local environment agency plan

RIVER TONE

ACTION PLAN

DECEMBER 2000

ENVIRONMENT AGENCY

EA - South West Leaps

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December 2000
Issue 2

ENVIRONMENT AGENCY

River Tone Environment News

Welcome to the second edition of the Environment Agency's newsletter for the River Tone area. If you would like more information on any issues raised in this Newsletter, or more copies, please contact the LEAPs team on 01278 457333.

The River Tone Catchment

The Tone rises in the Brendon Hills and flows for 33 km before joining the River Parrett at Burrowbridge. The catchment also includes the Bridgwater and Taunton canal, Clatworthy Reservoir, the towns of Taunton and Wellington and part of the Somerset Levels and Moors.

The Upper Tone

We have just published our five-year plan for the River Tone. The plan identifies environmental issues in the area and sets out the actions that we plan to take to address them. This newsletter highlights some of the main issues raised during a period of consultation. If you would like a copy of the Action Plan, please contact us on the above number.

Good news for West Country Rivers

The news was announced in September that the quality of rivers in the South West of England is the best in the country. Chemical water quality sampling carried out between 1997-1999 shows a 33% improvement in quality since 1990.

4.2 km of the River Tone has improved from poor to very good quality over the last 10 years. Much of this improvement is down to the work on controlling soil erosion by the Agency and the Somerset Farming and Wildlife Advisory Group, and to improvements to sewage treatment by the water companies. In 1999 only 2 out of the 30 river stretches that we monitor in the Tone catchment significantly failed to meet their water quality targets. A sewage treatment works is affecting one stretch, while the other failure is due to soil erosion problems.

Water quality is vitally important as rivers provide a source for drinking water supplies and industry, support a diverse range of wildlife and provide an important focus for recreation activities including fishing, canoeing, walking and cycling.

For bright ideas of how you can help to protect the environment look out for this symbol in the newsletter.

☆ Flood defence improvement scheme planned for the Tone

Work to make improvements to floodbanks along the River Tone is due to start in 2001, at a cost of around £3.6 million. The scheme involves improving Stanmoor Bank and Baltmoor Wall along the Tone near East Lyng.

Baltmoor Wall will be strengthened using a number of different techniques along its length. The works on Stanmoor Bank will involve strengthening and raising the bank using either steel sheet piling or an earth bank.

Baltmoor Wall protects over 60 properties and Stanmoor Bank protects over 130 homes and farms from flooding, many of which are built along the bank itself and are some of the most vulnerable to flooding on the Somerset Levels.

☆ Agency investigations reveal buried past of Baltmoor Wall

Baltmoor Wall was originally built by the Abbots of Athelney between 1154 and 1375 to reclaim land at North Moor and Saltmoor for farming. This medieval causeway linked East Lyng to the Abbey of Athelney.

The Environment Agency has carried out investigations on Baltmoor Wall revealing some of its earlier history. The medieval bank overlays a thick layer of clay that may represent an earlier bank. Under the clay was a peat deposit over a burnt layer; this may represent either industrial activity or clearance of marsh vegetation for farming. While the earth embankment dates back to medieval times, the stone cladding was added between 1880 and 1883.

☆ Dreaming of a Green Christmas

While of course we wish everyone a Happy Christmas, this year we would like to add Reduce-Reuse-Recycle to our Christmas message.

A lot of waste is produced over the Christmas period – gift wrap, packaging and Christmas trees.

Here are some suggestions to minimise waste over the festive period:

☆ Don't throw away Christmas cards; save them to cut into gift tags for next year.

☆ Keep Christmas decorations and use them again next Christmas.

☆ After parties collect and sort bottles, cans, jars and paper and take them to the nearest recycling centre.

☆ If your Christmas tree has roots plant it in the garden. If it does not survive some local councils have branch shredders.

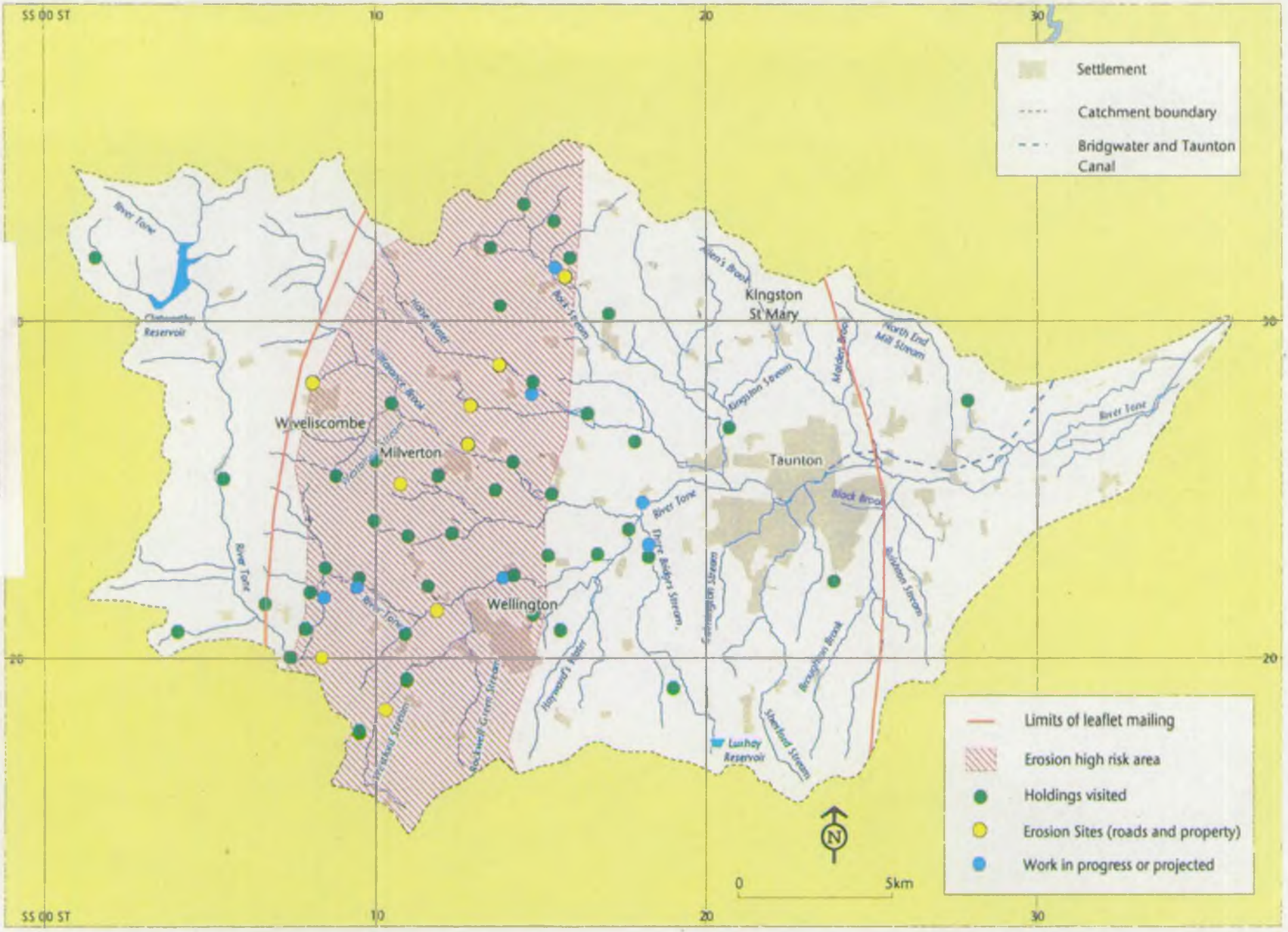
☆ You may be clearing out old toys and clothes after receiving new Christmas presents. Don't throw them away; give them to a charity shop or jumble sale for others to enjoy.

You could also think about buying gifts for family and friends made from recycled materials, using alternatives to wrapping paper such as newspaper or fabric scraps, or making your own decorations - be creative. You could also make a resolution to carry your new recycling habits into the New Year.

☆ Did you know?

It has been estimated that nationally we produce enough waste in one year to fill Lake Windermere.

Map 1 - Farming and Wildlife Advisory Group Collaborative Project with the Environment Agency



River Tone Action Plan

Additional Copies

Further copies of this Action Plan can be obtained from:

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General Enquiries

For general information about the work of the Environment Agency, or information about a specific matter, please contact our Customer Contact Team at the Bridgwater Office on 01278 457333.

The Internet

For general information about the Environment Agency including our national State of the Environment Report please visit our website at:

http://www.environment-agency.gov.uk

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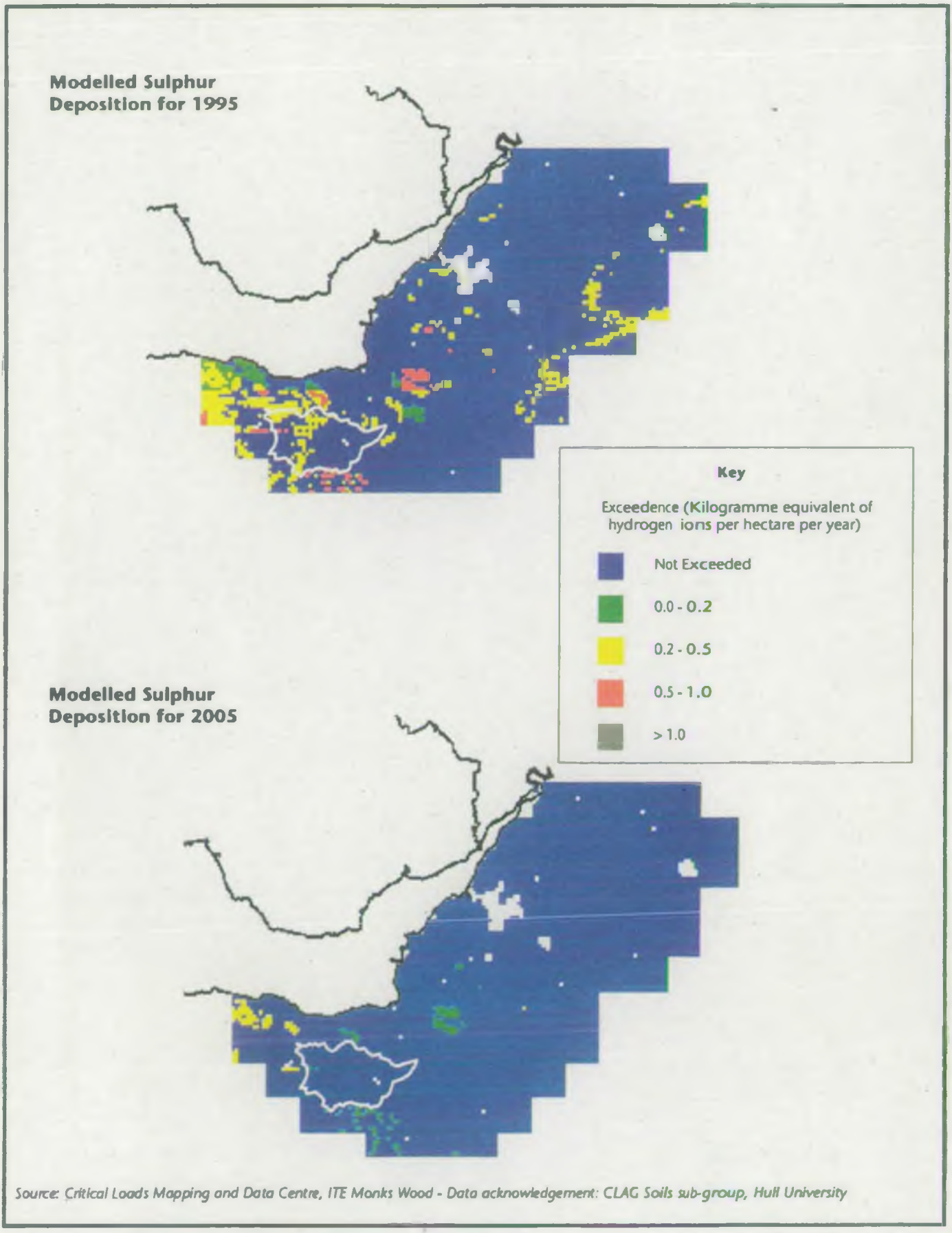
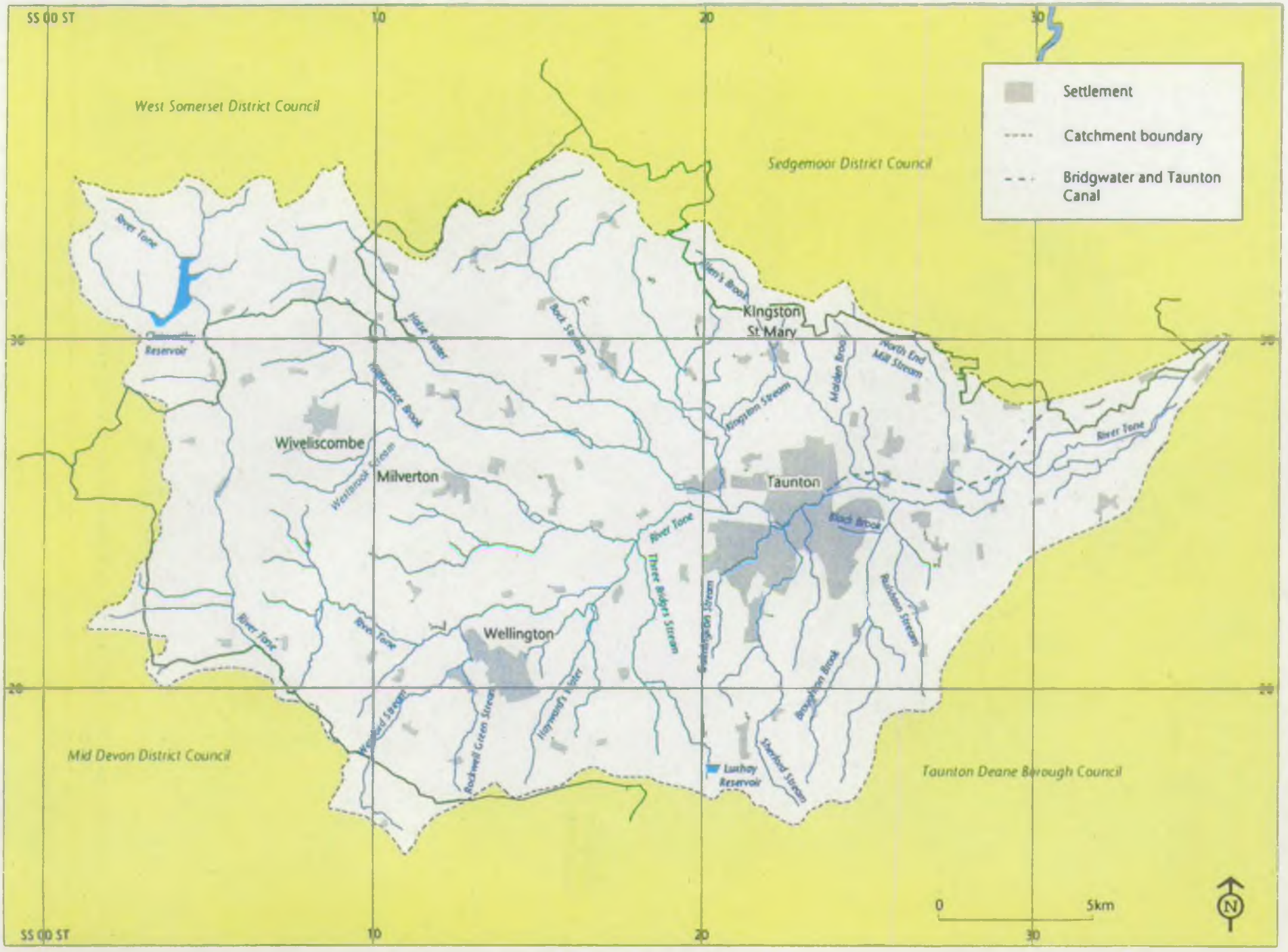
Map 3 - Exceedences of critical loads of acidity for soils



Source: Critical Loads Mapping and Data Centre, ITE Monks Wood - Data acknowledgement: CLAG Soils sub-group, Hull University

Map 2 - The River Tone Catchment



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1. Introduction

1.1. The Environment Agency

The Environment Agency has a wide range of duties and powers relating to different aspects of environmental management. These duties, together with those areas where we have an interest but no powers, are described in more detail in Appendix 5.1. We are required and guided by Government to use these duties and powers in order to help achieve the objective of sustainable development, defined as **development that meets the needs of the present without compromising the ability of future generations to meet their own needs**.

At the heart of sustainable development is the integration of human needs and the environment within which we live. Indeed the creation of the Agency itself was in part a recognition of the need to take a more integrated and longer-term view of environmental management at a national level. We therefore have to reflect this in the way we work and in the decisions we make. The local authorities are the focus for community action to work towards a more sustainable way of life at a local level. This is part of the global Local Agenda 21 initiative that we are committed to support (see Issue 2.26).

Taking a long-term perspective will require us to anticipate risks and encourage precautions, particularly where impacts on the environment may have long-term effects, or when the effects are not reversible. We must also develop our role to educate and inform society as a whole, as well as carrying out our prevention and enforcement activities, in order to ensure continuing protection and enhancement of the environment.

Our vision is:

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

1.2. Environmental Strategy

In September 1997 the Agency published its first national strategy entitled *An Environmental Strategy for the Millennium and Beyond* which set out nine principal and immediate environmental concerns. The Millennium Strategy has recently been under review, resulting in a new Environmental Vision. The new vision retains nine themes, but they are significantly different, reflecting a change in the Agency's approach. The strategy looks at a much longer timeframe (20 years or more) and recognises to a much greater extent the importance of working with others. The Environmental Vision is still being finalised. We will report on the new Environmental Vision in the first Annual Review of the River Tone Action Plan.

1.3. Local Environment Agency Plans (LEAPs)

One of the key outcomes of the United Nations Earth Summit held in Rio de Janeiro in 1992 was agreement by governments that, in order to solve global environmental problems, local action is crucial; we must all therefore **think globally but act locally**. We are committed to a programme of Local Environment Agency Plans (LEAPs) in order to produce our local programme of integrated action for environmental improvement. LEAPs help us to identify, prioritise and solve those local environmental issues within our remit and related to our functions, taking into account the views of our local customers. As a result, LEAPs allow us to deploy our resources for the benefit of the local environment. The LEAP process involves several stages as follows:

LEAP Action Plan Consultation Draft: The publication of the *River Tone LEAP Consultation Draft* in December 1999 was followed by a three-month period of formal consultation. The purpose of this was to enable all interested external organisations and the general public to liaise with the Agency, and reach a consensus about the management of the area.

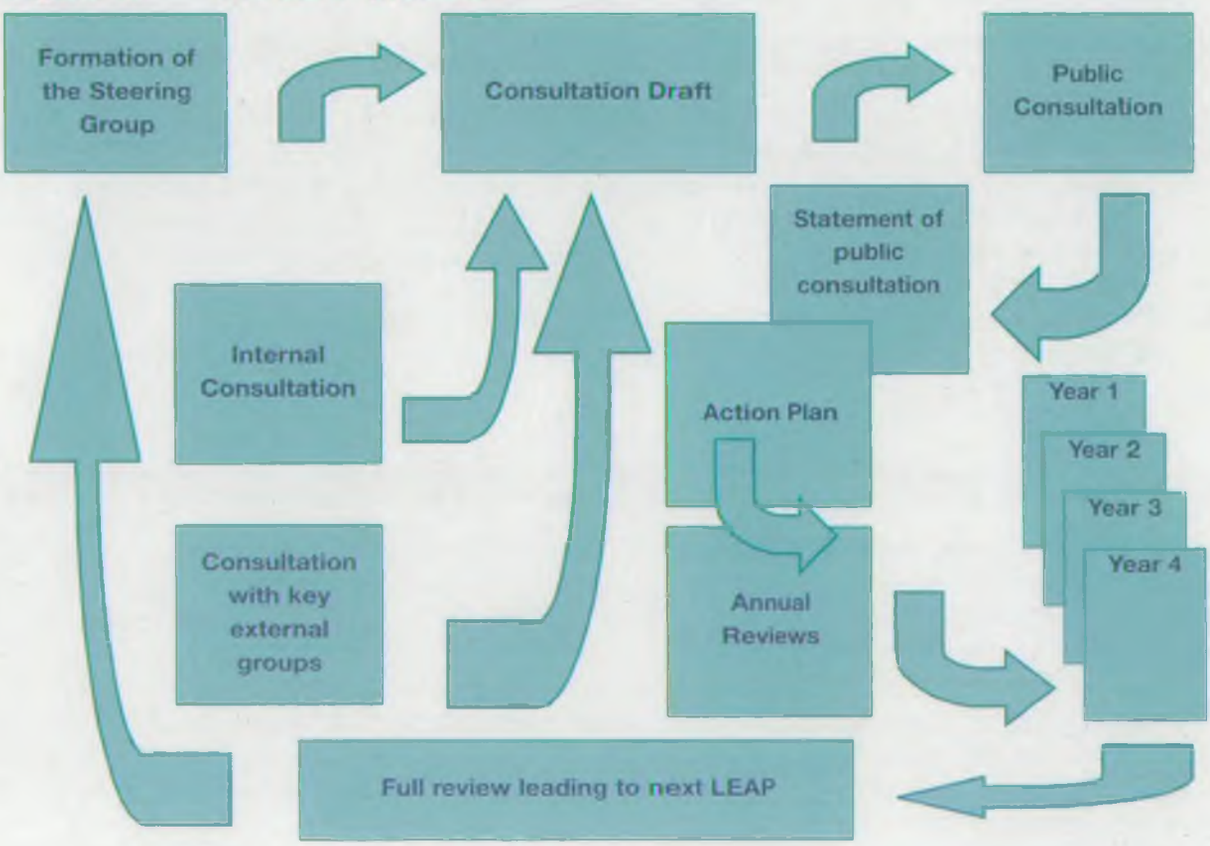
Approximately 400 Consultation Drafts were circulated to those on the national LEAP mailing list, local authorities, parish councils and interested individuals. In addition, we distributed approximately 600 newsletters *The River Tone Environment News* throughout the catchment. We received 30 formal responses, which is approximately 7.5% of the consultees. Of these, 8 were received from members of the public and 22 were received from a wide range of organisations. We have produced a *Summary of Public Consultation for the River Tone LEAP*, available from our Bridgwater Office.

LEAP Action Plan: This LEAP Action Plan takes into account the results of consultation and views expressed. It contains a list of actions that consider costs and benefits, and identifies timescales and partner organisations. These actions will be incorporated into the Agency's annual business plans.

LEAP Annual Review: About 14 months after publication of the Action Plan and then every 12 months thereafter we will publish an Annual Review to report on the progress in carrying out our planned actions, to both our Steering Group and the wider community. This will also be an opportunity to add new issues and actions as they arise.

Many of the actions identified in the National Rivers Authority's *River Tone Catchment Management Plan* have been carried out and some of the original issues have been resolved. Details can be found in the *River Tone Catchment Management Plan Annual Review* (1998). Unresolved issues and incomplete actions are incorporated in this LEAP.

Figure 1: The LEAP process



We invite readers to contact us at any time to raise new issues or suggest new actions; this ensures the LEAP process is a live one, which constantly evolves to meet the changing needs of the local environment.

1.4. Earlier consultation

In April 1999 we wrote to 113 organisations and individuals and invited them to give their views on what should go into the Consultation Draft.

On the 21 May 1999 we held an Issues Forum when invited representatives of our key customers met for a day to discuss the environmental issues in the River Tone area and start the process of working more closely together on their resolution.

Additionally we have set up a River Tone LEAP Steering Group (a voluntary, advisory body) to help us produce this Plan. The membership of individuals and organisations reflects as many interests in the area as possible. A list of members and the interests they represent can be found in Section 3.3. This group met on 10 September 1999 to discuss improvements to the Consultation Draft, and again on 28 September 2000 to finalise the plan.

1.5. The River Tone catchment

The River Tone catchment covers an area of approximately 414 km^2. The river rises in the Exmoor National Park near Raleigh's Cross on the Brendon Hills. The Tone is about 33 km long from its source to the confluence with the River Parrett, and falls approximately 370 metres.

Downstream of its source, the Tone enters Clatworthy Reservoir. From the reservoir, the river runs south towards the village of Greenham. It then does a U-turn, heading north for a short stretch, before turning east. The Tone skirts the northern side of Wellington, then passes Bradford-on-Tone and Norton Fitzwarren, before entering Taunton. From Taunton, the river flows past Creech St. Michael, and becomes tidal at New Bridge Sluice before joining the River Parrett at Burrowbridge.

