Common to confluence with Stirchell Brook	RE5	RE4
Fontmell Brook	Farrington to confluence with Stour	RE2	
Iwerne	Upstream Iwerne Fish Farm to Ranston	RE2 (2000)	
Iwerne	Ranston to confluence with Stour	RE2	
Tarrant	Tarrant Gunville to confluence with Stour	RE1	
North Winterborne	Winterborne Kingston to confluence with Stour	RE1	
Allen	Monkton up Wimborne to confluence with Gussage Stream	RE2	RE1*
Allen	Confluence with Gussage Stream to downstream Hinton Parva bifurcation	RE1	
Allen	Downstream Hinton Parva bifurcation to confluence with Stour	RE2	RE1
Crane	Squirrels Corner to Romford	RE1 (2000)	
Crane	Romford to upstream of Kings Farm	RE1	
Crane	Upstream Kings Farm to confluence with Mannington Brook	RE2	
Mannington Brook	Mannington to Ameysford	RE2	RE1
Uddens Water	Ameysford to confluence with Crane	RE2	RE1
Moors	Confluence with Crane to confluence with Stour	RE2	RE1

There are four Long Term RQOs shown (*) which we are not sure are achievable as we are currently unable to identify what actions should be carried out to improve water quality. We will be carrying out investigations over the next five years to determine how we can achieve these long term RQOs.

26.4 Annex 1A Reduction Programme

At the second and third North Sea Conferences in 1987 and 1990, the UK Government made a commitment to reduce the load (load = concentration × flow) of certain substances known as Annex 1A substances (below) entering tidal waters from rivers and direct discharges. Loads of most Annex 1A substances were to be reduced by 50%, and loads of mercury, cadmium and lead were to be reduced by 70%, by 1995 compared to a 1985 baseline (or a 1991/1992 baseline where data for 1985 is unavailable).

We are responsible for carrying out monitoring and identifying significant sources of the following substances. We identify significant sources by ranking loads of Annex 1A substances in rivers and direct discharges according to their size. A discharge is significant if it belongs to the group of discharges that contribute the first 95% of the total load entering tidal waters. In accordance with DoE guidelines we identify where reductions can be made.

Mercury	Aldrin	DDT	Fenitrothion
Cadmium	Dieldrin	Pentachlorophenol	Fenthion
Copper	Endrin	Hexachlorobenzene	Malathion
Zinc	Isodrin	Hexachlorobutadiene	Parathion
Lead	HCH	Carbon tetrachloride	Parathion-methyl
Arsenic	Chloroform	Dichlorvos	Trichlorobenzene
Chromium	Endosulphan	Trichloroethylene	1,2-dichloroethane
Nickel	Trifluralin	Tetrachloroethylene	Dioxins (*)
Simazine	1,1,1-trichloroethane	Atrazine	Triorganotin compounds
Azinphos-ethyl	Polychlorinated biphenyls	Azinphos-methyl	

26.5 The GQA Classification

The GQA Scheme is our classification system designed to provide an absolute measure and show trends in water quality over time (NRA 1994); it has replaced the earlier National Water Council (NWC) Scheme for this purpose.

26.5.1 Biological GQA

The GQA Biology sampling programme is carried out every 5 years. Each river stretch to be classified is then assigned the site that most accurately represents its biological status; the system is unsuitable for lakes, reservoirs and canals.

Biology is linked to water quality by biotic indices; we use the Biological Monitoring Working Party (BMWP) score (NRA 1994) for this purpose. Different watercourses, and different sites on the same watercourse, will support different invertebrates because of the differences in their geography, climate, geology, and the habitats that occur. The values of biotic indices derived from different sites will therefore vary, even when their water is of similarly good quality. Biotic indices cannot be used to compare the water quality of different sites, unless the sites are very similar morphologically and geographically. This suggests that it is best to describe biology in terms of a shortfall from that expected under conditions of good water quality.

To overcome the problem as detailed above, the GQA Biological classifications are based on Ecological Quality Indices (EQI), where

$$EQI\ \ No.taxa = \frac{Observed\ number\ of\ scoring\ taxa}{Predicted\ number\ of\ scoring\ taxa}$$

The RIVPACS III computer program was used to predict the composition of the fauna, and hence the values of biotic indices, expected at any site under natural, unpolluted conditions, based on its physical and geographical characteristics. The EQIs of ASPT (Average Score Per Taxon) and number of taxa (N-taxa) are used to classify rivers into bands as shown below, the worst predictor determining the GQA classification.

Biological Class	Class Description	Lower class limits	
		EQI ASPT	EQI N-taxa
a	Very Good	1.00	0.85
b	Good	0.90	0.70
c	Fairly Good	0.77	0.55
d	Fair	0.65	0.45
e	Poor	0.50	0.30
f	Bad	0.00	0.00

An EQI value of 1.00 or more indicates that the biological life in the river is that expected under conditions of un-impacted water quality. Lower scores indicate that the biota may be stressed. The risk of misclassification was calculated on the assumption that the EQI was estimated with the precision of ±20%

Biological classifications are based on data pooled from two seasons' samples and more closely represent best than worst conditions, as they are statements of underlying ecological health of the watercourse. They also respond to a much wider range of environmental influences than do chemical classifications; physical degradation of the habitat can also influence the biological classification. Conversely, the biological classification is based on limits relative to what is expected at each site if conditions were good.