The Bridgwater and Taunton Canal leaves the River Tone at Firepool Lock in Taunton, and enters Bridgwater at Hamp. Here, a weir allows excess water to run into the tidal River Parrett. Having passed through the outskirts of Bridgwater the canal ends at Bridgwater Docks, which it enters via a lock. The canal has an overall length of 24.5 km.
The Somerset section of the Great Western Canal also lies within the catchment.

The population of the catchment was estimated to be 96,000 in 1995, and is mostly concentrated in Taunton (54,000 in 1991) and Wellington (11,300 in 1991).

The predominant land use in the upper reaches of the Tone catchment is permanent pasture, with woodland (some ancient semi-natural) on the steeper valley sides. As the valley widens in the middle reaches, land use becomes more intensive, with improved and re-seeded grassland, maize cultivation and potatoes (principally in the Hillfarrance sub-catchment) which are regularly irrigated. Sheep and cattle grazing are common, with increasing numbers of horses. In the lower reaches of the Tone, the floodplain is essentially open moorland with improved permanent pasture, re-seeded grassland, withy beds and maize cultivation.

The catchment is characterised by its beautiful and diverse landscape with more than half the total area designated as an Area of Outstanding Natural Beauty (AONB) or Special Landscape Area (SLA). The river corridor itself is a designated Landscape Character Area between Taunton and Wellington, and between Creech St Michael and Burrowbridge, where the river passes through the unique landscape of the Somerset Levels and Moors. The catchment above Clatworthy Reservoir falls in the Exmoor Environmentally Sensitive Area (ESA).

The Tone is an exceptionally varied river in geomorphological terms until it becomes embanked and impounded below Taunton. The river corridor provides a variety of habitats for wildlife including the nationally rare otter and water vole, which are still present in good numbers. It has more kingfishers than any other Somerset river. There is a rich dragonfly fauna, and native white-claw crayfish may still be present in the river.

We monitor 176.5 km of rivers in the Tone catchment. Chemical river quality is measured annually, and biological quality is measured every five years (see Section 4). The next major review of biological quality is taking place this year. In 1998, 84% of monitored river lengths in the catchment were of good or very good chemical quality and 16% were of fairly good quality. In 1995, 98% of the monitored river lengths were of good or very good biological quality (no data are available for the remaining 2% in 1995).

1.6. About this Plan

1.6.1. Our everyday work

We spend over £600 million each year on protecting and improving the environment. Approximately 75% of this is derived from our own charges, principally in the form of licence fees, and the flood defence levy on local authorities which covers part of the cost of our Flood Defence function. The remainder is funded by Government grants; our main sponsor in Government is the Department of the Environment, Transport and the Regions (DETR). The Agency also has links to the Ministry of Agriculture, Fisheries and Food (MAFF) and the National Assembly for Wales. All our charges are reviewed annually and are assessed through consultation. Charge proposals are subject to approval by the Secretary of State, and Regional Flood Defence Committees approve flood defence levies.

The following figures (Figure 2) from the North Wessex Area Business Plan 2000/2001 have been included to give an indication of available resources and expenditure on Agency functions, to provide a context for spending priorities. A large proportion of this is used to undertake work required of us by legislation and regulation, and by the Agency's own requirements which apply nationally. This includes committing substantial resources to everyday monitoring and management of the environment. Remaining resources are used to undertake other environmental works throughout the area on a priority basis, reviewed annually as part of our business planning process.

1.6.2. Costs

Where possible, the costs of actions have been given. Costs are only our **estimates of costs to the Agency.** They do not indicate that this money has been committed. The costs shown are **indicative** only, to give the reader an idea of the relative size and resource implications of each action. All costs are given as thousands of pounds (£k) and include an estimation of staff time.

Figure 2: Area expenditure

Function	Area expenditure
Business Services	£ 1,027,000
Customer Services	£ 368,000
Environment Planning	£ 1,147,000
Environment Protection (North)	£ 978,000
Environment Protection (South)	£ 779,000
Environment Protection (shared budget)	£ 53,000
Flood Defence & Water Resources	£ 5,165,000
Fisheries, Ecology & Recreation	£ 754,000

1.6.3. About the issues

The issues identified in Section 2 of this Plan have arisen despite our considerable statutory work and the work of other organisations. Some issues can be resolved by reprioritising and redirecting our resources within our statutory work programme, sometimes needing the help and co-operation of other bodies. Other issues require action over and above our statutory work and funding; resources for this work are not certain and matched project funding is usually required in these cases.

Some issues require solutions beyond the scope of our existing budgets or technology; they are nevertheless valid issues and earn their place in this Plan in the hope that a solution may be found in the future.

1.6.4. Timescales

The years covered by this Plan are represented by a single date, for example, '2001' represents the financial year April 2001 to March 2002. Although the Plan period is five years, because of the short-term nature of our funding we can often only firmly commit ourselves to action in the current and next financial years. Our priorities, policies and budget may change so changing our action programme. The actions in this Plan will be prioritised together with those from our other LEAP areas and other proposed actions, as part of our Annual Business Plan process. These changes will be reflected at each LEAP Annual Review, together with progress on completing the actions.

1.6.5. Protection through partnership

The Agency often works with others to ensure that the actions in this Plan are implemented, and so each action identifies the partner organisations involved. The Agency also seeks opportunities to establish new links with other organisations that influence or affect the environment. These partnerships are identified throughout the Action Plan and summarised in Section 3.

2. Issues and proposed actions

2.1. Issue: The impact of agriculture and forestry on water quality

Diffuse pollution and nutrient enrichment from agricultural activity and forestry are a problem in the catchment, exacerbated by high rainfall, and changes from dairy farming to arable. Agricultural activity is or may be causing or contributing to non-compliance with the *European Community Freshwater Fish Directive* in the following stretches:

- River Tone: Huish Champflower to Stawley
- Hillfarrance Brook: source to confluence with Tone
- Back Stream: Combe Florey to confluence with Halse Water

Forestry

One source which may be causing or contributing to the failure of the Huish Champflower to Stawley stretch is the clear felling of Middleton Forest. Over the last two years the clear felling of trees has resulted in significant washing out of soil and solids due to vehicle movement and felling activities. The Agency is in discussion with the landowner to construct settlement lagoons and improve drainage. Further investigations are required.

The main hazards from forestry operations in the catchment are associated with chemical spillage and siltation through both accident and poor practice. All work within woodlands should be carried out to the standards given in the *UK Forestry Standard: The Government's Approach to Sustainable Forestry*. The Forestry Commission has also published the *Forests and Water Guidelines,* which gives specific recommendations on forest operations.

Agriculture

Significant sections of the River Tone catchment are prone to major soil erosion problems where inappropriate agricultural practices are pursued. Areas with sandy soils are the most affected, and include Westford Stream, Hillfarrance Brook, Halse Water, Back Stream and the River Tone (Greenham-Taunton). Problems arise where arable fields are left bare in periods of high rainfall. We are particularly concerned about the soil erosion caused by swede and potato cultivation, the increase in arable farming, and especially the increased production of fodder maize. This can have adverse effects on downstream drainage, and on the ecology of the natural river bed deposits.

A particular issue in the South West is the six-fold increase in the growing of maize silage. The use of herbicide on maize can threaten the environment and contaminate drinking water supplies. Also, where there have been heavy applications of manure to the soil in which maize is grown, this can result in direct runoff or long-term build up of nutrients in the soil and their subsequent loss to water. Land used for growing maize is also at risk from erosion because fields are often left bare over winter.

We encourage farmers to follow the Ministry of Agriculture, Fisheries and Food *Code of Good Agricultural Practice for the Protection of Soil*. The Ministry of Agriculture, Fisheries and Food has also produced a series of advisory booklets for the control of soil erosion (see Appendix 5.8 for a list of publications). We have also produced a guide in conjunction with the Maize Growers Association called *Managing Maize: environmental protection with profit*.

The upper Tone and its tributaries such as Hillfarrance Brook, Westbrook Stream and Back Stream are contained in a catchment that has soils at high erosion risk. We have co-funded a partnership with Somerset Farming and Wildlife Advisory Group (FWAG), Somerset Wildlife Trust and others, on a project in the River Tone catchment to promote best environmental practice direct to the farming communities. The project aims to reduce soil erosion, minimise runoff and therefore reduce potential water quality problems.

Farming and Wildlife Advisory Group Collaborative Project

The Somerset Farming and Wildlife Advisory Group approached the Agency to set up a collaborative project to act upon farming and land-owning issues from the *River Tone Catchment Management Plan* that were not being tackled by the Agency itself. The main thrust of the project was to address problems of diffuse pollution from agriculture and to enhance riverside habitat. The decline in dairy and stock farming and increased arable areas on productive, sandy soils has led to a severe soil erosion problem that can block roads and pollute the river and its tributaries.

After 18 months of the project, the Farming and Wildlife Advisory Group has delivered advice to nearly a third of the farmers in the whole catchment, including two-thirds of the farmers in the soil erosion priority zone (see Map 1). Awareness of soil erosion has been heightened amongst the farming community and some have already taken measures to reduce risk of erosion or environmental damage. Buffer zones have been placed in key locations, crop rotations altered and non-inversion tillage introduced. As concerns about soil erosion have increased, Somerset County Council, WS Atkins Highways Management and Taunton Deane Borough Council have got involved in the project. In addition, the project has instigated numerous habitat enhancement works along the main river and its tributaries in partnership with Somerset Wildlife Trust, English Nature, Taunton Fly-fishing Club and Somerset Otter Group.

The aim of the project in the future is to place soil erosion high on the agenda for farm decision making, and propose a programme of measures to reduce erosion for all those farming in high risk areas. Working with the regulatory bodies, the Farming and Wildlife Advisory Group hopes that every farmer will soon be reducing erosion risk. The project will continue to highlight farming operations such as inadequate waste management and disposal, and pesticide spray drift that are causing environmental damage. As riverside and other farmland habitats are closely linked to whole catchment water quality, the project will continue encouraging farmers to enhance these areas. It is proposed to extend the approach taken with the Tone project into neighbouring catchments.

Chelston Stream

Agricultural activities may affect biological quality (see Section 4). Poor biological quality (Class C) has been reported in the Chelston Stream in the past. Investigation has shown that the failures were connected to swede washing operations and persistent problems with irrigating wash-water.

Management has since improved at the site, and Chelston Stream was classified as Class B biological quality in 1995. A permanently grassed field has been established to help improve water quality. There have been few problems following prosecution, although there have been two discharges of wash-water caused by drainage problems. In addition, an unlicensed scrapyard may also contribute to the problem, and further investigations are being undertaken (see Issue 2.21).

Action 2.1.1	
We will investigate potential sources of farm, forestry and other pollution and will work with landowners to control both point and diffuse pollution and give advice on best practice in the two stretches: Huish Champflower to Stawley, and Hillfarrance Brook from source to confluence with the Tone.	
Cost: £2k	**Timescale**: 2000-2001
Action By: Agency, Somerset Farming and Wildlife Advisory Group, Somerset Wildlife Trust, landowners	**Contact**: Team Leader Environment Protection

Action 2.1.2	
We will work with Somerset Farming and Wildlife Advisory Group and Somerset Wildlife Trust on promoting best environmental farming practices.	
Cost: £1k	**Timescale**: 2000-2004
Action By: Agency, Somerset Farming and Wildlife Advisory Group, Somerset Wildlife Trust	**Contact**: Team Leader Environment Protection

Action 2.1.3	
We will investigate potential sources of pollution and advise farmers of best practice to control both point and diffuse pollution in the Back Stream.	
Cost: £0.5k	**Timescale**: 2000-2001
Action By: Agency, Somerset Farming and Wildlife Advisory Group, Somerset Wildlife Trust	**Contact**: Team Leader Environment Protection

Action 2.1.4	
We will monitor the Chelston Stream for the effect on biological quality of recent improvements to discharges from vegetable washing activities and investigate the effect of discharges from scrapyard activities.	
Cost: £0.5k	**Timescale**: 2000-2001
Action By: Agency	**Contact**: Team Leader Biology

2.2. Issue: The impact of nutrient pollution and nutrient enrichment

Eutrophication is the accelerated growth of algae and higher plants such as duckweed, which results from the enrichment of water by plant nutrients, mainly nitrogen and phosphorus. It causes a change in the ecological balance and deterioration in water quality (particularly a reduction of dissolved oxygen). Nutrients enter watercourses from:

- diffuse runoff from farmland of excess organic and inorganic fertilisers
- point sources such as sewage treatment works and some farm discharges

Phosphate pollution

Sewage effluents contain nitrogen from the breakdown of human sewage, and phosphate of which 30-50% comes from detergents and washing powders. Phosphate is the more important nutrient released into freshwater since lack of phosphate is often the limiting factor in plant growth. Up to 30% of phosphate entering freshwater comes from agricultural sources. Conventional sewage treatment removes a limited amount of phosphate.

Phosphate reduction is costly and will only be installed at those sewage treatment works which require nutrient reduction under the *European Community Urban Waste Water Treatment Directive* because they discharge to designated Sensitive Areas (Eutrophic).

Currently there are no watercourses in the Tone catchment designated as Sensitive Area (Eutrophic) under the Urban Waste Water Treatment Directive by the Department of the Environment, Transport and the Regions and therefore no sewage treatment works require phosphate stripping equipment. However, there is growing evidence to suggest that nutrient levels in the Tone are increasingly elevated and that the watercourse may be becoming eutrophic.

We are currently assessing, as part of the review in 2001, whether the Tone from below Wellington Sewage Treatment Works to the Normal Tidal Limit should be proposed as a candidate Sensitive Area (Eutrophic). Should the River Tone from below Wellington sewage treatment works to its Normal Tidal Limit be designated as a Sensitive Area (Eutrophic) then phosphate reduction may be required at Wellington and Taunton (Ham) Sewage Treatment Works. It is likely that the Agency will recommend that this stretch of the Tone be designated as a Sensitive Area (Eutrophic), although the final decision rests with the Department of the Environment, Transport and the Regions. A report is due by the end of November 2000.

Point and diffuse pollution

It may be that the perceived eutrophication of this stretch of the Tone is due to a combination of point and diffuse sources, and that the potential benefits of phosphate removal at Wellington and Taunton (Ham) Sewage Treatment Works may be masked by continuing nutrient inputs from diffuse sources.

Diffuse inputs may vary in magnitude and location within the catchment and may be seasonal or intermittent. They therefore need to be tackled by other means. Nutrient concentrations are also dependent on the amount of flow in the river available for dilution; available flow below Taunton is discussed in Issue 2.22.

We are currently reviewing all consents for Special Protection Areas (SPAs) including the Somerset Levels and Moors as required by the *European Community Habitats Directive* (see Issue 2.7), because of the potential effects of discharges on nutrient enrichment and its impact on the ecology. This review is due for completion in 2004. Actions arising from the review will require subsequent negotiation and prioritisation. We have carried out detailed monitoring of water quality in the rhyne and ditch systems of West Sedgemoor and Curry Moor. Fortnightly sampling started in May 1999 and continued until March 2000. The results have not yet been published, but are available in the Agency's archive.

Nitrate pollution

Nitrate pollution of both surface water and groundwater can reach levels harmful to human health when used for drinking. Water companies monitor public supplies, and we liaise with local authority environmental health officers to monitor private drinking water supplies, to ensure that public health standards are met.

Taunton Deane Borough Council Environmental Health Department raised concerns about elevated nitrate levels in private water supply boreholes. Nitrate levels exceeding the 50 milligrams per litre limit for drinking water (set by the *European Community Nitrates Directive*) have been found in both shallow and deep boreholes in the Otter Sandstone aquifer.

The Directive requires member states to monitor the nitrate concentration of fresh waters (surface and groundwater) and to review the eutrophic state of surface, estuarine and coastal waters to identify those that are or could be affected by agricultural nitrate. The land draining to these must be designated as Nitrate Vulnerable Zones. Currently there are no surface water Nitrate Vulnerable Zones in the Tone catchment. We are currently working with Taunton Deane Borough Council, taking and analysing samples for nitrate levels from 4-6 private water supply boreholes across Taunton Deane. We also designate Source Protection Zones for drinking water sources (see Issue 2.22).

Reducing nutrient inputs

We will work with farmers and other interested groups to reduce inputs of nutrients from farms and farmland by:

- promoting the creation of buffer strips especially where arable land is close to a watercourse. Buffer strips are bands of unfarmed land approximately 10-100m wide immediately next to a river which, because of the vegetation which develops, absorb some of the excess nutrients in the farmland runoff. Financial assistance may be available to landowners from the Countryside Stewardship Scheme administered by the Ministry of Agriculture, Fisheries and Food;

- promoting the Ministry of Agriculture, Fisheries and Food, *Codes of Good Agricultural Practice for the Protection of Water and Soil* (see Issue 2.1);

- influencing and advising those involved in the spreading of waste to land under 'exemptions' from the *Control of Pollution Act 1974*;

- consulting on and implementing our new national Eutrophication Strategy *Aquatic Eutrophication in England and Wales*. The Strategy was published in late 1999 and forms the framework for tackling eutrophication in England and Wales. This framework will provide a useful basis for future planning for the reduction of nutrients in the Tone catchment.

Action 2.2.1	
We will assess, for review in 2001, whether the River Tone from below Wellington Sewage Treatment Works to its Normal Tidal Limit should be proposed as a candidate Sensitive Area (Eutrophic).	
Cost: Unknown	**Timescale**: 2000-2001
Action By: Agency	**Contact**: Senior Scientist Regional Water Quality

Action 2.2.2	
We will work with others to ensure compliance with the Urban Waste Water Treatment Directive: Sensitive Areas (Eutrophic) on the River Tone if designated by the Department of the Environment, Transport and the Regions.	
Cost: Unknown	**Timescale**: 2000-2001
Action By: Agency, Department of the Environment, Transport and the Regions, Wessex Water	**Contact**: Team Leader Biology

Action 2.2.3	
We will continue to assess the ecological impact of excess nutrients on the catchment.	
Cost: Unknown	**Timescale**: 2000-2001
Action By: Agency	**Contact**: Team Leader Biology

Action 2.2.4	
We will continue to assess the nutrient status of the River Tone and those Moors directly fed from it (principally Curry Moor). One year's work has already been completed; sampling has been carried out every 14 days.	
Cost: Unknown	**Timescale**: 2000-2004
Action By: Agency	**Contact**: Team Leader Biology

Action 2.2.5	
We will collect water samples and analyse existing data and consider the need for additional monitoring in the Tone catchment.	
Cost: Unknown	**Timescale**: 2000
Action By: Agency	**Contact**: Team Leader Investigations

Action 2.2.6	
Where necessary we will investigate sources of pollution identified above and draw up a suitable remediation plan.	
Cost: Unknown	**Timescale**: 2000-2001
Action By: Agency	**Contact**: Team Leader Investigations

2.3. Issue: Land use, river rehabilitation, channel and bank-side management

Since the 1940s throughout England, land drainage schemes and intensive farming have drained many wetlands and in places reduced river corridors to a thin strip of bank-side cover. This has reduced habitat diversity and channel shading and increased the amount of pesticide and nutrients reaching rivers. In parts of the Upper Tone catchment this process has been less evident due in part to the topography. In recent years however, the pressures facing livestock and dairy farmers have resulted in the conversion of much former grassland to arable. This change is proving to be particularly problematic where there are easily eroded sandy soils on steep gradients.

Rural land use

We will promote buffer strips where appropriate to reduce the amount of nutrients, silt and livestock waste entering rivers and streams, and to improve habitat diversity and landscape value. In addition we will seek to promote good agricultural practice to prevent problems arising at source. Works are generally financed by owners with top-up funding through grant schemes where possible.

We wish to rehabilitate rivers by restoring river corridors and their functional floodplains to a more natural state, which will improve both their landscape and habitat diversity. We will maintain and restore the biodiversity of rivers and streams in line with the *South West Regional Biodiversity Action Plan*. Rehabilitation will enhance the fisheries, ecology and landscape value of rivers and their corridors and may reduce the need for flood defence maintenance, improve water quality, and improve access to the river corridor.

Urban rivers

Rivers can provide attractive landscapes in our towns but development has often resulted in built-up urban riversides. The Taunton flood defence scheme produced a realigned River Tone downstream of Taunton whilst in the town centre there is a reinforced channel which is not in sympathy with the landscape and its ecology. We will continue to seek enhancement opportunities related to developments and local initiatives in partnership with the local authority, developers and riparian owners.

We will take into account archaeology and the conservation status of buildings and structures, such as those on the Grand Western Canal, when considering proposals for river works. We will also seek to be involved in collaborative projects that improve the habitat, water quality and amenity value of degraded streams, which are non-main river in urban areas.

Our success depends on the goodwill and co-operation of riparian owners and the support of other organisations such as local authorities, Somerset Wildlife Trust, the Countryside Agency, the Farming and Wildlife Advisory Group, the local community and local interest groups.

Large river control structures can be visually intrusive, and act as impassable barriers to fish (see Issue 2.5). These structures can also act as silt traps, slow down flows and promote the growth of algae and aggressive water plants. We will continue our presumption against any further impoundments, whilst still considering any proposals on their individual merits. We would not expect to permit an impoundment without environmental assessment and mitigating works such as a fish pass.

We will also examine options for altering such structures to restore a more natural flow regime and improve habitat diversity. We will continue to advise and work with riparian owners with regards to best practice for the operation of control structures. While we will actively seek opportunities to enhance existing structures, we will not compromise their river control functions.

Action 2.3.1	
We will continue to collaborate in the River Tone Catchment Project (see Issue 2.1).	
Cost: £25k (£12k for 1999, £13k for 2000)	**Timescale**: 1999-2004
Action By: Agency, Farming and Wildlife Advisory Group, Somerset Wildlife Trust, riparian owners	**Contact**: Team Leader Conservation

Action 2.3.2	
We will identify river control structures for the feasibility of redesign.	
Cost: £5k	**Timescale**: 2000
Action By: Agency, riparian owners, British Canoe Union	**Contact**: Team Leader Fisheries

Action 2.3.3	
We will work with local authorities to enhance urban streams.	
Cost: Depends on project	**Timescale**: 2000-2004
Action By: Agency, local authorities, Somerset Wildlife Trust	**Contact**: Team Leader Conservation

2.4. Issue: The siltation of spawning gravels in the Upper Tone

We will maintain, improve and develop fisheries, and regulate fishing. The River Tone above Taunton supports brown trout and some grayling offering fly-fishing to the game angler. In the Bridgwater and Taunton Canal and the Tone downstream of Taunton (where the Environment Agency owns some of the fishing rights), coarse fishing takes place. Stocks of fish are generally good although salmon are rare. Salmon par have been found near Nynehead, where Hornshay Weir presently forms a barrier to upstream migration of adults.

We wish to see a fish pass at the Weir but have no funds to carry out the work (see Issue 2.5). A further constraint on the successful breeding of salmonids is the silting and compaction of spawning gravels between Clatworthy Reservoir and Taunton, particularly between Wellington and Taunton where the soils are easily eroded.

We will encourage improved farming practice to reduce the amount of silt entering the river and its tributaries, and investigate the water release regime at Clatworthy Reservoir to see if scouring flows are possible.

Action 2.4.1	
We will promote the prevention of bank erosion and field runoff by encouraging riparian owners to create buffer strips, fence banks and plant riverside trees beside the River Tone and its tributaries.	
Cost: Unknown	**Timescale**: 2000-2001
Action By: Agency, riparian owners, Farming and Wildlife Advisory Group, National Farmers Union, Ministry of Agriculture, Fisheries and Food	**Contact**: Team Leader Conservation

Action 2.4.2	
We will encourage Ministry of Agriculture, Fisheries and Food and other grant-aiding bodies to target the catchment for Countryside Stewardship and other grant schemes to help reduce siltation of spawning gravels.	
Cost: Unknown	**Timescale**: 2000-2001
Action By: Agency	**Contact**: Team Leader Conservation

Action 2.4.3	
Investigate the water release regime at Clatworthy reservoir to see if scouring flows are possible.	
Cost: £2k	**Timescale**: 2001-2002
Action By: Agency	**Contact**: Team Leader Area Water Resources

2.5. Issue: The need for fish passes at Wellington and Hornshay Weirs

In order to achieve diverse and healthy fish populations in all rivers we need to allow the free passage of fish within the catchment to take place, and so we need to build further fish passes at certain weirs. Fish passes would benefit all species including resident brown trout by extending their range of habitat, and salmon; juveniles have been found below the weir at Hornshay.

At present we do not have the resources to carry this out. However, we will continue to seek funding to enable us to start this work. There may be a possibility of some funding from English Nature using their Biodiversity Action Plan money.

Action 2.5.1	
We will continue to seek funding and opportunities to provide fish passes at impassable weirs causing obstruction to migrating fish.	
Cost: Unknown	**Timescale**: 2000-2004
Action By: Agency	**Contact**: Team Leader Fisheries

2.6. Issue: Maintaining and enhancing biodiversity

Biodiversity, which is the variety of life on earth, is being lost. In the United Kingdom alone over 100 species have been lost this century. However, the local position is more encouraging as both otter and water vole populations are increasing in this area following their serious decline.

Biodiversity Action Plans

The United Kingdom Government signed the Biodiversity Convention at the 1992 Rio Earth Summit, committing the United Kingdom to play its part in halting and reversing the decline in numbers of species and areas of key habitat. The *United Kingdom Biodiversity Action Plan* lists habitats and species that require conservation action through regional and local plans. The *Regional Biodiversity Audit Plan for the South West* was published in 1996 and was followed by *Action for Biodiversity in the South West* in 1997, giving a series of habitat and species plans to guide delivery. Biodiversity is a key indicator of sustainable development.

Over the next five to ten years, we will work with a number of organisations that are formulating and implementing habitat and species action plans at both a regional and local level. The following local Biodiversity Action Plans cover the Tone Catchment:

- Taunton Deane Biodiversity Action Plan (Taunton Deane Borough Council)
- West Somerset Biodiversity Action Plan (West Somerset District Council)
- Sedgemoor Biodiversity Action Plan (Sedgemoor District Council)
- Devon Biodiversity Action Plan (Devon County Council)

In Somerset local Biodiversity Action Plans have been developed at district level, while in Devon the plan covers the county. British Waterways are developing their own local Biodiversity Action Plan for the Bridgwater and Taunton Canal, while organisations like Wessex Water are also producing Biodiversity Action Plans for land they own.

Species and habitats

We are developing National Species Action Plans and have agreed to be the contact point for the chalk rivers habitat and over 40 species of aquatic animals and plants, including otter and water vole, which are known to occur within the catchment. The rare depressed river mussel has recently been recorded in other Somerset catchments and may be present in the Tone. We will take into account the habitat requirements of this species when carrying out our river management functions, although surveys undertaken so far have not identified this species as being present in the catchment. The native crayfish has also been recorded although there have been no recent records, probably due to displacement by the introduced American signal crayfish. We will also continue to work with the Hawk and Owl Trust to identify sites suitable for nest box schemes on Agency-owned land; about 80% of the current breeding population of barn owls can be found in low-lying river valleys.

The Agency has an important partnership role in the conservation of other water-related habitats including fens, grazing marsh, lowland wet grassland, reedbeds, headwater streams and tufa-depositing springs (springs producing calcareous deposits, mainly occurring in limestone areas).

Among the species identified in the Taunton Deane Biodiversity Action Plan are two that are dependent on the aquatic environment; the hairy click beetle and the *Valvata macrostoma* aquatic snail. The Agency will be collaborating with others in the conservation of both species and this may require a change in our river management practices. Work to conserve the hairy click beetle has been jointly funded by the Agency and English Nature's Biodiversity Action Plan fund.

We are committed to maintaining and improving the contribution that rivers and wetlands make to the biodiversity of the catchment. We aim to protect sensitive sites through our control over authorisations for water abstraction, effluent discharge, works on or near main rivers and waste disposal. The Agency is also a partner in the Tone Project (see Issue 2.1). The protection of good habitat and water quality is the Agency's principal contributions to the biodiversity initiative. Appropriate habitat management enables a wide variety of plant and animal species to flourish.

We will give priority to:

- protecting the biodiversity of the most diverse stretches of river and remaining wetland areas
- enhancing biodiversity by improving water and habitat quality through channel improvements and protecting flow regimes (see Issue 2.23)
- restoring and improving degraded rivers and wetlands by working in partnership (see Issue 2.3)

Particular threats to biodiversity in this catchment include:

- invasive alien plants that can dominate river margin vegetation (see Issue 2.8)
- the probable extinction of native crayfish in their traditional habitats
- changing agricultural use; in particular change from beef or dairy to arable, which can result in more silt, nutrients and pesticides reaching watercourses (Issues 2.1 and 2.2)

Elvers

Concern has been expressed that elvers may be unable to enter the network of rhynes within Curry and Hay Moors and Stan and North Moors because former gravity outlets have been sealed. However, the only gravity outlet from the area is still operational but would not be open during the elver run, as this is in winter when there are periods of high tides and large discharges. Under these conditions the level of the River Tone is considerably higher than the winter level in Curry Moor. During winter months the inlets to the Moor are also closed and elvers are most likely to arrive during periods of overtopping. We are producing a National Eel Strategy that is due to be published in 2000, but cannot currently offer a solution to this problem.

Action 2.6.1	
Coastal and floodplain grazing marsh: we will collaborate with English Nature to enhance the Curry and Hay Moor Site of Special Scientific Interest by contributing to a Water Level Management Plan and its implementation.	
Cost: Unknown	**Timescale**: 2000-2004
Action By: Agency, English Nature, Internal Drainage Boards, riparian owners	**Contact**: Team Leader Conservation

Action 2.6.2	
Coastal and floodplain grazing marsh: we will monitor water quality in the Curry and Hay Moor Site of Special Scientific Interest.	
Cost: £1k	**Timescale**: 2000-2004
Action By: Agency	**Contact**: Team Leader Conservation

Action 2.6.3	
Coastal and floodplain grazing Marsh: we will seek opportunities to restore functional floodplains and wetlands in co-operation with riparian owners and the Wildlife Trust.	
Cost: Unknown	**Timescale**: 2000-2004
Action By: Agency, English Nature, riparian owners, Somerset Wildlife Trust, Farming and Wildlife Advisory Group, Internal Drainage Boards	**Contact**: Team Leader Conservation

Action 2.6.4	
Rivers and streams: we will implement the South West Regional Biodiversity Action Plan for Rivers and Streams by working with others to maintain and where appropriate improve quality and biodiversity. English Nature is providing funding using its Biodiversity Action Plan money channelled via Somerset County Council.	
Cost: Unknown	**Timescale**: 2000-2004
Action By: Agency, English Nature, Farming and Wildlife Advisory Group, Somerset Wildlife Trust, riparian owners, local authorities	**Contact**: Team Leader Conservation

Action 2.6.5	
Otter: we will work closely with the Somerset Otter Group to further the understanding of otter ecology in the catchment and to protect features of importance to the species.	
Cost: Unknown	**Timescale**: 2000-2004
Action By: Agency, Somerset Otter Group, Somerset Wildlife Trust, Farming and Wildlife Advisory Group, riparian owners	**Contact**: Team Leader Conservation

Action 2.6.6	
Water vole: we will work with others to further the understanding of water vole ecology in the catchment with particular emphasis on the tidal Tone. We will work to protect features of importance to the species and to ensure that flood defence practices do not compromise water vole habitat.	
Cost: Unknown	**Timescale**: 2000-2004
Action By: Agency, Somerset Wildlife Trust, Farming and Wildlife Advisory Group	**Contact**: Team Leader Conservation

Action 2.6.7	
Depressed river mussel: we will investigate the possibility that this species is present in the catchment.	
Cost: Unknown	**Timescale**: 2000-2004
Action By: Agency	**Contact**: Team Leader Conservation

Action 2.6.8	
Native crayfish: we will continue to be vigilant during our routine surveys for presence of native crayfish particularly in its former known habitat on the River Tone.	
Cost: Unknown	**Timescale**: 2000-2004
Action By: Agency	**Contact**: Team Leader Conservation

Action 2.6.9	
Locally important species (*Valvata macrostomata* snail, hairy click beetle, and black poplar; the Vale of Taunton Deane has 2% of the British population of black poplar): we will work with others to sustain viable populations of these species.	
Cost: Unknown	**Timescale**: 2000-2004
Action By: Agency, Internal Drainage Boards, riparian owners, district councils, Somerset Wildlife Trust	**Contact**: Team Leader Conservation

2.7. Issue: The need for extra protection for key designated nature conservation sites

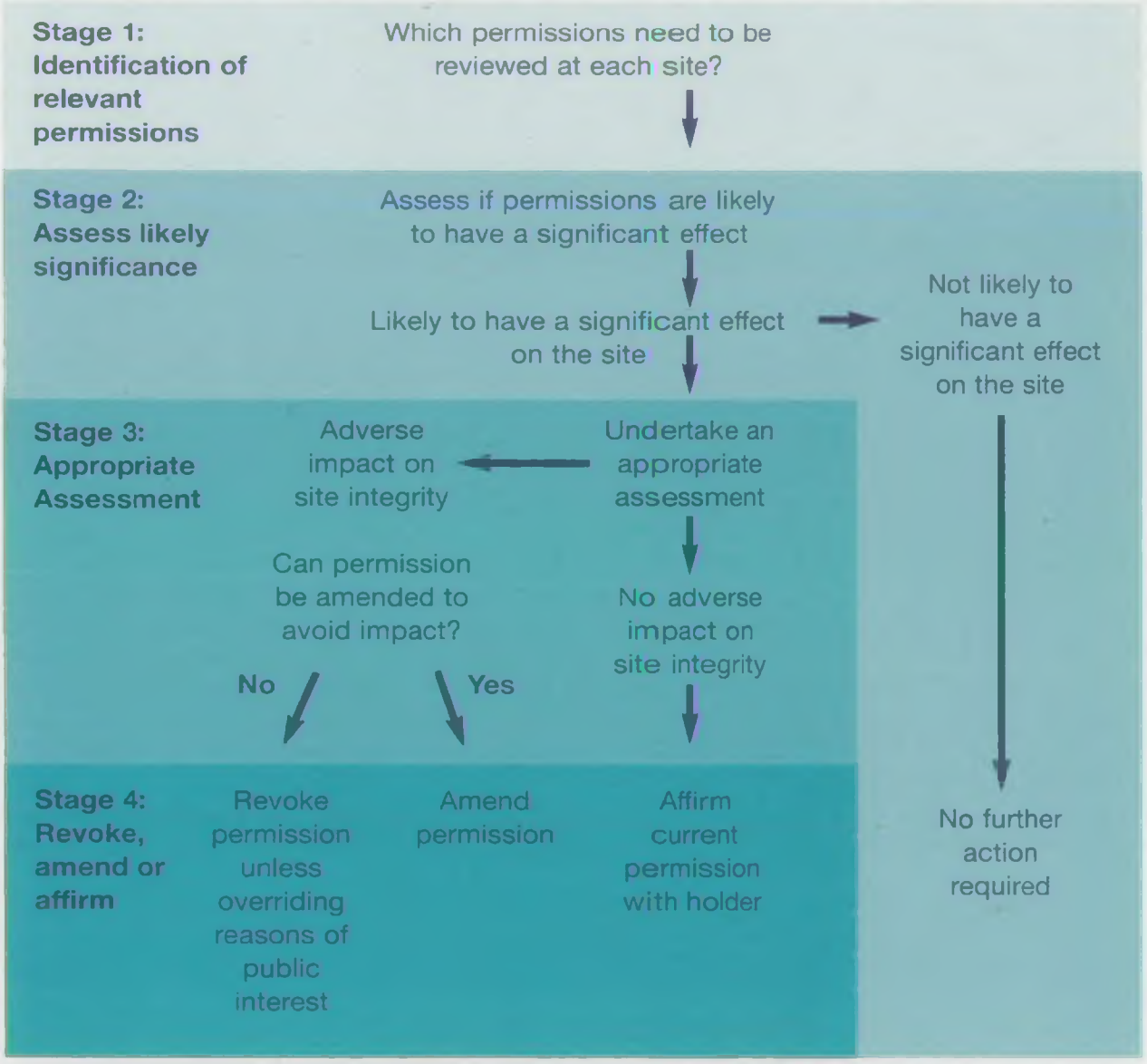
The European Community Birds Directive and the *Habitats and Species Directive* place responsibilities on the Agency in addition to our normal conservation duties. The aim of the legislation is to protect and conserve certain threatened species and habitats throughout Europe. This is to be achieved by the establishment of a network of nature conservation sites that will be known as the Natura 2000 Network. Natura 2000 sites are Special Protection Areas (SPAs) which are designated under the Birds Directive, and Special Areas of Conservation (SACs) which are designated under the Habitats Directive. It is Government policy that RAMSAR wetland sites (sites identified under the Convention on Wetlands of International Importance, which was ratified by the United Kingdom Government in 1976) will also be considered under the Habitats Regulations. The Government has decided that once a site has been submitted to Brussels (i.e. it has become a candidate Special Area of Conservation) the Regulations will apply. There are four sites in the Tone catchment, which will eventually become part of the Natura 2000 network.

Figure 3: Natura 2000 Sites in the Tone catchment

Site	Designation	Qualifying interests
Somerset Levels and Moors	Special Protection Area, Ramsar site	Bewick swan; golden plover; teal; wintering waterfowl numbers in excess of 20,000; the outstanding assemblage of ditch flora & fauna, particularly water beetles
Holme Moor and Clean Moor	Candidate Special Area for Conservation	*Molinia* meadows on chalk and clay (*Eu-Molinion*); calcareous fens with *Cladium mariscus and Carex davalliana*
Hestercombe House	Candidate Special Area for Conservation	Greater horseshoe bat
Quants	Candidate Special Area for Conservation	Marsh fritillary

The Agency, as a competent authority, has extra responsibilities to safeguard these sites. Any applications for new authorisations (consents to discharge, abstraction licences, waste licences) and activities (land drainage or flood defence work), that may have a significant effect on a Natura 2000 site, will be subject to an appropriate assessment of its impact on the conservation interests of the site. Figure 4 summarises the identification and authorisation process under the Regulations.

Figure 4: Summary of the consents process under the European Community Habitats and Birds Directives



We are also obliged to review all existing authorisations and activities that may be affecting the sites. These authorisations can be either inside or outside the site, as those outside the boundary may still have the potential to impact on the site's qualifying interests. The appropriate assessment of the effect of a new or existing activity or authorisation on a Natura 2000 site must take place in the light of conservation objectives that will be supplied by English Nature by the end of March 2001. The authorisation or activity can only be allowed where the assessment has demonstrated that it will not adversely affect the integrity of the site.

Action 2.7.1	
Review all authorisations and actions as required by the Habitats Regulations.	
Cost: £50k	**Timescale**: 2000-2004
Action By: Agency	**Contact**: Team Leader Conservation

2.8. Issue: Invasive plants

Japanese knotweed, giant hogweed and Himalayan balsam were introduced to Britain in the nineteenth century as ornamental plants. These species have become aggressively dominant along road, rail and river corridors where human activities have aided their dispersal. They have become problematic along river corridors where they shade out our native vegetation, increase riverbank erosion following autumn dieback, decrease flood storage capacity and devalue biodiversity. Giant hogweed is also a health hazard. Under the *Wildlife and Countryside Act (1981)* it is an offence to plant or cause Japanese knotweed or giant hogweed to grow in the wild.

Parts of the River Tone and its tributaries now have significant stands of Himalayan balsam. Water is important for its dispersal and therefore this species is strongly associated with riparian habitats and tends to colonise downstream sites rapidly. It has not yet colonised the upper tributaries of this catchment, all of which are of high conservation value. Japanese knotweed does not appear to be a particular problem in the Tone catchment at present. We will continue to monitor this problem and recommend appropriate control measures. Accurate information on the distribution and status of alien species is the key to successful management. We will develop a management strategy by establishing links with other interested parties to tackle the problem of alien invasive species in the catchment. We have produced a leaflet that gives advice to riparian owners on how to control alien invasive plants and we will give further advice if required.

Rape and ragwort are reported to be problems in the lower catchment reaches of the Tone. The landowner is responsible for controlling ragwort; the Ministry of Agriculture, Fisheries and Food can provide advice on the control of noxious species. Floating pennywort is present at the Blackbrook development, and other introduced species including water fern and swamp stonecrop could prove to be issues in the future. The Agency is targeting gardeners with an education campaign regarding these species.

Action 2.8.1	
Extensive River Habitat Surveys planned in this catchment will give a good indication of the distribution of alien invasive plants.	
Cost: Unknown	**Timescale**: 2000-2001
Action By: Agency	**Contact**: Team Leader Conservation

Action 2.8.2	
We will continue to monitor the distribution and status of invasive alien species.	
Cost: £2k p.a.	**Timescale**: 2000-2004
Action By: Agency	**Contact**: Team Leader Conservation

Action 2.8.3	
We will provide appropriate advice to riparian owners on the identification and control of the three alien species through the River Tone Catchment Project.	
Cost: £9k	**Timescale**: 2000-2004
Action By: Agency, Farming and Wildlife Advisory Group, Somerset Wildlife Trust, riparian owners	**Contact**: Team Leader Conservation

Action 2.8.4	
We will set up a management group for Japanese knotweed, to identify management options and control mechanisms.	
Cost: £5k p.a.	**Timescale**: 2000-2004
Action By: Agency, English Nature, local authorities, Somerset Environmental Records Centre, Somerset Wildlife Trust, British Trust for Conservation Volunteers, Forestry Commission, angling clubs	**Contact**: Team Leader Conservation

2.9. Issue: Disease of alder trees

Alder trees are often abundant along watercourses, where they provide valuable cover for wildlife and their roots help to stabilise the bank. In 1993 it was discovered that alder roots can suffer from a fatal disease caused by a fungus of the genus Phytophthora. Affected trees produce few, small, yellow leaves, which often fall off early. The trunk of an infected tree often has tarry rusty spots, indicating that the bark is dead and the tree is dying. Phytophthora is of particular concern in this catchment due to the very large riparian alder population. Although there is not a high incidence of this disease in the catchment there are some reported outbreaks. A wide-scale spread of this disease would have a dramatic effect on the landscape and riparian ecology, decreasing the habitat and cover available for wildlife. Loss of riparian alders would be extremely serious in the upland catchment where high river velocities can cause serious erosion problems.

There is very little information on, and experience of, the management of Phytophthora, since it is a relatively new problem. The Agency and the Forestry Commission have produced a leaflet explaining the disease and giving guidelines for managing infected riparian alders. We will use this leaflet and other means to promote awareness. The Agency and the Forestry Commission would also like to know of new sightings of the disease. We will monitor the distribution and status of the disease, assess its long-term impact and take remedial action when required. This may involve the planting of native trees to replace lost alders to maintain bank stability and provide wildlife habitats. Future management may also involve coppicing of dangerous trees.

Action 2.9.1	
Extensive River Habitat Surveys planned in this catchment will provide an indication of the extent of the disease.	
Cost: Unknown	**Timescale**: 2000-2004
Action By: Agency	**Contact**: Team Leader Conservation

Action 2.9.2	
We will identify management options, once the outcome of research into disease transmission is known.	
Cost: Unknown	**Timescale**: Unknown
Action By: Agency, Forestry Commission	**Contact**: Team Leader Conservation

Action 2.9.3	
We will formulate a management programme for bank-side alders in partnership with others.	
Cost: Unknown	**Timescale**: 2000-2004
Action By: Agency, Forestry Commission, Farming and Wildlife Advisory Group, local authorities, Somerset Wildlife Trust	**Contact**: Team Leader Conservation

Action 2.9.4	
We will undertake remedial action according to the conservation and recreation management programme (see Issue 2.25).	
Cost: Unknown	**Timescale**: 2000-2004
Action By: Agency, Forestry Commission	**Contact**: Team Leader Conservation

2.10. Issue: The investigation of the spined loach on the Maiden Brook

The spined loach is an uncommon fish in the River Tone area and sightings have been reported in the Maiden Brook. The spined loach is listed under the *European Community Species and Habitats Directive* and the Bern Convention. Current records indicate that the species has a localised, fragmented distribution. We will carry out a survey of the brook to find out if it is there, and if so, the extent of its range.

Action 2.10.1	
We will investigate the presence of the spined loach in the Maiden Brook by carrying out a population survey.	
Cost: £1k	**Timescale**: 2000
Action By: Agency	**Contact**: Team Leader Fisheries

2.11. The need for improved flood defence practices in the catchment

Flooding cannot be prevented; it can only be mitigated through protection works. The broad aim of flood defence policy is to reduce risks to people and the environment (developed and natural) from flooding and erosion, through a combination of flood warning, flood and coastal defence and development control. Safeguarding of lives and the protection of urban areas are given greatest priority, followed by the continuation of existing rural flood defence and drainage schemes. New rural flood defence and drainage schemes receive least priority (see Figure 5).

The basic principle of flood defence within the Somerset Levels and Moors is that to protect the urban areas including Taunton, Bridgwater and Langport, excess floodwater from rivers or high tides is stored on the low-lying moors until it can be evacuated without increasing flood risk downstream.

The current situation

Riparian landowners have the responsibility to maintain the watercourses on their land although in practice the situation is rather different. Under the *Land Drainage Act 1991* the more significant rivers are designated as main river and the Act gives the Agency powers to maintain them, and in practice we maintain them using money obtained from a precept on the Council Tax. We are also responsible for a large number of water level management control structures. The current political climate for reducing direct taxation is resulting in downward pressure on our flood defence budgets, which in turn is having an effect on our priorities.

Local authorities have powers to maintain non-main river although in general they only exercise these powers where lack of maintenance is causing a significant flooding problem. The Agency has an overall duty to supervise flood defence matters, and also advise on who is the appropriate person or body to deal with a problem (see Appendix 5.6 for flood defence operating authorities).

Main rivers in the Tone catchment include the River Tone (from the village of Waterrow to its confluence with the Parrett at Burrowbridge), Hay Moor Main Drain and Curry Moor Main Drain on the Levels. The total length of main river in the Tone catchment is 69 km, a very small percentage of the total river length in the catchment.

Levels of flood defence

Levels of flood defence, tidal for the lower catchment and fluvial for the upper catchment, are relatively high. However, increased development will require flood mitigation works so that any risk to third parties from increased surface water disposal can be reduced (see Issue 2.14). Over the years, the Agency's predecessors have constructed flood alleviation schemes to protect Taunton and the villages of Ruishton, Creech St Michael, Ham Lane and Ham downstream. These have been designed to cope with the Ministry of Agriculture, Fisheries and Food Indicative Standards of Protection. The Taunton scheme has been improved and now provides a 1 in 200 year return flood protection whilst the villages downstream fall between 1:20 to 1:50 year flood return. Figure 5 shows our current Standards of Service land-use bands and targets.

Figure 5: Standards of Service

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

We take every opportunity to improve flood defence standards where Treasury rules mean an improvement scheme can be justified. Justification is based on cost-benefit. If a scheme is proposed, and not justified on cost-benefit, it will not go ahead. If a scheme is justified, it might not come high enough on the Ministry of Agriculture, Fisheries and Food priority list for grant aid: The scheme will then require some other funding. Where defences are currently below standard, we try and link funding with development proposals such as the new Tesco Superstore at Tangier and the planned redevelopment at Norton Fitzwarren, or by setting up a partnership for bidding for other funds where there are significant environmental benefits.

Maintenance

A great deal of concern has been expressed from a number of sources about the level of maintenance on the river particularly in the lower reaches. Asset inspections of our flood defences have shown a need for increased maintenance, to ensure they are secure should a flood reach their design limit. We are proposing further annual maintenance of flood alleviation schemes to run alongside the already extensive programme of grass and weed-cutting, together with tree maintenance work every ten years on the upper reaches of the Tone above Taunton. Much work, including dredging and bank repairs, has already been carried out over the last few years downstream from Ham where the river is embanked through the moors. Further significant works are proposed and this is reflected in the actions.

There are however considerable demands on the limited funding available and this, together with our environmental duties, may have a major impact on the timings and extent of the work. Maintenance practices such as dredging and weed-cutting can have a harmful effect on water quality and river life and so must be carefully managed to reduce impacts.

Winter flooding

There has been much concern regarding winter flooding events within the catchment over recent years, especially at Curry Moor and Hillfarrance. A flood alleviation scheme has been proposed for Hillfarrance Brook after 2005. However, the Brook is not defined as main river by the Ministry of Agriculture, Fisheries and Food, who will not accept the designation unless the scheme is already completed to their standards. Because of this, the Somerset Local Flood Defence Committee has not been able to make it a priority in times of limited funding. As the Brook is not defined as main river, it remains the responsibility of Taunton Deane Borough Council.