27. GLOSSARY OF TERMS

AGLV	Area of Great Landscape Value
AMP	Asset Management Plan
Anadromous	Fish which live in the sea but enter rivers to breed e.g. salmon
AONB	Area of Outstanding Natural Beauty, designated by the Countryside Commission to conserve and enhance the natural beauty of the landscape, mainly through planning controls
Aquifer	A layer of water-bearing rock
BASIS	British Agrochemical Standards Inspection Scheme
BATNEEC	Best Available Techniques Not Entailing Excessive Cost
BC	Borough Council
BMWP	Biological Monitoring Working Party
BOD	Biochemical Oxygen Demand
BOD (ATU)	Biochemical Oxygen Demand with nitrification suppressed by allylthiourea
BP	British Petroleum
BPEO	Best Practicable Environmental Option
BWHW	Bournemouth & West Hants Water Compaany
Catadromous	Fish which live in freshwater but return to the sea to breed e.g. eels
CCIRG	Climate Change Impact Review Group
CIS	Coastal Interceptor Sewer
CMP	Catchment Management Plan
CSO	Combined Sewer Overflow
Cyprinids	All non-salmonid freshwater fish
DC	District Council
DCC	Dorset County Council
DO	Dissolved Oxygen
DoE	Department of the Environment
DoH	Department of Health
DoT	Department of Transport
EC	European Community
EHO	Environmental Health Officer
Eocene	Geologic time period
EPAQS	Expert Panel of Air Quality Standards
EQI	Ecological Quality Index
EQS	Environmental Quality Standard
ERLOS	Emergency Response Levels of Service
ESA	Environmentally Sensitive Area
EU	European Union
FAS	Flood Alleviation Scheme
Fecund	Greatly productive
GQA	General Quality Assessment
HE	House Equivalents per kilometre

HMIP	Her Majesty's Inspectorate of Pollution, the former regulatory authority for IPC, and now part of the Environment Agency
HMSO	Her Majesty's Stationery Office
HNDA	High Natural Dispersion Area
IFE	Institute of Freshwater Ecology
ITE	Institute of Terrestrial Ecology
IPC	Integrated Pollution Control, a system introduced to control pollution from industrial processes which could cause significant pollution to air, land and water
LAAPC	Local Authority Air Pollution Control
LEAP	Local Environment Agency Plan
LNR	Local Nature Reserve
LSO	Long Sea Outfall
LTA	Long Term Average
MAFF	Ministry of Agriculture, Fisheries and Food
MoD	Ministry of Defence
Neap tide	Tide where there is least difference between high and low water
NNR	National Nature Reserve, a site owned or leased and managed by English Nature and established as a reserve
NO	Nitrogen oxide
NO_2	Nitrogen dioxide
NO_x	Oxides of nitrogen
NRA	National Rivers Authority
NT	National Trust
NWC	National Water Council
OFWAT	Office of Water Services, the government regulatory agency for the water industry
OD	Ordnance Datum
PCB	Poly Chlorinated Biphenols
PPPG	Policy and Practice for the Protection of Groundwater
pSAC	Proposed Special Area for Conservation designated under the EC Habitats Directive
PWS	Public Water Supply
R&D	Research and Development
RAMSAR	Sites identified by UK Government under the Convention on Wetlands of International Importance which was ratified by the UK Government in 1976
RE	River Ecosystem
RIVPACS	River Invertebrate Prediction and Classification System, a computer program developed by IFE which predicts the most likely invertebrate fauna of a river from a selection of simple physical and chemical measurements
RQO	River Quality Objective
SAC	Special Area for Conservation designated under the EC Habitats Directive
Salmonids	Salmon, brown, sea and rainbow trout
SAM	Scheduled Ancient Monument of national importance designated under the Ancient Monuments and Archaeological Areas Act 1979
SMP	Shoreline Management Plan
SNCI	Site of Nature Conservation Interest selected (usually by County Trusts) as sites of

	County ecological importance
SoS	Standards of Service
SPA	Special Protection Areas identified by UK Govemment under the EC Directive on the Conservation of Wild Birds
Spring tide	Tide where there is the greatest difference between high and low water
SPZ	Source Protection Zone
SSO	Short Sea Outfall
SSSI	Site of Special Scientific Interest of national importance designated under the Wildlife and Countryside Act 1981. Habitats, sites for individual species, geology and land forms may be designated
STW	Sewage Treatment Works
Tertiary	Geologic time period
Triassic	Geologic time period
UNECE	United Nations Economic Commission for Europe.
UWWTD	EC Urban Waste Water Treatment Directive
VOC	Volatile Organic Compound
WHO	World Health Organisation
Winterbourne	A stream which only flows seasonally, usually in winter
WRA	Waste Regulatory Authority, now part of the Environment Agency
WSA	Wessex Salmon Association
WWS	Wessex Water Services Ltd

28. UNITS

mm	millimetre	m^3/s	cubic metres per second (cumecs)	ppb	parts per billion
cm	centimetre	m^3/d	cubic metres per day	mg/l	milligrams per litre
m	metre	l/s	litres per second	µg/l	micrograms per litre
km	kilometre	Ml/d	megalitres per day	ng/l	nanograms per litre
km^2	square kilometre	Ml/y	megalitres per year	µg/ m^3	microgram per cubic metre
ha	hectare	Mgd	millions of gallons per day	ml	millilitre

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