In recent years there has been a series of extreme flood events on Curry Moor, mostly occurring during the winter months. These were characterised by medium to heavy rainfall at regular intervals over two or three months prior to the start of flooding. This used all of the soil storage capacity so the entire catchment was waterlogged. The rain then entered the River Tone very quickly and, as it was already full from previous prolonged rain, resulted in flooding. The catchment is predominantly impermeable clay with a rapid runoff response to rainfall; once waterlogged, the ground acts in the same way as an urban area with impermeable materials such as roads, footpaths and buildings (see Issue 2.14).

Climate change is likely to mean that this situation will get worse. Under the current Standards of Service and despite the impact on local communities, Curry and Hay Moor cannot justify particularly high standards of protection, especially when resources are limited. However, under the Review of Flood Management Practices, which is also Phase II of the Agency's Review of the Somerset Levels and Moors Water Level Management Strategy, we will be looking to propose radical solutions that would make a real difference, and not small changes in maintenance.

We are looking at options to hold back water on small watercourses as part of a larger review. This is in conjunction with the Town and Country Planning process and the Agency's role as advisor to local planning authorities on flood risk matters.

Review of flood management practices

Over the last decade, the Somerset Levels and Moors has experienced an increased incidence of prolonged, deep flooding. Predictions on the likely effects of climate change suggest the threat of flooding could increase. This is a matter of some concern to those living and working in the area. Over the same period, national and international interest in the conservation importance of the area has grown.

All this has focused the Agency's plan to review Flood Management Practices on the Levels and Moors on producing a high level sustainable strategy that complements an agreed vision for the future of the area. The Steering Group, set up by the Somerset Local Flood Defence Committee to guide the Review, set the following objectives at their first meeting in June 2000:

- To produce a consultation document proposing a number of potential management scenarios aimed at providing a clear strategic direction for flood management practices leading to actions by all operating authorities.
- The scenarios to be supported by a clear representation of the issues, with costs and risks identified.
- To consider other issues providing benefit where changes could be achieved without compensation or new legislation.

The Review will consider a full range of options and will present these options in the context of readily understood scenarios, including the December 1999 flood, in order to show what impact these options might have on the differing interests. The conditions of and risks involved with the existing flood defence infrastructure, e.g. pumping stations or flood banks, will be considered and constraints on adopting favoured options highlighted.

The Parrett Catchment Project takes a new approach and is proposing a major public conference in early 2001, following a technical seminar autumn 2000. The initial technical outputs of the Review will have been made available to the technical seminar, and draft results for consultation will be presented to the conference in 2001. The final document will be available in April 2001.

Action 2.11.1	
We will complete the Asset Survey and carry out annual risk-based inspection of flood defences for input to the Flood Defence Management System.	
Cost: £10 p.a.	**Timescale**: 2000-2003
Action By: Agency	**Contact**: Team Leader Flood Defence Strategic Planning

Action 2.11.2	
We will use the Flood Defence Management System and other manuals and guidance notes to justify priorities and implement maintenance works within the catchment.	
Cost: Unknown	**Timescale**: 2000-2003
Action By: Agency	**Contact**: Team Leader Flood Defence Operations

Action 2.11.3	
We will develop the computer model for the Parrett and Tone system and use it to investigate modifications to the operational and maintenance procedures.	
Cost: £5k	**Timescale**: 2000-2001
Action By: Agency	**Contact**: Team Leader Flood Defence Operations

Action 2.11.4	
We will carry out capital improvements to the Stanmoor Bank to safeguard its structural stability.	
Cost: £0.8k (2002), £1.5k (2003)	**Timescale**: 2002-2003
Action By: Agency	**Contact**: Team Leader Flood Defence Improvements

Action 2.11.5	
We will return Hook Bridge Spillway to design level after we have completed Stanmoor Bank subject to review of flood defence practices.	
Cost: Unknown	**Timescale**: 2003
Action By: Agency	**Contact**: Team Leader Flood Defence Improvements

Action 2.11.6	
We will carry out capital improvements to Baltmoor Wall, which is now classified as a dam under the Reservoirs Act.	
Cost: £1450k	**Timescale**: 2000-2001
Action By: Agency	**Contact**: Team Leader Flood Defence Improvements

Action 2.11.7	
We will undertake a review of flood defence staffing and field inspection practices within the catchment.	
Cost: Unknown	**Timescale**: 2000-2001
Action By: Agency	**Contact**: Team Leader Flood Defence Improvements

Action 2.11.8	
We will endeavour to implement the flood alleviation scheme for the Hillfarrance Brook and then designate the Brook as a main river.	
Cost: £400k	**Timescale**: 2005-2006
Action By: Agency	**Contact**: Team Leader Flood Defence Improvements

Action 2.11.9	
We will produce a consultation document under the Review of Flood Management Practices to obtain a consensus proposal to present to the Ministry of Agriculture, Fisheries and Food.	
Cost: £443k	**Timescale**: 2000-2001
Action By: Agency	**Contact**: Team Leader Flood Defence Strategic Planning

2.12. Issue: Flood warning and Major Incident Plans

Absolute flood protection is not possible and so effective warnings are essential, especially where a flood defence scheme cannot be justified (see Figure 5). We issue warnings through the media, the Agency's Floodline telephone service, and directly to people in some areas by telephone, fax or pager, or by local flood wardens or sirens.

During 1998 much of England and Wales were seriously hit by floods, both at Easter and again in October. An independent report was commissioned to look at how we dealt with these floods; the result was the Bye Report, published on 1 October 1998. In response we published our own Easter Floods Action Plan. Findings from both these reports and consultation with the Government set new priorities to ensure the delivery of an improved Flood Warning Service:

A seamless and integrated service of flood forecasting, warning and response

One of the key developments resulting from the review of flood warning is the implementation of a new flood warning code system. The colour-based flood warning code system (yellow, amber, and red) has been replaced with a staged approach since September 2000. Under the new system there are four stages of warning:

- **All-clear:** No flood watches or warnings currently in force in the area; flood water levels receding; check all is safe to return; seek advice.
- **Flood watch:** Flooding is possible; be aware; be prepared; watch out.
- **Flood warning:** Flooding of homes, businesses and main roads is expected; act now.
- **Severe flood warning:** Severe flooding is expected; imminent danger to life and property; act now.

There are up to 100,000 properties at risk of flooding in the South West alone. Climate change threatens to increase the risk of flooding, and development in flood-prone areas may compound the problem (see Issue 2.14). In September we mailed 843,000 homes and businesses in flood risk areas throughout England and Wales as part of Flood Action Week. The package sent out included a flood plan checklist of actions people can take to protect themselves and their property, and an emergency card containing information about the new flood warning codes. Simple actions include taking out adequate insurance, protecting vital documents, and clearly marking gas and electricity switches ready to turn them off if necessary.

Floodline 0845 988 1188 was also introduced in October 1999, and is an integral part of the new system. The service gives details 24 hours a day of flood warnings in force, and advisors can give callers advice to protect homes and property. Floodline has already received over 90,000 calls. The service now also offers a callback facility. We aim whenever possible to give at least a two-hour warning, based on weather information and our own telemetry readings. The flood warning service is based on the principle that the better prepared people are, the better they will cope with the effects of flooding.

A further aspect of the Agency's Flood Warning Dissemination Project is the production of Major Incident Plans for urban areas protected by flood defences, in conjunction with local authorities and emergency services. The plans are funded by the Agency, but owned by the local authority. The Agency has already contributed to the Major Incident Plan for Taunton, which is now in place.

Action 2.12.1	
As part of the Regional study we will implement the Easter Floods Action Plan and review Flood Warning and decide priorities for improvement in the River Tone area.	
Cost: £1 million p.a. for the South West Region	**Timescale**: 2000-2004
Action By: Agency	**Contact**: Team Leader Flood Warning

2.13. Issue: A sustainable approach to investment in Somerset's flood defence

The area covered by Somerset is largely rural with a relatively low population. Approximately one fifth of the area is low-lying with high flood risk both from a fluvial and coastal flood defence point of view. Recently, the frequency of extreme weather conditions has increased resulting in severe floods with a significant impact on local communities.

The ability of the area-operating authorities to raise money is mismatched against the flood defence needs of the area, and if climate change predictions are realised, this situation can only get worse. The designation of large areas of the county as being internationally important wildlife sites (see Issue 2.7) has also increased the cost of maintaining and improving flood defence.

It is therefore necessary to highlight to the Ministry of Agriculture, Fisheries and Food that the operating authorities in Somerset cannot sustain the burden of demand on their resources alone. The Agency proposes to combine with the other operating authorities (listed in Appendix 5.6) to produce a long-term strategy for the area, for discussion with the Ministry of Agriculture, Fisheries and Food.

Action 2.13.1	
We will combine with the other operating authorities to highlight Somerset's funding shortfall to the Ministry of Agriculture, Fisheries and Food.	
Cost: Unknown	**Timescale**: 2000-2001
Action By: Agency and other operating authorities	**Contact**: Team Leader Flood Defence Strategic Planning

2.14. Issue: The impact of new development on drainage, flooding and water resources

In accordance with the former Department of the Environment *Circular 30/92 Development and Flood Risk*, we advise planning authorities on flood defence matters. We also issue consents and byelaw approvals for certain works, which are likely to affect the flow of water or impede any drainage work.

The Agency's role

Although we can control some of the things which influence the quality of the environment or affect flood risk we have very little direct control over the way that land is developed. This is the responsibility of local planning authorities. Local planning authorities prepare statutory development plans. The policies in these plans will guide the way that land is developed in the future. The Agency's role is to ensure that new development is not in itself at risk from flooding and does not increase third-party flood risk. This is achieved through our role as advisors to the local planning authority; the Agency advises, the local planning authority decides.

As a statutory consultee to Development Plans, the Agency advises the following local planning authorities in the River Tone area on the impact of development on flooding and drainage:

- Taunton Deane Borough Council
- Somerset County Council
- Sedgemoor District Council
- Mid Devon District Council
- West Somerset District Council

We have produced a document 'Environmental Planning Issues in the North Wessex Area' which details local issues of interest to planning authorities. We also publish guidance for local planning authorities to encourage them to adopt policies that protect the water environment from the harmful effects of development and where possible enhance it. Where we can, we will reinforce these policies when making our own decisions, and when we comment on planning matters.

We also advise planning authorities on planning matters relating to industrial processes, waste management and the storage, use and disposal of radioactive material, and are working closely with Somerset County Council on the strategic environmental appraisal of their Minerals Local Plan.

We seek the earliest opportunity to discuss development proposals with the developer and the local authority to ensure environmental protection and maximum sustainability. We review and comment to the planning authority on all planning applications, which may have environmental implications. Comments include recommending that planning permission will not be granted unless certain conditions to protect the environment are attached.

In some cases we formally object to a planning application either conditionally or outright. In determination, a number of policy matters are taken into consideration with decision-making being guided by Development Plans (structure and local), Government advice in Planning Policy Guidance Notes (PPGs) and circulars. Local authority policy documents add further guidance. Nationally we are conducting an audit of the take-up of our requirements.

Floodplain mapping

We have supplied detailed indicative floodplain maps (Section 105 maps) to the local authority to assist in their work of steering development away from floodplains, for land-use planning within Local Development Plans. 'Level A' plans cover main river lengths. These were delivered to the Local Planning Authority in 1997. The standard we use is a flood that has a statistical probability of happening once in 200 years for the coastal / tidal situation and once in 100 years for rivers.

The Local Plan for Taunton Deane covers the majority of the Tone Catchment. Taunton Deane Borough Council included Section 105 maps on their Local Plan Deposit maps. This is most helpful as it not only informs the reader of the plan on this matter but also demonstrates to other local planning authorities that it can be practically achieved without overburdening maps. To date, West Somerset who also placed their Local Plan on Deposit last year have not included the Section 105 maps. This has resulted in objections from the Agency on a number of settlements. Continuing discussion will, it is hoped, lead to inclusion of the Section 105 floodplain data on the adopted plan's maps. Sedgemoor District Council has also included the Section 105 data on their maps. The Deposit Plan has now been issued and the Agency is pleased to note that the Plan also includes data on Groundwater Source Protection Zones (see Issue 2.22).

Section 105 'Level B' maps are more detailed flood risk maps. The Level B studies consist of hydrological modelling of the existing catchment and hydraulic modelling of those sections of the watercourse which may be affected (either directly through existing flood risk to the site itself, or by upstream discharges of surface water from new development). The results of these studies became available towards the end of 1997. Level B maps have already been provided for Taunton Deane Borough Council and it is anticipated that, subject to funding, all local planning authorities will be provided with detailed flood risk maps for consideration in the current land-use planning round.

Drainage

The increase in volume and speed of runoff from paved areas (roads, car parks and pavements) is of concern to us. To minimise this effect, we recommend the use of Best Management Practices (BMPs) or Sustainable Urban Drainage (SUDs). This can include techniques such as swales (a much improved 'ditch', with a very broad base and gently sloping sides often grass covered, which aids the settlement of pollutants), reedbeds, wetlands, flow attenuation ponds and permeable paving. We encourage developers to enhance the ecological and wildlife value of their site as part of this work. Detention reservoirs and attenuation ponds can be incapacitated by high siltation rates, therefore advice should be sought before installation.

For further guidance see our recently revised Scottish Environment Protection Agency / Environment Agency leaflet or video *Nature's Way*.

Development and water resources

The availability of water resources is an increasingly important issue across England and Wales. Whilst the Government has said that it does not expect water resources to be a reason for development proposals being rejected, the provision of adequate water supplies could have an influence on the timing of developments. We comment on all county and district plans, and any individual planning applications that will have a significant water use, with respect to water resources and indeed water efficiency; as all new homes are now metered water efficiency can reduce customers' bills.

However, we can only comment on water resources in general as the specifics depend on which sources the relevant Water Company would plan to use to supply the development. In the light of this, we would wish to see water companies added to the list of statutory consultees that deal with planning applications. See also Issue 2.22: Securing future public water supplies.

Taunton Deane Local Plan Deposit Draft

The *Local Plan Deposit Draft* was placed on deposit in April 1998 and allocated land at Norton Fitzwarren as a major housing development site. Following the closure of the cider factory, the Development Guide for Norton Fitzwarren (originally published in 1993) was revised as a Draft for consultation; consultation on this document ended in November 1999.

The Environment Agency and its predecessors have provided advice to Taunton Deane Borough Council on flood risk issues on this potential development area since 1993. Over that time the Agency has consistently advised that the site is at flood risk, and that if development were to progress then on-site and off-site flood alleviation measures would be required. Current discussions between the Local Planning Authority, developers and the Agency have centred around the provision of a strategic off-site flood attenuation facility on the Halse Water. The proposed attenuation pond would come under the Reservoirs Act. Taunton Deane Borough Council have agreed to the principle of tributary attenuation; funding must come from Government or the developer.

This will provide a holistic solution to both the development site and further down the catchment. The advantages of such a scheme are as follows:

- Existing built areas of Norton Fitzwarren currently at flood risk from the Halse Water will be protected up to the 200 year standard (this standard is required by Taunton Deane Borough Council).
- All new development will be protected to the 200 year standard.
- Pressures on the Somerset Levels and Moors would be relieved by retaining upland floodwaters near the development, rather than adding to flooding on the Levels and Moors.
- It is anticipated that the majority of the costs in providing these works will be generated by the new development rather than by a charge on the public purse.

A similar strategy has been adopted elsewhere within Taunton for any new development discharging to a watercourse flood-locked by the River Tone, e.g. Tesco's at Tangier (Galmington Stream). These strategies will also improve water quality by reducing the silt load to the River Tone from upland catchments.

Land used for the strategic attenuating of floodwaters will continue in its current use for 99% of the time.

Action 2.14.1	
We will produce hydraulic models for identifying definitive floodplains for some local authority identified reaches for 1999/2000.	
Cost: Complete	**Timescale**: 1999-2000
Action By: Agency	**Contact**: Team Leader Development Control

Action 2.14.2	
We will liaise with planning and highway authorities, consultants and contractors to ensure protection for the water environment before, during and after construction of developments.	
Cost: £25k	**Timescale**: 2000-2004
Action By: Agency, local authorities, Highways Agency	**Contact**: Team Leader Development Control

Action 2.14.3	
We will liaise with the local planning authorities to ensure that appropriate policies, to protect the environment, are included in their Development Plans.	
Cost: £50k	**Timescale**: 2000-2004
Action By: Agency, local authorities	**Contact**: Team Leader Planning Liaison

2.15. Issue: Somerset Levels and Moors Water Level Management Strategy

The Agency is a member of the Somerset Levels and Moors Partnership (LAMP), whose overall strategy and wider vision for the Levels and Moors is:

A thriving wetland landscape valued by its communities and others, able, through a vibrant local economy, to protect and enhance its special features through wise use

A Somerset Levels and Moors Strategy was published by the National Rivers Authority in 1991. The Agency has since reviewed the Strategy and carried out a programme of consultation, which has resulted in the *Somerset Levels and Moors Water Level Management Action Plan*, published September 1999. The Agency's Review of Flood Management Practices is also Phase II of the Review of the Somerset Levels and Moors Water Level Management Strategy (see Issue 2.11). The Action Plan will involve actions and costs by other partner organisations and individuals (see Action 2.15.1), and addresses the following issues:

- achieving Raised Water Level Areas and wetland restoration
- land use of areas providing floodplain storage
- Water Level Management Plans
- arable farming in peatland
- poor water quality in ditches
- the withy industry
- North Somerset Moors
- shortages of water
- flooding and flood defence expenditure
- priorities of Agency's statutory requirements
- Biodiversity Action Plans
- Strategic Plans
- elver fishing
- climate change
- public access

Action 2.15.1	
We will implement actions agreed in the Somerset Levels and Moors Water Level Management Strategy Action Plan (September 1999).	
Cost: Total costs for the whole of the Levels and Moors: £524k for 1999, £298k for 2000, £287k for 2001, £269k for 2002 and £95k for 2003	**Timescale**: 1999-2003
Action By: Agency, English Nature, Somerset County Council, Farming and Rural Conservation Agency, Royal Society for the Protection of Birds, National Farmers Union, Country Landowners Association, Association of Drainage Authorities, Internal Drainage Boards, English Heritage, Levels and Moors Partnership.	**Contact**: Somerset Levels and Moors Project Officer

Action 2.15.2	
We will carry out a Review of the Agency's Flood Defence Practices on the Somerset Levels and Moors.	
Cost: Total costs for the whole of the Levels and Moors: £40k for 1999, £80k for 2000 and £15k for 2001	**Timescale**: 1999-2001
Action By: Agency	**Contact**: Somerset Levels and Moors Project Officer

For further information, a copy of the *Somerset Levels and Moors Water Level Management Action Plan* is available from our Bridgwater Office.

2.16. Issue: The impact of energy and fossil fuel use on climate

The climate has always changed, but the rate of change appears to be increasing in recent years. There is a broad consensus of scientific opinion that such changes are occurring because of the impact of human activities on the global atmosphere. Emissions of a range of gases, particularly carbon dioxide and methane, are adding to the greenhouse effect which contributes to global warming. Estimated emissions of carbon dioxide nationally, from large industrial processes and other sources in the UK, reached 155 million tonnes in 1990. The Kyoto Agreement made in 1997 legally binds industrialised countries to reduce six main greenhouse gases (including carbon dioxide) overall to 5.2% below 1990 levels over the period 2008 to 2012. The United Kingdom agreed to a target of 12.5%. The present Government is committed to reducing carbon dioxide emissions by 20% on 1990 levels by 2010. We are continuing to authorise and regulate emissions to air from industrial processes within the catchment (see Appendix 5.4). We have been aiming to decrease our own emissions through a reduction in business mileage and a reduction in energy consumption within our offices, achieving a 23% reduction in electricity consumption. We will continue to set targets to improve our own environmental performance using initiatives such as videoconferencing to reduce business mileage (see Appendix 5.5).

Fossil fuel burning directly for heat, light and transport produces greenhouse gases, mainly carbon dioxide and sulphur dioxide. Carbon dioxide and methane are also the main contributors to landfill gas (see Issue 2.18). In accordance with our aim of contributing to the attainment of sustainable development we need to promote the use of sustainable energy sources such as hydropower schemes, and strongly support the Government's targets for the use of renewable energy. However, any scheme utilising renewable energy sources will be subject to the same regulatory requirements as other schemes. We also promote the reduction of energy and fossil fuel use in industry and commerce. Under the *Home Energy Conservation Act* councils also have a duty to promote increased energy efficiency in all domestic properties. The Agency will:

- promote the efficient use of energy in industry
- seek reductions in direct heat output from local industry and commerce
- seek reductions in the production of greenhouse gases such as carbon dioxide and methane through our regulation of landfills and complex industrial processes
- promote fuel-efficient, integrated transport (see Issue 2.17)
- set targets for our own energy consumption and report on our progress

Action 2.16.1	
Reduce energy (electricity) consumption in our offices and depots by 20% compared to Energy Efficiency Office typical, or 1991/1992 consumption whichever is lower.	
Cost: Unknown	**Timescale**: 2000-2004
Action By: Agency	**Contact**: Area Business Services Manager

Action 2.16.2	
Reduce business mileage in the North Wessex Area by 5% and improve our overall fuel efficiency by 3 mpg on our 1996/1997 figures.	
Cost: Unknown	**Timescale**: 2000-2004
Action By: Agency	**Contact**: Area Business Services Manager

Action 2.16.3	
We will seek reductions in energy use and greenhouse gas production as part of our regulation of major industry.	
Cost: Unknown	**Timescale**: 2000-2004
Action By: Agency	**Contact**: Area Environment Planning Manager

Action 2.16.4	
We will promote the efficient use of energy in industry and agriculture as part of our regulatory activities.	
Cost: Unknown	**Timescale**: 2000-2004
Action By: Agency	**Contact**: Area Environment Planning Manager

2.17. Issue: Air pollution

The Agency and local authorities are both responsible for aspects of air quality monitoring and management. *The Environment Act 1995* placed obligations on local authorities to carry out air quality reviews. In January 2000 the Government published its *National Air Quality Strategy*, to replace that of the former administration in 1997, including:

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

Where standards are not likely to be met by 2005 local authorities will have to designate problem areas as Local Air Quality Management Areas and draw up action plans to improve air quality.

We will be working closely with local authorities to help achieve the objectives of the National Air Quality Strategy, principally through our regulation of emissions to air from major industrial processes under Integrated Pollution Prevention and Control (IPPC). Local authorities are responsible for the regulation of smaller, less complex industrial processes and for reducing traffic pollution (see Appendix 5.4).

First Stage Air Quality Review

The majority of the Tone catchment area falls within the areas administered by Taunton Deane Borough Council and West Somerset District Council. These authorities have conducted and published the *First Stage Air Quality Review and Assessment Report* as required by the Government Air Quality Regulations. This has been carried out by a steering group consisting of members from Mendip District Council, South Somerset District Council, Taunton Deane Borough Council, West Somerset District Council and Somerset County Council.

The Agency has been consulted on this review and assessment and has commented on it to the steering group. In general the report does not show or anticipate serious or repeated exceedences of air quality standards, except for transport-related pollution where there are high traffic flows and congestion, such as on the M5 motorway and in and around Taunton.

Further review and assessment of air quality was recommended for four pollutants: sulphur dioxide, nitrogen dioxide, carbon monoxide and particulate matter (PM_{10}) in the Taunton Deane area. West Somerset District Council does not currently have any monitoring points within the Tone catchment; data collected at Minehead and Dunster showed no exceedences (see *West Somerset Rivers LEAP Annual Review 2000*).

Second Stage Air Quality Review

In March 1999, Taunton Deane Borough Council started diffusion tube surveys for nitrogen dioxide and sulphur dioxide. The purpose was to identify 'hot spots' prior to the second stage review and assessment of air quality in the Taunton Deane area. *Taunton Deane Borough Council Air Quality Review and Assessment Second Stage Consultation Document* was published in March 2000. The report shows that the required air quality targets are likely to be met, although a third stage review is required for nitrogen dioxide.

Sources of pollution

Ambient concentrations of smoke and sulphur dioxide have generally declined in the UK generally over the last 20 years. Both the quantity released and the concentration of lead in the atmosphere at roadside sites has declined since the mid-1980s following the introduction of lead-free petrol. Since the end of 1999 virtually all petrol sold in the UK is lead-free. Releases of some pollutants such as nitrogen oxides, carbon monoxide and volatile organic compounds have remained relatively constant during this period, although there may have been changes in their source. For example, releases of nitrogen oxides from industrial sources have generally declined whilst emissions from road traffic have increased. Planned development in the area will lead to an increase in vehicle movement and therefore increase the amount of polluting discharges, especially nitrogen oxides. The Agency aims to set an example in reducing emissions from vehicles by reducing our own business mileage and increasing the use of public transport.

With the exception of ground level ozone, ambient levels of these pollutants are generally lower in the South West of England than in many other parts of England and Wales. Road transport accounts for 46% of United Kingdom emissions of nitrogen oxides. Other large producers are the electrical power generation industry 22%, other industry and commerce 12% and domestic sources 2%. The Tone catchment is a mainly rural, non-industrial area with no major or large-scale industrial processes. There is one small industrial process authorised by the Agency: the machining of beryllium metal at Avimo Ltd., located in Taunton, which has a very high standard of abatement and control.

Road transport

Although the Agency has no formal remit in relation to road transport, many of the associated issues have a bearing on the Agency's ability to regulate and manage the environment effectively. The need to take a holistic, long-term view of this issue is at the heart of the principal aim of sustainable development. Road transport has long been acknowledged as a major source of air pollution, nitrogen oxides and particulate matter being the main pollutants. Nitrogen oxides and volatile organic compounds from vehicles are also precursors of ozone which has a detrimental effect on health. Lead also has a wide range of toxic effects. Petrol engines accounted for almost 75% of carbon monoxide emissions in 1997. Petrol also contains the carcinogenic benzene and 1,3 butadiene, which are released to the atmosphere during combustion.

The Agency as a statutory consultee to local planning authorities advises on issues within our remit when new roads are proposed. In addition to air pollution, impacts can include:

- habitat loss and barriers to species movement
- diffuse water pollution from accidental spillages
- climate change
- increased flood risk
- cumulative effects on the environment through related land uses such as petrol stations and increased use of raw materials (including aggregates and petroleum)
- loss of landscape value and increased noise nuisance

The Agency will work with local authorities, Government agencies, and developers to ensure that developments make use of transport options producing the least pollutants. The Government's National Transport Strategy will have an important bearing on this issue.

Since 1997 the Agency has been involved in a number of initiatives concerned with transport at a national level, particularly through the National Centre for Risk Analysis and Options Appraisal. The Centre has been closely involved in developing a new approach to appraisal for road schemes, which was used to appraise the short-term programme for roads in 1997. This resulted in the Roads Review in 1998, a process which substantially reduced the number of road-building projects. Our North Wessex Area Office is also working locally on air quality through its membership of the steering group of the University of the West of England's Air Quality Management Centre, and has contributed to the cost of running the Centre.

Action 2.17.1	
Contribute to reducing Agency North Wessex Area business mileage by 5% and improve our overall fuel efficiency by 3 miles per gallon (mpg) on our 1996/1997 figures (see Appendix 5.5).	
Cost: Saving	**Timescale**: 2000-2001
Action By: Agency	**Contact**: Area Business Services Manager

Action 2.17.2	
Report any local authority air quality monitoring results in future LEAP Annual Reviews.	
Cost: Nil	**Timescale**: 2000-2004
Action By: Agency, Taunton Deane Borough Council, West Somerset Borough Council.	**Contact**: Team Leader LEAPs

2.18. Issue: The impact of methane produced by landfill sites and odour nuisances

With the decay of biodegradable waste in landfills, a mixture of gases generally known as landfill gas is produced. In the early years of decay carbon dioxide (CO_2) is the main contributor to landfill gas and its emission to the atmosphere. As available oxygen is used up within the landfill, methane (CH_4) is produced and becomes the main contributor. Both carbon dioxide and methane are greenhouse gases. Methane is an estimated 20-30 times more damaging than carbon dioxide. Therefore, conversion of methane to carbon dioxide by burning is less damaging to the environment than allowing the landfill gas mixture to be discharged to the atmosphere unchanged.

The combustion of gas either in flares or as part of an energy recovery process converts methane to carbon dioxide, and should be undertaken whenever the landfill gas yield is capable of supporting combustion. However, only sites that take large quantities of biodegradable waste may be able to support combustion in some form or another. At these sites gas management is also carried out for health and safety reasons. Within the Tone catchment, Poole Landfill site at Wellington is operated by Wyvern Waste Services Ltd, and currently operates a gas flare system to control the levels of methane gas. In addition the operator is intending to introduce an energy generation scheme to utilise the landfill gas. Electricity Development Limited has been appointed by Wyvern Waste to progress the project. Planning permission has been granted and generation equipment will be installed in 2000.

Potential problems with odour are predicted during the installation of the new gas collection system. The area around this landfill site has suffered from a long-standing landfill odour nuisance. This site is nearing completion, at which time all the landfill area will be incorporated within the gas extraction scheme. The company has substantially increased the area of the site from where the gas is extracted and has added a second flare. A new cap will also be included for part of the site. The new improvements will require modifications to the waste management licence and/or working plan. We are in discussion with Wyvern Waste with regard to including a condition relating to the management of odour. Regular liaison meetings are held between the Agency, Wyvern Waste, Taunton Deane Environmental Health Officers, West Buckland Parish Council, Nynehead Parish Council and local residents regarding the odour nuisance.

Action 2.18.1	
We will revise the waste management licence and working plan for Poole landfill.	
Cost: £3k	**Timescale**: 2000
Action By: Agency	**Contact**: Team Leader Waste Licensing

Action 2.18.2	
We will continue to monitor and encourage the operator to minimise odour nuisance.	
Cost: £1k	**Timescale**: 2000-2001
Action By: Agency	**Contact**: Team Leader Waste Licensing

Ham Sewage Treatment Works outfall on the River Tone: Issue 2.24

Balancing pond at the Hankridge Farm development: Issue 2.14

Baltmoor Wall at Athelney after the completion of repair work: Issue 2.11

Giant Hogweed – an invasive species that can grow over 5m high: Issue 2.8

Pumping station at Curry Moor on the Somerset Levels: Issue 2.15

Bridgwater and Taunton Canal abstraction sluice on the River Tone: Issue 2.23

Firepool Lock on the Bridgwater and Taunton Canal: Issue 2.25

Hornshay Weir on the River Tone, currently causing an obstruction to migratory fish: Issue 2.5

New Bridge on the River Tone, with sluice and fish pass to allow the passage of migratory fish: Issue 2.5

Aerators in use on the River Tone, used to boost oxygen levels: Issue 2.1

2.19. Issue: The need for a better informed and integrated Agency view on waste management

The Environment Agency regulates the treatment, recovery, storage, movement and disposal of controlled wastes. Controlled waste includes household, commercial and industrial wastes. It excludes waste from agricultural, mining and quarrying operations, waste water, explosives and radioactive wastes. However, some agricultural, quarry and mine waste may become controlled waste in the near future.

National legislation

The Government's strategy for sustainable waste management in England and Wales is set out in a White Paper *Making Waste Work*, published in December 1995. This sets out the waste hierarchy:

- reduction
- re-use
- recovery – recycling, composting, energy
- disposal

The overall objective is to move the management of waste up the hierarchy thus reducing the volume of waste that is finally disposed to landfill. Landfill, however, will remain as a method of solid waste disposal in the United Kingdom for wastes that cannot be recovered, and for the residue of some recovery methods such as incineration with energy recovery (see Issue 2.18).

Government initiatives to move waste management up the hierarchy include legislative as well as financial incentives. Mechanisms already in place include:

- the requirement on local authorities to draw up Waste Local Plans as well as Recycling Plans to detail how household recycling targets are to be met;

- the Landfill Tax, which was introduced on 1st October 1996; Her Majesty's Customs and Excise enforce the Landfill Tax. There are two levels of tax, £2 per tonne for inactive (inert) wastes and £10 per tonne for all other wastes disposed of at landfill sites. Landfill Tax is levied on the landfill site operations and before VAT is calculated. Site operators can contribute to enrolled environmental bodies for specific environmental projects. In return they can claim a tax credit worth 90% of any contribution to a maximum credit of 20% of their landfill tax liability.

- the *Producer Responsibility Obligations (Packaging Waste) Regulations 1997 (as amended)* place obligations on companies that perform specific activities regarding packaging and packaging materials. The Regulations place an obligation on companies to recover and recycle specific amounts of waste packaging calculated from the amounts of packaging that they handle. Not only does this approach enforce increased recycling and recovery, it encourages companies to reduce the amount of packaging they use; the less packaging companies handle the less onerous and costly achieving their obligations becomes. The Producer Responsibility regime is due to be applied in regulations on other large or problematic waste streams including waste electrical equipment, end of life vehicles and waste batteries.

Since the publication of *Making Waste Work* the Government has published a consultation paper on waste strategy for England and Wales entitled *Less Waste More Value?* in 1998. The consultation paper highlights the lack of reliable information on size and composition of various waste streams. It emphasises the need to increase our understanding of types and quantities of waste we produce in England and Wales. One of the Environment Agency's main objectives was to provide information and guidance on the National Waste Strategy. As a result, the Environment Agency has carried out the first National Waste Production Survey, which was completed in April 1999. Data was collected from companies across a variety of industrial and commercial sectors on the amounts and types of waste produced and how it was managed.

The Government saw the need for a better informed and integrated strategy for waste management and so produced its first Statutory Waste Strategy in a White Paper 'A Way with Waste'. After a period of consultation the Strategy was published in May 2000, and provides definitive guidance on best practice for waste management using the Best Practicable Environmental Option (BPEO) for specific waste streams. Decision-makers are expected to take account of three key considerations when assessing the Best Practicable Environmental Option:

- the Waste Hierarchy (reduction, re-use, recovery, disposal)
- the Proximity Principle (requires waste to be disposed of as close to the place of production as possible)
- Self-sufficiency, meaning that waste should not be exported from the UK for disposal; the Government believes that where practicable, Waste Planning Authorities and the waste management industry should aim for regional self-sufficiency in managing waste

The *National Waste Strategy* incorporates data gathered by the Agency from the National Waste Production Survey.

Strategic Waste Management Assessments

As a requirement of Waste Management Licence conditions we receive data from site operators relating to the amount of waste each site has managed in a set period, usually quarterly. This data is used to produce statistics on how much waste is being managed at licensed sites within a particular area, district or county. This data, combined with data from the national survey, can then be used in the production of the Agency's own Strategic Waste Management Assessments, advising regional planning functions such as Regional Technical Advisory Bodies, and advising local authorities about the provision of land and resources for waste management. The Agency's South West Region Strategic Waste Management Assessment is currently being produced and will be published by the end of 2000. Somerset County Council is working on a Waste Local Plan; the consultation draft is due at the end of February 2001. Poole landfill is the only major site within the area taking putrescible waste. At current rates of filling it has only four years of life left. This fact must be taken into account when planning for waste.

We have also undertaken a £1.5 million programme of research in life-cycle techniques for waste management. Life-cycle assessment is a technique in which the inputs and outputs of a particular process or practice are systematically identified, quantified and costed from 'cradle to grave'. The various options for waste disposal are then considered in terms of their environmental and economic impact and the best practicable environmental option is chosen.

This methodology will be of use to local authorities in determining the provision of waste facilities in their area. It is expected that this more case-specific methodology of life-cycle analysis for waste management will supersede the Waste Hierarchy for Local Government when planning which waste management facilities and techniques to employ.

Action 2.19.1	
We will produce Strategic Waste Management Assessments for the local authorities in this area.	
Cost: £1k	**Timescale**: 2000-2001
Action By: Agency	**Contact**: Team Leader Tactical Planning

2.20. Issue: The over-creation of waste

Our consumer society is producing ever greater quantities of waste each year. It has been estimated that the amount of waste produced nationally in one year would fill Lake Windermere. Non-renewable resources are used once and then disposed of in ways which render them permanently unusable. Increased waste cost companies more and there is a potential for pollution from all methods of disposal.

It is becoming increasingly difficult to find sufficient space to continue the use of landfill as our main disposal method and waste is often transported large distances. This is clearly not sustainable. We aim to encourage people to reduce their waste and, for the waste that is produced, to promote re-use and recycling. We are contributing to achieving the Government's National Waste Minimisation Targets in a number of different ways:

- we encourage and guide industry to develop new and improved techniques for the management of special and other industrial wastes
- for industries that are not regulated by the Agency, we promote the Environmental Technology Best Practice Programme and Waste Minimisation Clubs
- we have carried out a National Waste Production Survey (see Issue 2.19)
- we are implementing Producer Responsibility legislation which aims to reduce the amount of packaging waste going to landfill (see Issue 2.19)
- we have produced our Waste Minimisation Video and good practice guide, which we use to promote best practice
- we will promote best practice for farm waste management in partnership with organisations such as the Farming and Wildlife Advisory Group who are currently giving advice as part of their 'Landwise' Review, and the Government's Farming and Rural Conservation Agency
- we will undertake a Pollution Prevention and Waste Minimisation Survey at Comeytrowe Trading Estate, Taunton following a significant oil pollution; there are approximately 30 small and medium businesses that will benefit from the new integrated approach to environment protection

Industries can call the **Environment and Energy Helpline: Freephone 0800 585794** for up to two hours of free advice on saving money through waste minimisation and energy efficiency measures.

The five District Councils in Somerset have agreed to work together on a joint Waste Strategy for household waste, dealing with waste collection and management throughout the county. Taunton Deane Borough Council operates an organic waste collection from households for their garden wastes; the material is collected in and around the towns and villages in the borough and is composted at Wyvern Waste Services Priorswood site. The scheme has proved very successful over the last few years, collecting 900 tonnes from April to September in 1998. This service complements the collection of garden waste from waste recycling centres which currently receive approximately 6000 tonnes a year.

Action 2.20.1	
We will promote the creation of waste minimisation partnerships as appropriate.	
Cost: £1k	**Timescale**: 2000-2004
Action By: Agency	**Contact**: Team Leader Tactical Planning

Action 2.20.2	
We will work with Farming and Wildlife Advisory Group, Farming and Rural Conservation Agency and others to give waste minimisation and best practice management advice to farmers.	
Cost: £1k	**Timescale**: 2000-2004
Action By: Agency, Farming and Wildlife Advisory Group, Farming and Rural Conservation Agency	**Contact**: Team Leader Tactical Planning

Action 2.20.3	
We will conduct a joint Pollution Prevention and Waste Minimisation survey at Comeytrowe Trading Estate.	
Cost: £1k	**Timescale**: 2000-2004
Action By: Agency	**Contact**: Team Leader Environment Protection

2.21. Issue: Illegal waste disposal

The disposal of controlled waste requires an Agency licence. Illegal activities in the area include fly-tipping and an unlicensed scrapyard. Fly-tipping is defined as 'the illegal deposit of controlled waste on land (excluding deposits at unlicensed sites designated or adapted for the reception of waste with a view to disposing of it)'. Fly-tipping can be a problem in this area and is very difficult to control. We rely largely on information supplied by members of the public.

Apart from the usual reasons for fly-tipping such as avoiding commercial waste charges, one reason in the Tone area may be that the Priorswood Civic Site is very busy and cramped. The site has been identified as problematic but any extension to the site can only be progressed via Somerset County Council and the operator, Wyvern Waste Services. The local authorities are responsible for development planning, including waste planning, while we are statutory consultees and give them information and technical advice. We will work with the local authorities to combat and remove fly-tipped waste according to the 'Memorandum of Understanding' of 16 September 1998 between the Agency and the Local Government Association. Forests in the catchment are being particularly targeted. We are developing a partnership with the Forestry Commission and Taunton Deane Borough Council to develop a plan of action to combat fly-tipping incidents and the removal of fly-tipped waste. Fly-tipping of animal carcasses (especially calves) is a new problem resulting from the crisis in the livestock industry.

One of the few remaining unauthorised scrap-metal yards within the North Wessex area is situated at Chelston, Wellington. Nationally, we are currently pursuing the regulation of all outstanding scrap-metal and vehicle-dismantling yards. Our North Wessex Area office is in discussion with an operator to establish a new scrapyard at Poole Brickworks, Wellington. We will continue to hold discussions with the operator to ensure the proposed activities fulfil the requirements of waste management licensing. Failure to comply may lead to legal action being considered.

Action 2.21.1	
We will liaise with the Forestry Commission and Taunton Deane Borough Council to develop a plan to combat fly-tipping.	
Cost: £0.5k	**Timescale**: 2000-2001
Action By: Agency, Forestry Commission, Taunton Deane Borough Council	**Contact**: Team Leader Environment Protection

Action 2.21.2	
We will continue to hold discussions with the scrapyard operator to ensure proposed activities fulfil waste-management licensing requirements.	
Cost: £1k	**Timescale**: 2000-2001
Action By: Agency	**Contact**: Team Leader Waste Licensing

Action 2.21.3	
We will work with the local authorities to combat fly-tipping, and remove fly-tipped waste.	
Cost: £0.5k	**Timescale**: 2000-2004
Action By: Agency, local authorities	**Contact**: Team Leader Environment Protection

2.22. Issue: Securing future public water supplies

Water is an essential but finite resource. The Agency has a central role in water resource planning in England and Wales but is not responsible for the supply of water. One of the Agency's roles is to protect the water environment (lakes, rivers and wetlands) from over-abstraction, whilst considering the needs of the public, agriculture and industry now and in the future.

The Agency is also responsible for the environmental regulation of the water companies in England and Wales, whilst the Office of Water Services (OFWAT) is responsible for their financial regulation. We work with the water companies in order to ensure best possible use of available resources.

As part of Asset Management Plan 3 (see Issue 2.24), water companies were required to revise their water demand forecasts, review their water resources availability and consider any potential resource options to meet forecast deficits within the planning horizon up to 2010. In parallel with this, companies were required to submit water resource plans to the Agency, setting out their demand forecasts and available resources over the next 25 years. Within these plans, potential demand and resource management options, including leakage reduction, were considered along with any resource development options that may be required to meet forecast demand. The companies will be expected to update these plans annually.

Meeting demand

To manage water resources the Agency issues abstraction licences for specific volumes of water from identified sites. The abstraction licence will include restrictive conditions to control abstraction and prevent adverse environmental impacts. In 1998, there were 118 active licences in the Tone LEAP area, representing 16,428 million litres of water per year. Ten of these licences are public water supply licences held by Wessex Water Services Limited; this equates to 12,978 million litres of water per year. The remainder are non-public water supply licenses which are used for a number of purposes including agricultural and industrial supplies. The majority of the water abstracted is returned to the river system through consented sewage effluent discharges (see Issue 2.24). Wessex Water is the main water supply company within the Tone LEAP area. However, South West Water Ltd supplies a small area in the south west of the catchment.

Water resource planning is based around areas known as 'water resource zones', which comprise an interconnected network of sources and mains. These can cover large geographic areas, often extending over several LEAP catchments and other administrative boundaries. It is therefore difficult to obtain data for a specific LEAP and the precise impact of new development on water resources in the plan area can be difficult to predict.

Before any new resources can be developed or existing resources developed further, the Agency must be satisfied that water companies have looked in detail at a range of appropriate options. These include the following demand management measures:

- increasing the efficiency of abstraction and treatment (resource / production management)
- increasing efficiency of pipe networks as well as reducing their leakage towards an acceptable level (distribution management)
- encouraging people to use water more efficiently (customer side management)

Metering

Distribution management involves a number of different initiatives including metering. Meters are installed in all new domestic properties connected to the water company supply and all domestic customers have the option of having their home metered free of charge. Wessex Water also operates a tariff scheme which metered customers who have a low water use can opt for to make further financial savings. People who have a garden sprinkler are asked to register it with the company and pay for a sprinkler licence but they are not required to have a meter. Water companies have a duty to promote efficient use of water and the Agency expects that they should pursue this duty with imagination and vigour.

Distribution management

Extra resources can be obtained from making savings through reducing leakage. The water companies are set leakage targets each year by the Office of Water Services. They are bound to meet these but can set tighter targets if they wish. Wessex Water's leakage was 88.3 Ml/d (million litres per day) in 1999/2000 compared to their target level of 89.0 Ml/d. Their target levels for 2000/2001 and 2001/2002 have been set at 85 Ml/d and 80 Ml/d respectively.

South West Water's leakage was 83.7 Ml/d in 1999/2000 compared to their target level of 84 Ml/d. Their target level remains at 84 Ml/d for both 2000/2001 and 2001/2002. Leakage reduction targets are set at a level where the cost of repairing leaks is balanced with the cost of water saved.

Promotion of water saving measures

In 1999/2000 the average household use for unmetered properties was 139 litres per person per day in the Wessex Water area, and 161 litres per person per day in the South West Water area. In metered properties, domestic consumption was 129 litres per person per day in the Wessex Water area, and 122 litres per person per day in the South West Water area.

Within the home there are many opportunities to help reduce this figure, for example:

- water use: turning taps off, taking showers rather than baths
- repairs: washer replacement, rapid repair of leaks
- appliances: water efficient washing machines and dishwashers, low flush toilets, normal rather than power showers
- gardening: water butts, trigger switches on hose pipe nozzles, drought resistant garden plants, mulch on flower beds to retain moisture and restrict weed growth

The workplace and industry also offers many opportunities to reduce water use (and save money). Measures outlined above may be suitable together with process / site specific measures. Examples of these and other water efficiency measures are detailed in various Agency publications, including most recently details of the Water Efficiency Awards 2000. Taunton Deane Borough Council ran a successful reduced price rainbutt and compost bin scheme last year, and plan similar schemes this year.

Resource Zones

The Tone LEAP area is part of the North Resource Zone which supplies water to most of Somerset and parts of Dorset. The water supplied in the catchment is from a combination of surface and groundwater sources dominated by Clatworthy reservoir with smaller abstractions from the Bridgwater and Taunton Canal and the smaller reservoirs in the south of the catchment. The groundwater sources tend to be smaller but are still significant as they account for 44.2% of public water supply in the catchment. The impact of the abstraction from the canal and the water lost to the Tone catchment is currently being investigated by the Agency; details of this are given in Issue 2.23. The south-west edge of the Tone LEAP area is part of South West Water's Wimbleball Resource Zone which supplies water to East Devon. The water supplied in the catchment is from a combination of surface and groundwater sources dominated by Wimbleball reservoir.

Groundwater Source Protection Zones

Source Protection Zones (SPZ) are a tool used to support the Agency's Groundwater Protection Policy, which provides a framework for the monitoring and protection of groundwater resources. Source Protection Zones provide an indication of the risk to groundwater supplies that may result from potentially polluting activities and accidental releases of pollutants; generally, the closer the release is to a groundwater source the greater the risk. Three zones are usually defined although a fourth zone of special interest

may also be used. Source Protection Zones currently apply only to groundwater sources (wells, boreholes and springs) used for public water drinking supply, although there are many other types of abstraction. There are currently five Source Protection Zones in the catchment. Further information and maps showing current Source Protection Zones are available on the Agency's Website at http://www.environment-agency.gov.uk.

Changes to the water abstraction licensing system

Nearly everyone who needs to abstract water from rivers, canals, reservoirs, lakes or from groundwater sources requires a licence from the Environment Agency. There are about 48,000 licensed abstractions in England and Wales.

Since the present licensing system was introduced in 1965, demand for water has increased, environmental expectations have grown and commercial practices have changed. As a result, the Government reviewed the licensing system during 1997/1998, publishing its report *Taking Water Responsibly* in March 1999. This review has resulted in some important changes.

Initially we are concentrating on the following areas, which do not require new primary legislation:

- Catchment Abstraction Management Strategies
- time-limiting of licences
- restoring sustainable abstraction by dealing with damaging abstractions
- review of licence administration procedures

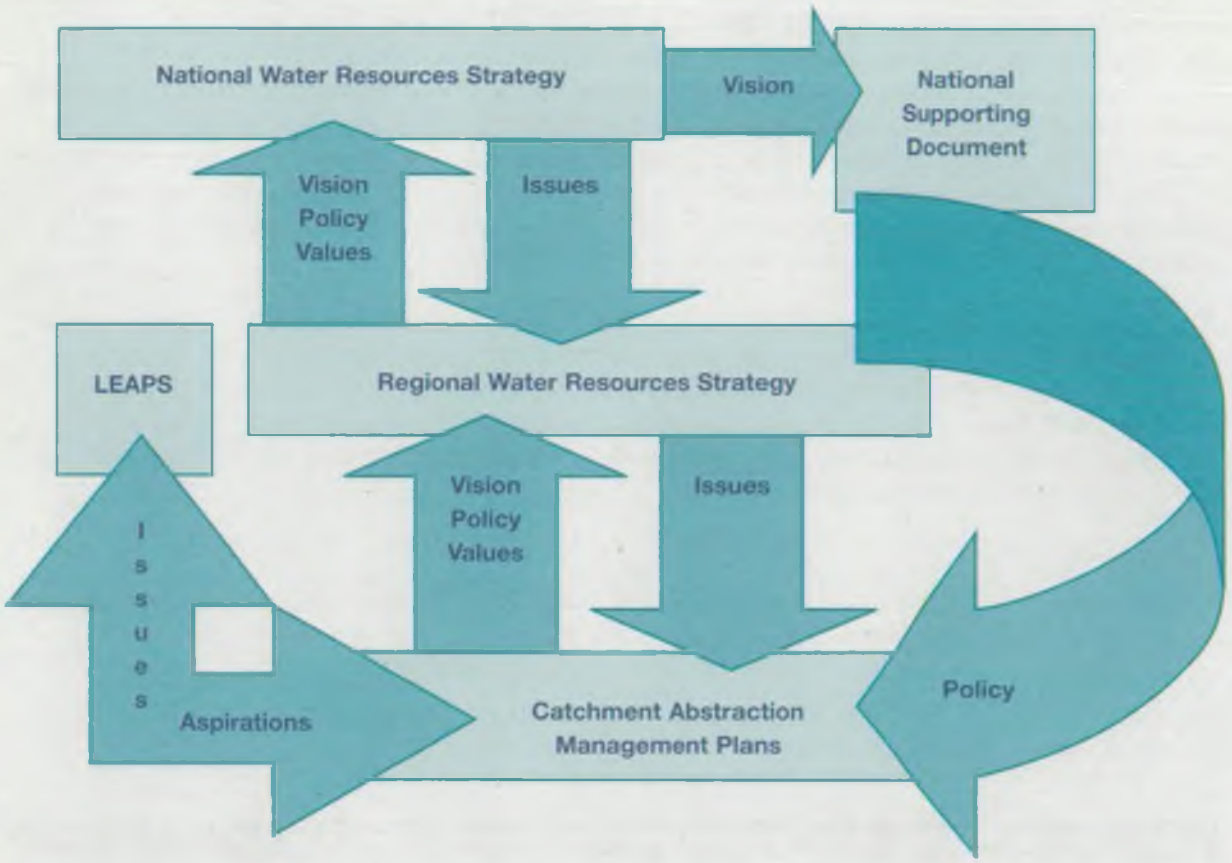
Catchment Abstraction Management Strategies (CAMS)

This major initiative will provide the opportunity, at a local catchment level, for groups and individuals to contribute to the development of the strategy to be adopted for the catchment. Catchment Abstraction Management Strategies will provide information on:

- the availability of water in a catchment
- licensing practice in dealing with new applications
- changes needed to the abstraction regime in the catchment to achieve the sustainable long-term use of water resources
- a transparent basis for planning by abstractors, the Agency and all other interested parties

A national consultation exercise on our proposals for the production of Catchment Abstraction Management Strategies closed on 31 July 2000. Following the consultation we will publish a National Support Document in April 2001 and then start work on the first Catchment Abstraction Management Strategy. In North Wessex we hope to publish our first Catchment Abstraction Management Strategy in 2002. These will be published one at a time on a six-year rolling cycle.

Figure 6: Links between Catchment Abstraction Management Strategies and other Agency documents



Action 2.22.1	
We will revise the Regional Water Resources Development Strategy based on information received in the water companies' water resources plans.	
Cost: £4k	**Timescale**: 2000-2001
Action By: Agency	**Contact**: Regional Senior Water Resources Planner

2.23. Issue: Bridgwater and Taunton Canal water resources management

Water is abstracted by British Waterways from the River Tone at Firepool, Taunton, to suppiy the Bridgwater and Taunton Canal. This abstraction is currently exempt from licensing. Wessex Water Services Ltd abstract from the canal to supply Wessex Water 's Durleigh Reservoir under a licence held by British Waterways. However, we need to review the canal abstraction as part of the requirements of the Habitats Directive Regulations (see Issue 2.7). We need to consider if the balance of the water needs between the canal and the Lower Tone is being met by current operations.

It is important that sufficient water flows down the canal to supply the Durleigh Reservoir abstraction, to reduce the incidence of algal blooms in Bridgwater Docks and lower reaches of the canal and to maintain navigation. It is equally important that the ecology of the River Tone downstream is not adversely affected. In early 1998 a joint Agency, British Waterways and Wessex Water Technical Group was established to review the water resources management arrangements for the canal.

A programme of fieldwork to collect information on flow rates and water quality in the canal was implemented in summer 1998. This work included the installation by British Waterways of an ultrasonic flow-monitoring device at Bathpool. For the first time this enabled detailed continuous flow data to be collected for the canal. The Environment Agency undertook an extensive programme of flow measurements at other locations, and took regular water quality measurements from the lower reaches of the canal. The results from the 1998 monitoring programme showed that there are improvements that can be made to the present system of water usage in the canal. Under summer flow conditions, the most appropriate division of water between the canal and the Tone downstream of Firepool weir remains an issue which is still to be resolved, and discussions are continuing between the Agency and British Waterways.

The Tone Catchment also contains part of the Grand Western Canal. This historic canal has a number of structures of importance such as aqueducts and boat lifts. While responsibility for their care lies with the owners, the Agency will have regard for the protection of these structures when determining any works or licensing. The Grand Western Canal Trust is currently working with landowners to produce a management and conservation plan for the canal.

Action 2.23.1	
If appropriate we will implement changes to the water management practice, having due regard to the needs of the Canal and the River Tone downstream of Firepool.	
Cost: £10k	**Timescale**: 2000-2004
Action By: Agency, British Waterways, Wessex Water, English Nature	**Contact**: Team Leader Area Water Resources

2.24. Issue: The impact of sewage and unsewered areas

Every five years the Office of Water Services (OFWAT) undertakes a 'Periodic Review of Prices'. This sets out what the water companies can charge their customers and how this money is to be spent over the following five years. Crucial to this process is the development by the water companies of their strategic business plans (known as Asset Management Plans), which set out their planned improvements according to guidelines agreed between the Agency, the Office of Water Services and the Government. The water companies' improvement plan for the period 1995-2000 is known as Asset Management Plan 2 (AMP2).

Asset Management Plan 2 was developed in 1994 along guidelines agreed between the National Rivers Authority (now the Environment Agency), the Department of the Environment (now the Department of the Environment, Transport and the Regions), the water services companies and the Office of Water Services.

Asset Management Plan 3

In 1999 the third Asset Management Plan (AMP3) was agreed covering the period 2000-2005. Detailed environmental obligations for the companies were established in relation to sewerage discharges and over-abstraction after a review by the Agency in liaison with English Nature, and in agreement with the Department of the Environment, Transport and the Regions. The Agency and Government require these improvements to take place by 2005, but many of the schemes will be delivered before then. First time sewerage schemes for Blagdon Hill and Pitminster are to be included in Wessex Water's Plan. We will continue to monitor the progress of these schemes, which are likely to be completed before the end of 2002. We expect improvements to the following continuous discharges to be completed before 2005.

- Taunton (Ham) sewage treatment works is causing River Quality Objective and Long Term River Quality Objective failure in the River Tone. We expect improvements to this sewage treatment works to be completed by 2004. We are likely to have to review this discharge under the Habitats Directive Regulations (See Issue 2.7).

- Modelling has indicated that Maundown Water Treatment Works has a harmful effect on water quality in a tributary of the Hillfarrance Brook. We expect improvements to be completed by 2003.

Intermittent discharges

Recent work undertaken by the Agency and Wessex Water has identified a number of intermittent discharges (combined sewer overflows, settled storm overflows and pumping stations) within the Tone catchment which may be causing either aesthetic or water quality problems in the receiving watercourse. These will require remedial work by Wessex Water, which we expect to be completed by 2005. The Agency and Wessex Water will agree the prioritisation of these schemes.

Intermittent discharges from Galmington Surface Water Outfall may be causing or contributing to aesthetic and water quality problems in the River Tone. We are negotiating with Wessex Water's liaison group to install an interceptor to remove any debris and oil from entering the watercourse via the outfall.

Wrong connections

In urban areas where sewage and surface water are carried in separate sewers, pollution of watercourses occurs when domestic appliances including toilets and washing machines are illegally plumbed into surface water drains instead of the foul sewer. Wrongly connected surface water drains also put considerable pressure on the foul sewer system causing overflows to operate prematurely thus causing pollution to watercourses. The problem has been particularly bad in parts of Taunton for example at Rowbarton and St Patrick's Close. We are working in conjunction with Taunton Deane Borough Council to trace these wrong connections and get them corrected.

Action 2.24.1	
We will work with Wessex Water to ensure that they carry out proposed improvement to Taunton (Ham) sewage treatment works by 2004. We will monitor the effectiveness of the improvements.	
Cost: £1k	**Timescale**: 2000-2004
Action By: Agency	**Contact**: Team Leader Tactical Planning

Action 2.24.2	
We will work with Wessex Water to ensure that they carry out proposed improvement to Maundown Water Treatment Works by 2005. We will monitor the effectiveness of the improvements.	
Cost: £1k	**Timescale**: 2000-2003
Action By: Agency	**Contact**: Team Leader Tactical Planning

Action 2.24.3	
We are negotiating with Wessex Water to secure improvements to Galmington Surface Water outfall on the River Tone.	
Cost: £0.5k	**Timescale**: 2000-2004
Action By: Agency	**Contact**: Team Leader Environment Protection

Action 2.24.4	
We will monitor Wessex Water's progress in improving a number of intermittent discharges by 2005 and we will assess the impact of the improvements.	
Cost: £1k	**Timescale**: 2000-2005
Action By: Agency	**Contact**: Team Leader Tactical Planning

Action 2.24.5	
We will work with Taunton Deane Borough Council to identify wrong connections in the catchment and ensure correct connections are made.	
Cost: £0.5k	**Timescale**: 2000-2004
Action By: Agency	**Contact**: Team Leader Environment Protection

Action 2.24.6	
We will work with Wessex Water to ensure that they implement the Blagdon Hill and Pitminster Sewerage Scheme by 2003.	
Cost: £1k	**Timescale**: 2000-2003
Action By: Agency	**Contact**: Team Leader Tactical Planning

2.25. Issue: Promotion of sustainable recreation

We have a duty to promote the use of inland and coastal waters and associated land for recreational purposes, and a duty to make the best recreational use of Agency-owned land. We promote safe recreation within the river corridor where appropriate by working with local authorities and others such as the Ramblers Association, recreational users, the Inland Waterways Association and the British Canoe Union, and take into account the needs of the disabled. We work with other organisations to try to resolve conflicts between users. We encourage access agreements between canoe clubs and riparian owners, and have produced a booklet *Agreeing Access to Water for Canoeing* on behalf of the Angling and Canoeing Liaison Group. We support the popular activity of angling largely through our work to maintain and improve fisheries.

The River Tone catchment is essentially rural and undeveloped but it is used for informal recreation especially walking, cycling, angling, canoeing and boating. The Tone in Taunton and the Bridgwater and Taunton Canal provide an important focus for recreational use, being popular with walkers, anglers, canoeists and boat users. The canal is owned and managed by British Waterways although we monitor its water quality and fish stocks. Clatworthy Reservoir in the headwaters of the Tone is an important site for fly-fishing and walking.

Local authorities often own the riverside land in towns and we work with them, together with developers and other riparian owners, on schemes to enhance the town centre river corridor with, for example, landscaping, walkways and riverside seating. Such schemes can further nature conservation by providing opportunities to create wildlife habitats, and in some cases achieve a more natural river channel. Taunton Deane Borough Council is developing and improving routes for walkers, and in some instances cyclists, by way-marking and the provision of interpretation facilities, for example at Children's Wood, Taunton, where the Agency worked with Taunton Deane Borough Council. We also work to ensure that local authorities include appropriate policies in their Local Development Plans.

The Agency owns significant lengths of the River Tone and its banks downstream of Taunton but none at all in the upper catchment. We will be writing conservation and recreation management plans for the land in our control in consultation with others, including local community and recreation groups. We will balance the often conflicting interests of the need for recreation with our duty to safeguard the river environment and to conserve wildlife.

Sustainability is an underlying theme to the activities of the Agency and the promotion of recreation will be balanced with other considerations such as wildlife interest. There are a number of key organisations with an interest in the countryside and water recreation and we will work in partnership where appropriate to provide sustainable recreation. We are working in collaboration with other parties to develop strategic sustainable transport routes such as the Sustrans Route 3, which runs from Bristol, through Bridgwater and Taunton, to Penzance.

We also support the concept of sustainable transport on our inland navigation network, and will therefore support, in principle and subject to the appraisal of environmental impacts, proposals for navigation restoration that will enhance the recreational use of waterways. Active support will depend on the level of predicted recreational and other benefits, the predicted environmental impact and the availability of Agency resources.

Action 2.25.1	
We will review the recreational potential of Agency land on the lower River Tone.	
Cost: Unknown	**Timescale**: 2000-2001
Action By: Agency	**Contact**: Team Leader Conservation

Action 2.25.2	
We will liaise with local planning authorities to ensure appropriate policies are included in Local Development Plans and Community Plans.	
Cost: Unknown	**Timescale**: 2000-2004
Action By: Local authorities, Agency	**Contact**: Team Leader Conservation

Action 2.25.3	
We will work with others to provide sustainable water-based recreation and amenity.	
Cost: Unknown	**Timescale**: 2000-2004
Action By: Agency, local authorities, angling clubs, British Canoe Union, Sports Council, Countryside Agency, British Waterways, Bridgwater and Taunton Canal User Group	**Contact**: Team Leader Conservation

2.26. Issue: Local Agenda 21 (LA21)

Local Agenda 21 came out of the 1992 United Nations Earth Summit as a global initiative, and is an opportunity for people to say what they value about their surroundings and what they would like to see for their local environment in the 21st century. Local authorities are assisting their communities in developing local strategies and action plans for sustainable development. The approach adopted varies between local authorities. In Taunton Deane a series of working groups have been set up to look at issues such as transport and access to the countryside. The Agency is keen to extend its support for local authority Local Agenda 21 officers and sustainable development plans; we have taken part in some of the district and county groups, such as the Sustainable Somerset Forum.

The Agency has commented on the 'Local Agenda 21 Community Vision Draft' produced by Somerset County Council / Sustainable Somerset, which has recently been out to public consultation. Further information is available from the County Council.

A set of environmental indicators has also been chosen by local people through public consultation to monitor which aspects of the environment are getting better or worse. Sustainability indicators in Somerset include air quality, river water quality, the volume of household waste going to landfill and the percentage of household waste recycled. Other indicators measure social and economic trends. The Agency can provide scientific data relevant to the environmental indicators, such as river water quality.

Taunton Deane have also recently launched the Green Deane Business Network, which offers a free advisory service to local businesses on all aspects of environmental management including waste minimisation, energy efficiency and new legislation. This is a partnership initiative of Taunton Deane Borough Council, the Agency, Somerset Training and Enterprise Council, Business Link and the Chamber of Commerce.

We hold regular liaison meetings with Taunton Deane Borough Council to discuss matters of common concern such as sewage, litter and associated environmental issues. Agency staff volunteers have taken part in a 'litter-pick' along the River Tone at the Hankridge Farm development in Taunton. This was organised by Taunton Deane Borough Council as part of the National Spring Clean campaign in 1999, and was repeated again this year.

We also work with Local Authority Environmental Health Officers by way of a Somerset Water Studies Group on common issues such as pesticide contamination of private drinking water supplies. This has resulted in a monitoring programme across the Somerset area.

We can supply other information that Local Agenda 21 groups may find useful. A leaflet giving further details is available from our Customer Contact Team. The Agency also contributes indirectly to Local Agenda 21 by considering sustainability whilst carrying out all its activities.

Action 2.26.1	
We will supply information to Local Agenda 21 groups where possible, and will develop links with LA21 officers and local authorities to promote sustainability.	
Cost: Staff time	**Timescale**: 2000-2004
Action By: Agency	**Contact**: Team Leader LEAPs

3. Protection through partnership

The Agency works in partnership with many organisations and individuals concerned with the protection and enhancement of the environment. The Agency is essentially a regulatory body and does not give grants, so to achieve some of its aims it must co-operate with others to harness their financial resources and technical expertise.

In some cases partnerships are already well established, especially where there are joint responsibilities. In other areas, such as Local Agenda 21, we are actively seeking to establish closer links.

Working in partnership on areas of common interest can improve efficiency and help target limited budgets, avoiding duplication of effort. Through partnership we can ensure that the actions in this plan are implemented and that our environmental vision for the future can be realised.

3.1. Partners for action implementation

Organisation	Actions
Angling Clubs	2.8.4, 2.25.3
Association of Drainage Boards	2.15.1
Bridgwater and Taunton Canal User Group	2.25.3
British Canoe Union	2.3.2, 2.25.3
British Trust for Conservation Volunteers (BTCV)	2.8.4
British Waterways	2.23.1, 2.25.3
Country Landowners Association (CLA)	2.15.1
Countryside Agency	2.25.3
Department of the Environment, Transport and the Regions (DETR)	2.2.2
English Heritage	2.15.1
English Nature	2.6.1, 2.6.3, 2.6.4, 2.8.4, 2.15.1, 2.23.1
Farming and Rural Conservation Agency (FRCA)	2.15.1, 2.20.2
Farming and Wildlife Advisory Group (FWAG)	2.1.1, 2.1.2, 2.1.3, 2.3.1, 2.4.1, 2.6.3, 2.6.4, 2.6.5, 2.6.6, 2.8.3, 2.9.3, 2.20.2
Forestry Commission	2.8.4, 2.9.2, 2.9.3, 2.9.4, 2.21.1
Highways Agency	2.14.2
Internal Drainage Boards (IDBs)	2.6.1, 2.6.3, 2.6.9, 2.13.1, 2.15.1
Levels and Moors Partnership (LAMP)	2.15.1
Local authorities	2.3.3, 2.6.4, 2.6.9, 2.8.4, 2.9.3, 2.13.1, 2.14.2, 2.14.3, 2.15.1, 2.17.2, 2.21.1, 2.21.3, 2.25.2, 2.25.3
Ministry of Agriculture, Fisheries and Food (MAFF)	2.4.1

National Farmers Union (NFU)	2.4.1, 2.15.1
Riparian owners	2.1.1, 2.3.1, 2.3.2, 2.4.1, 2.6.1, 2.6.3, 2.6.4, 2.6.9, 2.8.3, 2.13.1
Royal Society for the Protection of Birds (RSPB)	2.15.1
Somerset Environmental Records Centre (SERC)	2.8.4
Somerset Otter Group	2.6.5
Somerset Wildlife Trust	2.1.1, 2.1.2, 2.1.3, 2.3.1, 2.3.3, 2.6.3, 2.6.4, 2.6.5, 2.6.6, 2.6.9, 2.8.3, 2.8.4, 2.9.3
Sports Council	2.25.3
Wessex Water Services Ltd	2.2.2, 2.23.1

3.2. Area Environment Group

The North Wessex Area Environment Group (AEG) is a non-statutory public group whose members are appointed from a wide range of backgrounds. The group meets four times a year in an advisory capacity to discuss decisions made by the Agency. Members are appointed every three years to represent a wide range of backgrounds and interests, and the meetings are open to the public and press.

The Area Environment Group also oversees the LEAP process, although detailed advisory work for each catchment is delegated to the LEAP Steering Group.

Name	Representing
Mr L R Fortune	Chairman, appointed by the Agency
Dr C D Holman	Regional Committee Member
Mr M J Stoodley	Regional Committee Member
Mr J Comer	Regional Committee Member
Mr M G Venning	Water Resources
Mr J R Ancell	Waste Management
Mr A Nicholson	Waste Management
Mr D Fish	Industry
Mr M W Minshal	Industry
Miss M de Rhe Philipe	Tourism
Mr W H Warmington	Agriculture
Ms JC Brookhouse	Conservation
Mrs A M Lennox	Recreation
Mr J L R Williams	Fisheries
Mr J B H Watkis	Flood Defence
Mrs L Bennett	Local Authority
Ms J Smith	Local Authority
Mr H P N Temperley	Local Authority
Mrs A E Fraser	Local Authority
Professor G P Hammond	Education
Mr S Eades	General

3.3. The LEAP Steering Group

This group represents a range of commercial, local authority and environmental interests operating within the catchment. The group comments upon the Consultation Draft and Action Plan prior to publication. They monitor the implementation of the Action Plan and provide us with specific advice on the importance of issues within the catchment. They act as a communication link between the local community and the Agency, and they help to promote and develop initiatives of benefit to the environment within the catchment. The Tone Steering Group members are:

Name	Representing
Mr L Fortune	Area Environment Group Chairman
Mr J Comer	Farmer/Area Environment Group Member
Mrs A Lennox	Ramblers Association/Area Environment Group Member
Mr M Venning	Wessex Water
Mr J Williams	Conservation
Mr R Martin	Somerset Wildlife Trust
Mr D House	Farmer
Mr E G Kidner	Wiveliscombe Parish Council
Mr P Stone	Somerset County Council
Mr J Clark	Taunton Deane Borough Council
Mr F Ulf-Hansen	English Nature
Mr A Tucker	Industry
Mr R Dommett	British Waterways
Mr J Pring	Wyvern Waste
Miss J Lavick	Taunton Deane Borough Council
Mr K Hayward	Norton Fitzwarren Parish Council
Mr R Simpson	Farming and Wildlife Advisory Group

4. River Quality

4.1. River Quality Objectives

We manage water quality by setting targets called River Quality Objectives (RQO). 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 planned future quality improvements. River Quality Objectives are assigned to all significantly sized rivers based on river flow. River Quality Objectives are based on the River Ecosystem Classification Scheme that consists of five classes. It sets standards for dissolved oxygen, biochemical oxygen demand (BOD), total ammonia, free ammonia, pH, dissolved copper and total zinc. Class RE5 has lower limits and does not in any way denote the worst water quality possible.

Figure 7: River Ecosystem classification

River Quality Objective	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

In some cases we may also manage water by setting Long Term River Quality Objectives. These must be realistic and are set where clear actions can be identified to bring about necessary improvements in water quality or to restore water quality to a former level, but no date is set for their achievement. Where Long Term River Quality Objectives are set, we measure compliance against River Quality Objectives, but use the Long Term River Quality Objectives as a basis for the setting of consents for new discharges, thus ensuring that these will not compromise the eventual achievement of Long Term River Quality Objectives.

Where the necessary steps to improve water quality are committed within a 5-10 year horizon, we set dated River Quality Objectives. These reflect the investment timetable for key dischargers set out by the Agency, and indicate the date at which we expect our water quality targets to be met.

We have shown failures to meet River Quality Objectives as significant and marginal failures. Significant failures are those where we are 95% certain that the river stretch has failed to meet its River Quality Objective. Marginal failures are those where we are less certain (between 50% and 95%) that the stretch has failed to meet its River Quality Objective.

Figure 8: River Quality Objective compliance 1998-1999

River name	Public Stretch Name	River Quality Objective [Long Term River Quality Objective]	Compliance 1998	Compliance 1999
Tone	Upstream Clatworthy Reservoir-Huish Champflower	1	Marginal[1]	Significant fail[1]
Tone	Huish Champflower-Chipstable	1	Marginal[2]	Compliant
Tone	Chipstable-Stawley	1	Significant fail[2]	Marginal[2]
Tone	Stawley-confluence with Westford Stream	2	Compliant	Compliant
Tone	Confluence with Westford Stream-Wellington sewage treatment works	2	Compliant	Compliant
Tone	Wellington sewage treatment works-Poole	2	Compliant	Compliant
Tone	Poole-confluence with Hele	2	Compliant	Compliant
Tone	Confluence with Hillfarrance/Hele-confluence with Halse Water	2	Compliant	Compliant
Tone	Confluence with Halse Water-Bridgwater & Taunton Canal	2	Compliant	Compliant
Tone	Bridgwater & Taunton Canal-confluence with Broughton Brook	3 [2]	Compliant	Compliant
Tone	Confluence with Broughton Brook-Ham	2	Compliant	Compliant
Tone	Ham-Knapp	4 [3]	Significant fail[3]	Significant fail[3]
Tone	Knapp-Haymoor (Tidal Tone)	3	Compliant	Compliant
Broughton Brook	Source-confluence with Tone	2	Compliant	Compliant
Bridgwater & Taunton Canal	Crossing with Tone-crossing with Petherton Park Brook	2	Compliant	Compliant
Bridgwater & Taunton Canal	Crossing with Petherton Park Brook-Bridgwater Dock	4	Compliant	Compliant
Sherford Stream	Pitminster-confluence with Tone	2	Compliant	Compliant
Halse Water	Source-Halse	2	Compliant	Compliant
Halse Water	Halse-Ash Priors Tributary	2	Compliant	Compliant
Halse Water	Confluence with Ash Priors Tributary-confluence with Back Stream	2	Compliant	Compliant

Halse Water	Confluence with Back Stream-confluence with Tone	2	Compliant	Compliant
Halse Water Tributary	Source-confluence with Halse Water	2	Compliant	Compliant
Back Stream	Source-confluence with Halse Water	2	Compliant	Compliant
Hele Brook	Lowton-confluence with Tone	2	Compliant	Marginal
Hillfarrance Brook	Source-Preston Bowyer	2	Marginal[2]	Compliant
Hillfarrance Brook	Preston Bowyer-confluence with Tone	2	Marginal[2]	Compliant
Westbrook Stream	Source-confluence with Hillfarrance Brook	2	Marginal[1]	Compliant
Haywards Water	Ford/Wellington Hill-confluence with Tone	2	Compliant	Compliant
Chelston Stream	Chelston-confluence with Haywards Water	2	Compliant	Compliant
Westford Stream	Beam Bridge-confluence with Tone	2	Compliant	Compliant

[1] These stretches marginally failed to comply for the first time in 1998. As marginal non-compliance indicates that there is a 50% chance that a stretch has not complied with its River Quality Objective, there is equally a 50% chance that this stretch has complied with its River Quality Objective. Thus no action will be taken at present; we will continue our routine monitoring of these stretches and, if repeat failures occur, we will then investigate the possible causes of failure.
[2] See section 2.1
[3] See section 2.24

Of the 30 monitored stretches (184.7 km of river) in the Tone catchment there are two stretches (6.8 km) which significantly failed to meet their River Quality Objective, and 5 stretches 28.6 km) which marginally failed to meet their River Quality Objective. We have also assessed whether river stretches meet their Long Term River Quality Objective. There is one stretch that significantly failed and no stretches that marginally failed to meet their Long Term River Quality Objective. The report on 1999 compliance is currently being produced; the data available to date has been included in Figure 8 and further information will be made available in the first River Tone Annual Review.

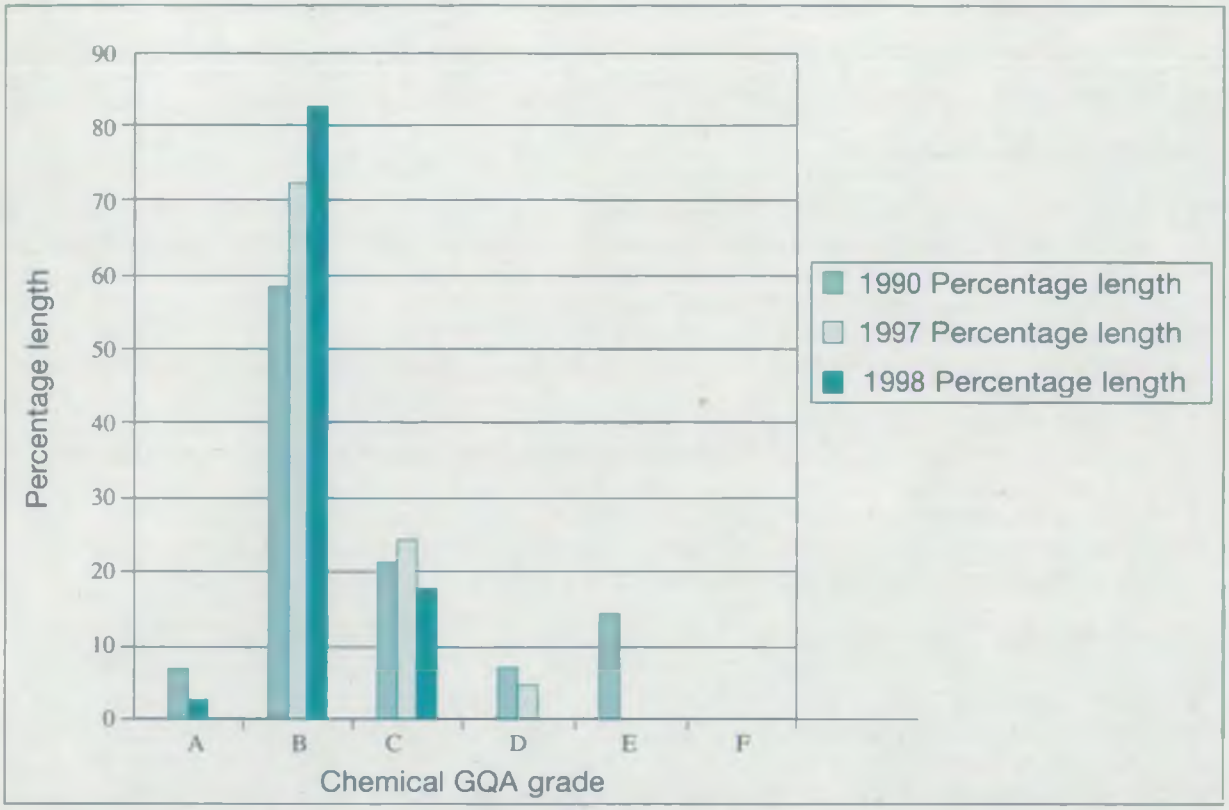
4.2. General Quality Assessment

We also use the General Quality Assessment scheme (GQA) to report at a general level on river quality and to show trends. The scheme uses 6 classes (A-F) to indicate quality (see Figure 10). Figure 9 shows the majority of stretches in the catchment are grade B (good), and this percentage length has increased since 1990 by 23.9% to 82.8%.

In the same period, the percentage in all grades below grade B has decreased. Overall, there have been movements up the grades.

The 1999 results for the whole of the North Wessex Area have indicated a massive 51.6% net improvement in water quality since 1990, with 63% of rivers now in the top two grades.

Figure 9: Percentage length of watercourse by chemical General Quality Assessment grade



4.3. Biological quality

In addition to chemical water quality, which is measured annually, we monitor biological quality every five years. River reaches are classified using a scheme of six classes, shown in Figure 10:

Figure 10: Biological class descriptions

Biological class	Description
A	Very good
B	Good
C	Fairly good
D	Fair
E	Poor
F	Bad

The biological quality survey is being carried out this year over two seasons (spring and autumn). Results are due during spring 2001, and we will report on the results of the survey in the First River Tone Annual Review.

5. Appendices

5.1. Duties, powers and interests of the Agency

5.1.1. Water Resources: The Agency has a duty to conserve, redistribute, augment and secure the proper use of water resources.

The Agency has powers to:

- grant or vary water abstraction and impoundment licences on application, with appropriate conditions imposed to safeguard the needs of the environment whilst allowing reasonable and justified use of available and sustainable water resources, with the aim of achieving an equitable balance between competing demands
- revoke or vary existing licences to reinstate flows or levels to surface or groundwaters that have become depleted as a result of abstraction; compensation may be payable if such powers are used
- secure the proper use of water resources through its role in water resources planning and the assessment of reasonable need for abstractions, and the promotion of more efficient use of water resources
- monitor and enforce abstraction and impoundment licence conditions
- issue conservation notices to direct appropriate practices with regard to water resources issues associated with exempt de-watering activities

The Agency has an interest (but no powers) in:

- the more efficient use of water by water companies, developers, industry, agriculture and the public, and the introduction of water efficiency measures and suitable design and layout of the infrastructure
- protecting the water environment from any adverse impact due to proposed major developments

Partnership:

- the Agency is committed to water demand management and will work closely with water companies and developers, local authorities, other relevant organisations and the public to promote the efficient use of water
- the Agency acknowledges that new resources may be needed in the future and supports a twin-track approach of planning for water resources development, alongside the promotion of demand management measures
- the Agency uses its position as a statutory consultee to the planning authorities to secure conditions and agreements that protect the water environment and that encourage water conservation measures; the Agency also seeks to influence planning decisions for new development by ensuring that planning authorities allow for any lead-time required for resource development

5.1.2. Flood Defence: The Agency has a duty to exercise general supervision over all matters relating to flood defence throughout each catchment

The Agency has powers to:

- control, through Land Drainage consents, development within 8m of main river (*Water Resources Act 1991, Section 109*) or construction of a structure that would affect the flow of an ordinary watercourse (*Land Drainage Act 1991, Section 23*)
- produce flood risk maps for all main rivers under Section 105 of the Water Resources Act 1991
- undertake works to main rivers using permissive powers
- issue flood warnings to the public relating to main rivers, local authorities and the police
- consent mineral workings within 16m of main rivers

The Agency has an interest (but no powers) in:

- granting of planning permission throughout a catchment but especially floodplains where development can significantly increase flood risk; this permission is granted by local planning authorities
- installation of surface water source control measures
- supervising the maintenance of ordinary watercourses which is a local authority remit, but may impact on main rivers
- installation of buffer zones which reduce flood risks and have significant environmental benefits
- urban and rural land use and measures that can reduce flood risk or the need for watercourse maintenance

Partnership:

- as a statutory consultee on planning applications within main river floodplains the Agency offers advice based on knowledge of flood risk; we also advise on the environmental impacts of floodplain development
- the Agency will encourage best practice, including source control measures and common standards, among local authorities and riparian owners to protect and enhance the environment
- the Agency works with civil authorities to prepare flood warning dissemination plans and supports their endeavours to protect communities at risk

5.1.3. Waste Management: The Agency has a duty to regulate the management of waste, including the treatment, storage, transport and disposal of controlled waste, to prevent pollution of the environment, harm to public health or detriment to local amenities

The Agency has powers to:

- vary waste management licence conditions
- suspend and revoke licences
- investigate and prosecute illegal waste management operations

The Agency has an interest (but no powers) in:

- the siting and granting of planning permission for waste management facilities - this is conducted by the waste industry and local planning authorities; the Agency, as a statutory consultee on planning applications, can advise on such matters

Partnership:

- the Agency will work with waste producers, the waste management industry and local authorities to reduce the amount of waste produced, increase re-use and recycling and improve standards of disposal

5.1.4. Water Quality: The Agency has a duty to monitor, protect, manage and where possible enhance the quality of controlled waters including rivers, groundwaters, lakes, canals, estuaries and coastal waters through the prevention and control of pollution

The Agency has powers to:

- issue discharge consents to controlled pollution loads in controlled waters
- regulate discharges to controlled waters in respect of water quality through the issue and enforcement of discharge consents
- issue works, enforcement and groundwater notices where action is required to reduce the risk of pollution
- prosecute polluters and recover the costs of clean-up operations
- serve prohibition notices (with or without conditions) on highway authorities to require treatment and pollution measures for highway runoff
- regulate new and modified structures on farms to reduce the risk of pollution

The Agency has an interest (but no powers) in:

- the greater use of source control measures to reduce pollution by surface water runoff
- prevention and education campaigns to reduce pollution incidents
- the provision of highway runoff control measures which is a highway authority remit

Partnership:

- the Agency will liaise with local authorities, developers, the Highways Agency, industry and Agriculture to promote pollution prevention and the adoption of source control measures; as a statutory consultee on planning applications, the Agency will advise local authorities on the water quality impact of proposed developments

5.1.5. Air Quality: The Agency has a duty to implement Part 1 of the *Environmental Protection Act 1990*

The Agency has powers to:

- regulate the largest technically complex and potentially most polluting processes such as refineries, chemical works and power stations including enforcement of, and guidance on, Best Available Technology Not Entailing Excessive Cost (BATNEEC) and Best Practicable Environmental Option (BPEO)
- have regard to the Government's National Air Quality Strategy when setting standards for the releases to air from industrial processes

The Agency has an interest (but no powers) in:

- the vast number of smaller industrial processes which are controlled by local authorities
- control over vehicular emissions and transport planning

Partnership:

- the Agency provides data on Integrated Pollution Prevention and Control processes and advice on planning applications to local authorities
- the Agency is willing to offer its technical experience to local authorities on the control of air pollution
- the Agency wishes to liaise with local authorities in the production of Air Quality Management Plans
- the Agency will advise and contribute to the Government's National Air Quality Strategy

5.1.6. Radioactive Substances: The Agency has a duty under the *Radioactive Substances Act 1993* to regulate the use of radioactive materials and the disposal of radioactive waste

The Agency has powers to:

- issue certificates to users of radioactive materials and disposers of radioactive waste, with an overall objective of protecting members of the public

The Agency has an interest (but no powers) in:

- the health effects of radiation

Partnership:

- the Agency will work with users of the radioactive materials to ensure that radioactive wastes are not unnecessarily created, and that they are safely and appropriately disposed of; the Agency will work with the Ministry of Agriculture, Fisheries and Food to ensure that the disposal of radioactive waste creates no unacceptable effects on the food chain
- the Agency will work with the Nuclear Installations Inspectorate to ensure adequate protection of workers and the public at nuclear sites
- the Agency will work with the Health and Safety Executive on worker protection issues at non-nuclear sites

5.1.7. Contaminated Land: The Agency has a duty to develop an integrated approach to the prevention and control of land contamination, ensuring that remediation is proportionate to risks and cost-effective in terms of the economy and the environment

The Agency has powers to:

- regulate the remediation of contaminated land designated as special sites
- prevent future land contamination by means of Integrated Pollution Prevention and Control, water quality and other statutory powers
- report on the state of contaminated land

The Agency has an interest (but no powers) in:

- securing with others, including local authorities, landowners and developers, the safe remediation of contaminated land

Partnership:

- the Agency supports land remediation and will promote this with developers and local authorities and other stakeholders

5.1.8. Conservation: The Agency has no direct conservation powers but uses its powers with regard to water management and pollution control to exploit opportunities for furthering and promoting conservation

The Agency will:

- further conservation wherever possible when carrying out water management functions
- have regard to conservation when carrying out pollution control functions
- promote the conservation of flora and fauna which are dependent on the aquatic environment

The Agency has an interest (but no powers) in:

- the conservation impacts of new development; these are controlled by local planning authorities
- protection of specific sites or species, which is a function of English Nature; the Agency does, however, provide advice to local authorities and developers to protect the integrity of such sites or species
- implementation of the *United Kingdom Biodiversity Action Plan*

Partnership:

- the Agency supports action to sustain or improve natural or man-made assets so that they are made available for the benefit of present and future generations
- many development schemes have significant implications for conservation; the Agency will work with developers, local authorities, conservation bodies and landowners to conserve and enhance biodiversity

5.1.9. Landscape: The Agency will further landscape conservation and enhancement when carrying out water management functions, have regard to the landscape when carrying out pollution control functions, and promote the conservation and enhancement of the natural beauty of rivers and associated land

The Agency has powers to:

- further the conservation and enhancement of natural beauty when exercising its water management powers, and have regard to the landscape in exercising its pollution control powers

The Agency has an interest (but no powers) in:

- the landscape impact of new development, particularly within river corridors; this is controlled by local planning authorities

Partnership:

- the Agency produces River Landscape Assessments and Design Guidelines which it uses when working with local authorities and developers to conserve and enhance diverse river landscapes

5.1.10. Archaeology: The Agency has a duty to consider the impact of all its regulatory, operational and advisory activities upon archaeology and heritage, and implement mitigation and enhancement measures where appropriate

The Agency has powers to:

- promote its archaeological objectives through the exercise of its water management and pollution control powers and duties

The Agency has an interest (but no powers) in:

- direct protection or management of sites of archaeological or heritage interest; this is carried out by local planning authorities, county archaeologists and English Heritage

Partnership:

- the Agency will liaise with those organisations which have direct control over archaeological and heritage issues to assist in the conservation and enhancement of these interests

5.1.11. Fisheries: The Agency has a duty to maintain, improve and develop salmon, trout, freshwater and eel fisheries

The Agency has powers to:

- regulate fisheries by a system of licensing
- make and enforce fisheries byelaws to prevent illegal fishing
- promote the free passage of fish and consent fish passes
- monitor fisheries and enforce measures to prevent fish entrainment in abstractions
- promote its fisheries duties by means of land drainage consents, water abstraction applications and discharge applications

The Agency has an interest (but no powers) in:

- the determination of planning applications which could affect fisheries

Partnership:

- many development schemes have significant implications for fisheries; the Agency will work with anglers, riparian owners, developers and local authorities to protect fisheries

5.1.12. Recreation: The Agency has a duty to promote recreational use of rivers and water space (we have no navigation responsibilities in the South West Region)

The Agency has powers to:

- contribute to its recreation duty through the exercise of its statutory powers and duties in water management

The Agency has an interest (but no powers) in:

- promotion of water sports; this is carried out by the Sports Council and other sports bodies

Partnership:

- the Agency will work with the Countryside Agency, the Sports Council, British Waterways and other relevant organisations to optimise recreational use of the water environment

5.2. Contaminated Land Regulations

Part IIA of the Environmental Protection Act 1990 came into force in England on 1 April 2000, and introduces a new regulatory regime for the identification and remediation of contaminated land. The new regime requires local authorities to identify contaminated land within their areas and provides a statutory definition of contaminated land:

any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that significant harm is being caused or there is a significant possibility of such harm being caused; or pollution of controlled waters is being, or is likely to be, caused

Certain sites may become designated as 'special sites' and these will become the responsibility of the Agency. Contaminated land is designated as a special site if the site falls within one of the descriptions defined in the Contaminated Land (England) Regulations 2000. These descriptions are summarised within Figure 11.

Figure 11: Conditions for designation of contaminated land as Special Sites

A) Any of the following activities have been carried out at any time:

- disposal of waste acid tars in a retention basin
- purification of crude petroleum or oil
- manufacture or processing of explosives
- the manufacture, production or disposal of chemical weapons
- the manufacture, production or disposal of biological agents or weapons
- an authorised prescribed process

B) The land is used for any of the following:

- naval, military or air force purposes
- an atomic weapons establishment
- within a nuclear licensed site
- activities which are subject to Section 30 of the Armed Forces Act 1996

C) Land which is affecting any controlled waters that:

- are used as a drinking water supply, and are likely to require treatment in order to be fit for human consumption, or
- are not likely to meet the requirements for water quality specified in regulations made under the Water Resources Act 1991, or
- are contained within one or more defined aquifers and where pollution relates to one or more of the defined substances

D) The land appears to be contaminated as a result of the escape of substances from sites that meet any of the descriptions for A and B.

Once sites have been designated as Special Sites we will liaise with the landowners and other appropriate persons to ensure a timely programme of remediation where action is required. No sites have yet been identified in this catchment. Details of Special Sites will be kept on a Public Register, maintained by the Agency. The Agency also has a role to provide relevant information and advice to local authorities, particularly regarding pollution of controlled waters.

5.3. Soil acidification

Some soils, particularly those which are naturally acidic such as granite-derived soils and peat soils, are vulnerable to increased acidity. This effect is made worse by high rainfall typically in upland areas and also by extensive conifer plantations. Sulphur-based deposits currently affect a number of areas in the Tone catchment.

Computer modelling shows that this problem should be resolved by 2005 provided that we continue to achieve the reductions in emissions expected as part of the Government's programme. If rain combines with certain airborne pollutants it becomes much more acidic and accelerates the process of soil acidification. The main pollutants are sulphur dioxide (SO_2) and oxides of nitrogen (NOx). The acidification of soil leads to the leaching out of minerals essential for plant growth and many plants cannot survive, while others are severely damaged. In 1994, a protocol was agreed under the United Nations Economic Commission for Europe to reduce exceedences of critical loads (the rate of sulphur deposition which ecosystems and other targets can tolerate in the long term without suffering damage). The United Kingdom agreed to reduce its sulphur dioxide emissions by 80% by 2010 from a 1980 baseline.

The United Kingdom's sulphur strategy published in December 1996 *Reducing Emissions of Sulphur Dioxide, A Strategy for the United Kingdom* indicates that the United Kingdom will meet interim targets for 2000 and 2005. Compliance is also expected with the 80% reduction target for 2010. However, critical load exceedences will continue at some sensitive sites. In January 1997 the European Commission published a draft strategy on acidification which aims to further reduce critical load exceedences for both sulphur and nitrogen. See Map 3 for the current and forecast critical load exceedences for this area.

Air pollution does not remain within catchment boundaries and the air pollution causing the areas of critical load exceedence in this catchment come chiefly from elsewhere. There are no breaches of air quality standards known to be caused by authorised industrial processes in the area. We are working to reduce acid gas emissions from the complex industrial processes that we regulate in the Avonmouth area; see the *Severn Vale LEAP* (2000) and the *Severn Estuary Management Plan* (due to be published in spring 2001) for further information.

5.4. Regulating major industry

5.4.1. Integrated Pollution Prevention and Control

One of the Agency's key responsibilities is to prevent pollutants from major industrial processes being released into the environment. Where releases do occur, we try to make sure they are minimised and made harmless. Regulations identify industrial processes that use or produce potentially harmful substances in significant amounts, known as prescribed processes and substances. Broadly, these are the industrial processes with the greatest potential to cause pollution. Local authorities regulate smaller, less complex industrial processes.

The United Kingdom was one of the first countries in Europe to introduce an integrated regulatory system, and many individual processes have been authorised under Integrated Pollution Control (IPC). A similar approach will be introduced throughout the European Union under the new *Integrated Pollution Prevention and Control Directive* (IPPC). Integrated Pollution Prevention and Control came into force in the UK on 1 August this year. This will apply to a broad range of industrial and commercial sectors, most subject to existing but separate authorisation schemes for their emissions to water, air and land.

Sectors such as those involved in food and drink production and intensive agriculture will be regulated by permits for the first time. We previously regulated discharges to water by sectors not covered by Integrated Pollution Control by issuing consents, which restrict the amount and type of pollutants that can enter a watercourse. While existing sites will be phased into the new regime between now and 2007, any new sites under development will be subject to Integrated Pollution Prevention and Control with immediate effect.

The Integrated Pollution Prevention and Control Directive requires member states to prevent or, where that is not possible, to reduce pollution from a range of industrial and other installations, by means of an integrated permitting process based on the application of 'best available techniques'. The integrated approach takes a wide range of environmental impacts into account such as emissions of pollutants (to air, water and land), energy efficiency, consumption of new materials, noise and site restoration. The aim is to achieve a high level of protection for the environment as a whole. Permits must take into account local environmental conditions at the site concerned, its technical characteristics and its geographical location. Conditions must be included to address any transboundary pollution from an installation and also to ensure, where necessary, that any environmental quality standard laid down in European Community legislation is not breached.

5.4.2. Radioactive substances regulation

The Agency is the enforcement authority for England and Wales of the *Radioactive Substances Act 1993*. This statute is concerned with the regulation of the keeping, use and disposal of radioactive waste. We will prosecute where breaches of a Radioactive Substances authorisation occur. There are three types of registration and one authorisation under the Radioactive Substances Act:

- Open Radioactive Source; radioactive material in a form that may be divided, for example, diluted. They include radioactive powders, gases, solutions or solids. There is potential for contamination of other materials.

- Closed Radioactive Source; firmly incorporated, or sealed, in solid, inert, non-radioactive material, which prevents the dispersion of any radioactive material. Closed sources include foil or electro-deposited materials. They normally consist of one or more radionuclides.

- Mobile Radioactive Apparatus; apparatus, equipment, appliance or other radioactive material, which is either constructed or adapted for being transported from place to place, and used for testing, measuring or otherwise investigating any of the characteristics of a substance or article, or used for releasing radioactive material into the environment or introducing it into organisms.

- 'Accumulate and dispose' authorisation; permits the accumulation and disposal of radioactive waste materials.

Within the Tone catchment there are three closed sources and one 'accumulate and dispose' site which are listed below.

Sites authorised as closed sources:
Three certificates are held by Somerset Scientific Services for Somerset County Council.

Sites authorised to accumulate and dispose of radioactive waste:
Taunton and Somerset National Health Service Trust, Musgrove Park Hospital, Taunton.

5.5. The Agency's own environmental management

We have developed an Environmental Management System to monitor our own environmental performance. An Environmental Management System is a systematic way of managing the environmental impact of an organisation. The approach follows the process of planning what we will do, how we are going to do it, checking that it is working, and reviewing and modifying our approach. A successful system will deliver a continual improvement in our environmental performance, and create potential for substantial cost savings.

We aim to ensure the allocation of resources at all levels to achieve the implementation of effective environmental management action throughout the Environment Agency, and to make line management responsible for the achievement of objectives and performance targets. The Agency will support continuous environmental improvement by the establishment of demanding but achievable and measurable environmental performance targets, determined and reviewed annually. These targets cover aspects of energy and resource use, waste minimisation and recycling. Our 1998/1999 performance is set out in Figure 12; the targets for next year are currently under discussion but have not yet been finalised.

Figure 12: Environmental Performance Targets 1998/1999

Target	Performance
Legislative Compliance	
Continue to ensure full compliance of all Agency sites with all relevant environmental legislation by undertaking a second round of DIY reviews and reporting, investigating and rectifying all environmental incidents caused by our own activities.	Of 193 sites identified as posing a risk to the environment, 184 have been inspected and are covered by an action plan.
Energy Management	
Reduce energy use in offices and depots by 20% measured as kWh/m² compared to Energy Efficient Office typical or 1991/1992 consumption, whichever is lower.	38 of 94 buildings achieved the target level for energy efficiency.
Compile "Green Transport Plans" to reduce commuter transport impacts at all key sites and reduce mileage on Agency business (lease, badged, casual, essential, etc.) by 5% on 1996/1997 figures.	During 1998/1999 we produced plans at 57 key sites, 77% of those targeted. We reduced our business mileage compared with 1996/1997 by 3%.
Improve overall fuel efficiency for badged vehicle fleet by 3 miles per gallon on 1996/1997 figures.	The fuel efficiency of the fleet has deteriorated throughout the last two years. We recorded 30.4 miles per gallon in 1998/1999 against 31.8 miles per gallon in 1996/1997.

Resource Management	
Implement resource and waste management plans at each Agency site. Specifically to:	We introduced resource management plans at 101 of 150 selected sites.
• reduce water use in offices and depots to 30% below accepted norm for this type of office or 1996/1997 consumption, whichever is higher;	We used 65.400m^3 water in our metered premises, a reduction of 30.4% on 1996/1997.
• reduce residual waste by 15% on 1997/1998 levels.	We produce about 163 kg waste per person, of which 51% is recycled.
Ensure that at least 10% of construction aggregates used are from recycled or secondary sources.	38% of materials used in construction projects were from recycled or secondary sources.

These national targets translate into area actions. The targets for North Wessex Area are covered by Actions 2.16.1, 2.16.2 and 2.17.1.

5.6. Flood defence operating authorities

Rivers and watercourses are divided into two legal categories; 'main rivers' as shown on statutory maps held by the Agency and the Ministry of Agriculture, Fisheries and Food and 'ordinary watercourses', which are all other rivers, streams, watercourses, rhynes and ditches.

Generally, the Agency has responsibilities for sea defences (protection against flooding of low-lying land from the sea and estuaries), and local authorities have responsibilities regarding coast protection (erosion of land not normally subject to flooding), although this division is subject to some variation in Somerset. The role of each organisation is usually based on permissive powers rather than a definite responsibility for undertaking any particular work. Whilst a duty of care applies when work is undertaken, the powers do not confer any statutory obligation to provide protection from flooding.

5.6.1. The Environment Agency

The Agency's flood defence function is undertaken through the Regional Flood Defence Committee with delegation of certain matters to the Somerset Local Flood Defence Committee. The Agency's Land Drainage byelaws generally apply to main rivers and their floodplains, and to areas within certain distances from flood and coastal defences. The Agency's role includes:

- supervising all matters relating to flood defence in England and Wales, including powers to direct where other drainage authorities fail to carry out their own duties
- carrying out improvement and maintenance works to reduce the risks of flooding from designated main rivers and sea
- clearing obstructions from main rivers that may cause a flood hazard

- operation of pumping stations and tidal and fluvial control structures on main rivers
- advising planning authorities on the implications of development proposals on flood risk issues and the environment
- issuing flood warnings
- using powers to regulate works that may affect flood risk; consent from the Agency is required for structures in, over or under main rivers, and for obstructions in non-main river watercourses
- survey of flood risk areas

5.6.2. Internal Drainage Boards

Eighteen Internal Drainage Boards (IDBs) operate within the lowland areas of the Somerset Levels and Moors catchments. Internal Drainage Boards have powers in relation to adopted or 'viewed' ryhnes. The adoption of these rhynes is by resolution of the Board, and finance is raised by the collection of a drainage rate on land and property in the Board's area. The roles of the Drainage Boards are:

- permissive powers to improve and maintain viewed rhynes
- powers to construct, operate and maintain control structures and pumping stations; in Somerset the Agency operates all major pumping stations

The Agency and the Internal Drainage Boards both have a duty to further conservation in the exercise of their powers and duties, and also specific duties as competent authorities under the Habitats Directive Regulations.

5.6.3. Local Authorities

- Local authorities may carry out works on watercourses, other than main rivers and those in Internal Drainage Board areas, in order to alleviate flooding from rivers or the sea, and they also have certain powers of enforcement on ordinary watercourses.
- Maritime District Councils (district councils which adjoin the sea) have powers to protect the land against erosion or encroachment by the sea.
- Local authorities produce contingency plans for civil emergencies and work with the emergency services to co-ordinate a response, and also respond to the local effects of flooding, including assistance to those at risk or affected by flooding.
- Local authorities have powers to regulate land use under planning legislation; planning authorities are responsible for protecting the flood defence interests of people whose properties may be affected by development proposals.
- Local authorities can make byelaws that apply to non-main river to ensure the efficient working of the drainage system, and to the coast.
- As highway authorities, local authorities are responsible for draining highways.
- Local authorities also have a duty to further conservation in carrying out any works.

5.6.4. Ministry of Agriculture, Fisheries and Food

- Assessment and award of grant aid for capital improvement works.
- Guidance and priorities for Water Level Management Plans.
- Overall policy for flood defence in England and Wales.
- Powers of direction in cases of dispute.

5.6.5. Riparian landowners

Riparian landowners have responsibilities for the maintenance of watercourses on their land including clearance of blockages and cutting of bankside vegetation, although in many cases statutory bodies may undertake both activities.

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

Each region has appointed an Education Co-ordinator to promote our education strategy at a local level. LEAPs are in themselves an educational resource within a local area. We have also produced a newsletter *The River Tone Environment News*, which is available from our Bridgwater office and summarises the key issues in the area.

We are also looking into more efficient ways to deliver environmental education, for example, offering training days to teachers. We support the Eco-schools initiative and have staff members who are trained as assessors for the scheme. Within Somerset the Agency has contributed to 'The Big Green Bus' project. This scheme is operated by Somerset Environmental Education Forum and provides grants to schools to cover the cost of transport to sites of environmental interest, such as landfills and organic farms. A new interactive CD-ROM *Riverside Explorer* has been produced by the Agency nationally and has been distributed free to all primary and secondary schools in England.

We exhibit at shows, such as the Royal Bath and West show and the Eco-Living event held by the Somerset Wildlife Trust. This year we organised a workshop, 'Your Waste Your Choice' which introduced schoolchildren from across Somerset to waste planning and waste management issues. This special one-day initiative for 12 to 14 year-olds involved workshops, a visit to a landfill site and a parliamentary-style debate at the council chambers.

For further information on our education initiatives please contact the Regional Education Co-ordinator at our Exeter Office. Our Customer Services Department at Bridgwater can provide a list of available resources for schools, which includes packs relating to Key Stages 1 and 2/3 and activity booklets for younger children.

5.8. Useful publications

British Geological Survey (1994)

Cordrey L (ed): *Action for Biodiversity in the South West; a series of habitat and species plans to guide delivery* (1997) ISBN 0903138972

Cordrey L (ed): *The Biodiversity of the South West; an audit of the South West biological resource* (1996) ISBN 0903138920

Department of the Environment Meteorological Office and Air Quality Division: *Air Quality A to Z* (June 1995) ISBN 0861803175

Department of the Environment: *Circular 30/92: Development and Flood Risk*

Department of the Environment, Transport and the Regions *Less Waste More Value* (1998) 98EP0055

Department of the Environment and The Welsh Office *Making Waste Work* (1995) ISBN 0-10-130402-1

Department of Environment: *Methodology for Designating Vulnerable Zones (Nitrates Directive)* Consultation Paper (1993)

Department of Environment: *Methodology for Identifying Sensitive Areas (Urban Waste Water Treatment Directive)* Consultation Paper (1993)

Department of the Environment, Transport and the Regions: *Taking Water Responsibly* (March 1999)

EC Directive: *Air Quality Standards for Nitrogen Dioxide* (85/203/EEC)

EC Directive: *Freshwater Fish* (78/659/EEC)

EC Directive: *Integrated Pollution Prevention and Control*

EC Directive: *Pollution caused by the discharge of certain dangerous substances into the aquatic environment* (76/464/EEC)

EC Directive: *Species and Habitats* (92/43/EEC)

EC Directive: *Surface Water Abstraction* (75/440/EEC)

EC Directive: *The Conservation of Wild Birds* (79/409/EEC)

EC Directive: *The Protection of Groundwater against Pollution Caused by Certain Dangerous Substances* (80/68/EEC)

EC Directive: *The protection of waters against pollution caused by nitrates from agricultural sources* (91/676/EEC)

EC Directive: *Urban Waste Water Treatment* (91/271/EEC)

Forestry Authority: *The UK Forestry Standard: The Government's Approach to Sustainable Forestry* (1998)

Forestry Commission: *England Forestry Strategy: A New Focus for England's Woodlands*

Forestry Commission: *Forests and Water Guidelines (3rd Edition)* (1997)

HMSO: *Biodiversity: the United Kingdom Steering Group Report* London, 2 Vols. (1995)

HMSO: *Control of Pesticide Regulations* (1986) SI 1510

HMSO: *Control of Pollution Act* (1974)

HMSO: *Control of Pollution (Amendment) Act* (1989)

HMSO: *Environmental Protection Act* (1990)

HMSO: *Health and Safety at Work Act* (1974)

HMSO: *Home Energy Conservation Act*

HMSO: *Land Drainage Act* (1991)

HMSO: *National Waste Strategy* (2000)

HMSO: *Radioactive Substances Act* (1993)

HMSO: *Reducing Emissions of Sulphur Dioxide: A Strategy for the United Kingdom* (1996)

HMSO: *Salmon and Freshwater Fisheries Act* (1975)

HMSO: *Sludge (Use in Agriculture) Regulations* (1989) SI 1263

HMSO: *The Control of Pollution (Special Waste) Regulations* (1980) SI 1709

HMSO: *The Environment Act* (1995)

HMSO: *The Forests & Water Guidelines* (1993)

HMSO: *The Producer Responsibility Obligations (Packaging Waste) Regulations* (1997)

HMSO: *The Special Waste Regulations* (1996) SI 972

HMSO: *Waste Management Licensing Regulations* (1994) SI 1056

HMSO: *Water Resources Act* (1991)

HMSO: *Wildlife and Countryside Act* (1981) HO-6/94-5k-CJTG

Ministry of Agriculture, Fisheries and Food: *Code of Good Agricultural Practice for the Protection of Air* (1992)

Ministry of Agriculture, Fisheries and Food: *Code of Good Agricultural Practice for the Protection of Soil* (1993)

Ministry of Agriculture, Fisheries and Food: *Code of Good Agricultural Practice for the Protection of Water* (1993)

Ministry of Agriculture, Fisheries and Food: *Code of Practice for the Safe Use of Pesticides on Farms and Holdings* (1990)

Ministry of Agriculture, Fisheries and Food: *Controlling Soil Erosion: an advisory booklet for the management of agricultural land* PB3280

Ministry of Agriculture, Fisheries and Food: *Controlling Soil Erosion: an advisory leaflet for preventing erosion caused by grazing livestock in lowland England* PB4091

Ministry of Agriculture, Fisheries and Food: *Controlling soil erosion: a field guide for an erosion risk assessment for farmers and consultants* PB4092

Ministry of Agriculture, Fisheries and Food: *Controlling soil erosion: a manual for the assessment and management of agricultural land at risk of water erosion in lowland England* PB4093

Somerset Air Quality Steering Group: *First Stage Air Quality Review and Assessment* (1998)

Somerset County Council: *Structure Plan*

Somerset County Council: *Waste Survey Report for Somerset* (1996)

Taunton Deane Borough Council: *Air Quality Review and Assessment in Taunton Deane Second Stage (Consultation document)* (2000)

Taunton Deane Borough Council: *Taunton Deane Local Plan*

Vincent Wildlife Trust: *The Water Vole (Arvicola terrestris) in Britain (1989-1990): Its Distribution and Changing Status* ISBN –0-94-6081-23-9

United Kingdom Climate Change Impact Review Group: *A Review of the Potential Effects of Climate Change in the United Kingdom* (1996)

5.9. Environment Agency Publications

A Guide to Information Available to the Public (1996)

A Guide to Sustainable Urban Drainage (1997)

A Price Worth Paying: The Environment Agency's Proposals for the National Environment Programme for Water Companies 2000–2005; a Submission to Government (May 1998)

Agreeing Access to Water for Canoeing (1999)

An Environmental Strategy for the Millennium and Beyond (1997)

1998/99 Annual Environmental Report for the Agency's Own Activities (1999)

Aquatic Eutrophication in England and Wales: A Proposed Management Strategy Consultative Report (1998)

Aquatic Weed Control (1997)

Baltmoor Wall (1998)

Conservation Designations in England and Wales (1998)

Corporate Plan 2000/01 (1999)

Corporate Plan Summary 2000/01 (1999)

Educational Resources for Schools, Colleges and Environmental Centres (1997)

Education Resources for Teachers (1999)

Enhancing Biodiversity (1999)

Farm Waste Minimisation (1997)

Floodline (1999)

Flood Warning Information (1999)

Freshwater Crayfish in Britain and Ireland (1999)

Garden with Care and Protect the Environment (1996)

General Guide to the Prevention of Water Pollution (1998)

Green Shoots: Our Vision for Environmental Education

Groundwater Regulations (1999)

Guidance for the Control of Invasive Plants near Watercourses (1996)

Guidance Notes for Riparian Landowners (1996)

Identifying Freshwater Crayfish in Britain and Ireland (1999)

Integrated Pollution Prevention and Control (1998)

Liaison with Local Planning Authorities (1997)

Living on the Edge: a Guide to the Rights and Responsibilities of a Riverside Owner (1998)

Local Agenda 21 (1998)

Looking After Our Rivers (1996)

Make Your Own Compost (1997)

Making Your Home and Garden More Water Efficient (1998)

Managing Maize: Environmental Protection with Profit (1997)

National Air Quality Strategy: The Role of the Agency (1998)

Nature's Way: A Guide to Surface Water Best Management Practices

Otters and River Habitat Management (1999)

Phytophthora Disease of Alder (1997)

Policy and Practice for the Protection of Floodplains (1997)

Policy and Practice for the Protection of Groundwater (1998) J40899 4/98
Pond Heaven (1997)
Ponds and Conservation (1998)
Producer Responsibility Obligations (Packaging Waste) Regulations (1999)
Reducing Air Pollution; Improving Air Quality (1999)
Review of Flood Defence Practices on the Somerset Levels and Moors (1999)
River Tone Catchment Management Plan (1997)
River Tone Catchment Management Plan: First Annual Review (1998)
River Tone Environment News (1999)
River Tone LEAP Consultation Draft (1999)
Saving Water: On the Right Track (1999)
Saving Water: On Your Farm (1999)
Saving Water: Taking Action (1997)
Severn Estuary Strategy: Severn Estuary Strategy Joint Issues Report (1998)
Severn Vale LEAP Action Plan (2000)
Somerset Levels and Moors Water Level Management Action Plan (1999)
Somerset Levels and Moors Water Level Management Strategy Review (1999)
Stanmoor Bank (1998)
State of the Environment of England and Wales – Coasts: A Summary Report (1999)
State of the Environment of England and Wales – Freshwaters: A Summary Report (1998)
Summary of Public Consultation for the River Tone LEAP (2000)
Sustainable Urban Drainage (1999)
The Environment Agency and Sustainable Development (1996)
The River Tone and the Riverside Development at Hankridge Farm (1997)
Tomorrow's Water (1999)
Understanding Buffer Strips (1996)
Understanding Riverbank Erosion (1998)
Waste Minimisation and Recycling Directory: North Wessex Area (1998)

For a copy of any of these publications or for information on other leaflets and documents that we produce, please phone our **Customer Contact team on 01278 457333.**

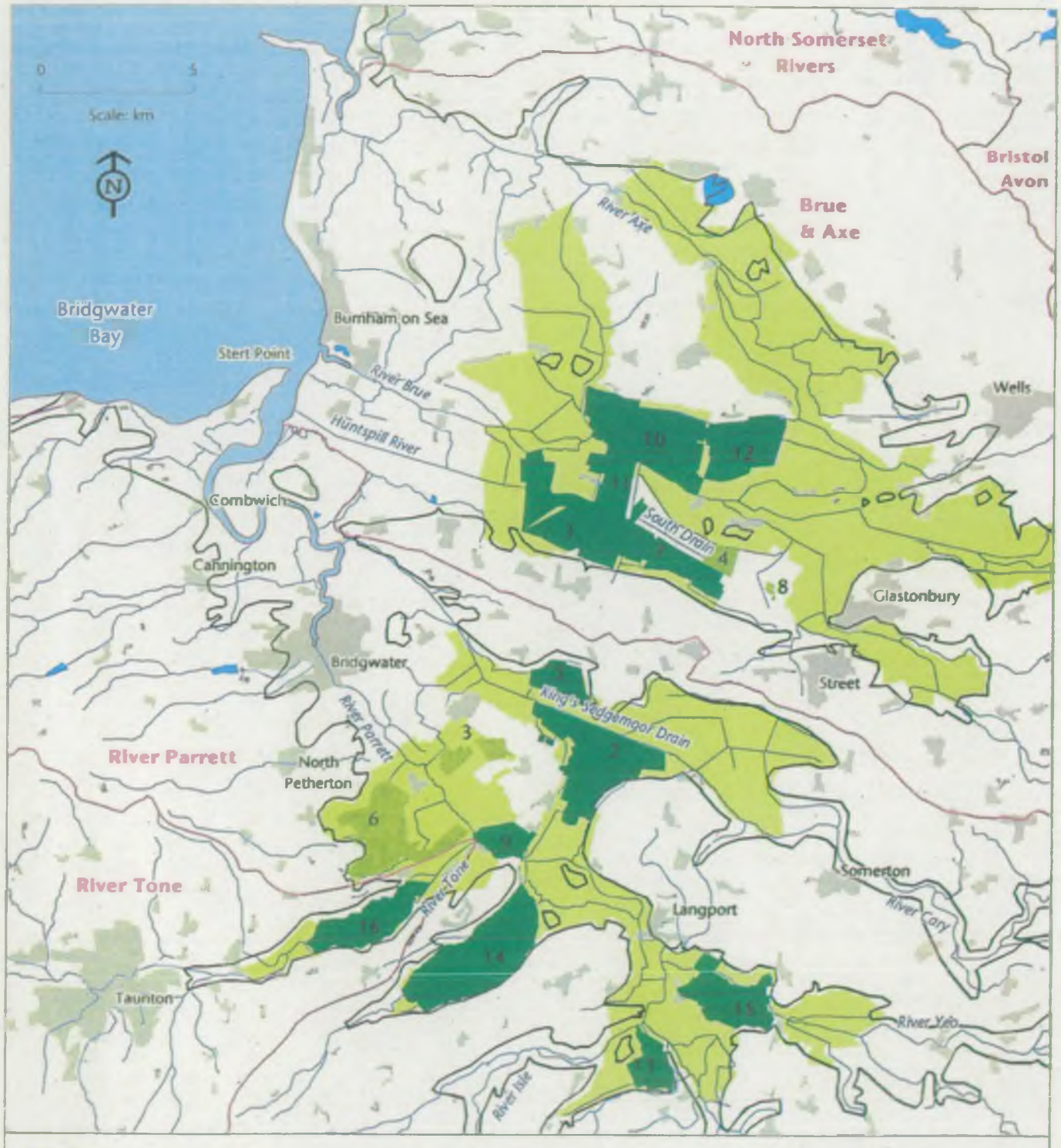
5.10. The Agency and public information

We are committed to being an open organisation and will provide information about our decisions and actions, and ensure consultation for our customers on plans and reports. Our Customer Charter sets out how we aim to achieve this commitment. We must maintain a set of public registers that hold information on the activities we regulate and on the monitoring we carry out. In addition to the information we place in registers, we make available most other environmental information that we hold.

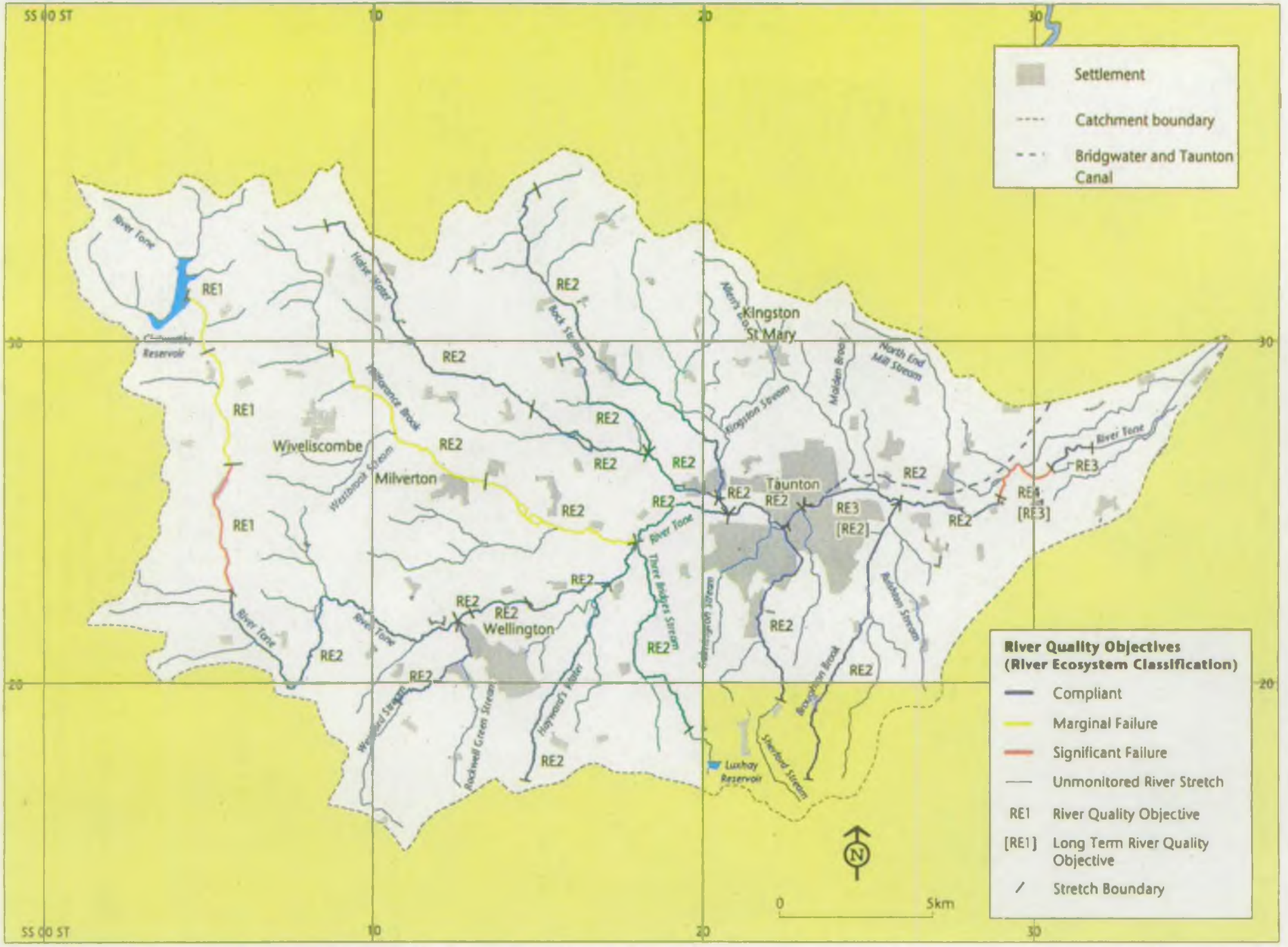
We have produced an information guide available to the public that sets out what information is available and how to obtain it (see above list). Information is usually provided free of charge, but for large and complex requests we may charge for staff time and materials. Confidential information, incomplete or draft reports and information where disclosure may lead to environmental damage are generally not available.

Other information is available from our Website, including an up-to-date national 'State of the Environment Report' at: **http://www.environment-agency.gov.uk**.

Map 4 - Somerset Levels and Moors and LEAP Catchments



Map 5 - Compliance with River Quality Objectives 1998 (River Ecosystem Classification)



☆ Solutions to soil erosion: Success of the River Tone Catchment Project

Farming is the main land-use in the Tone catchment and is vital to the area economically. However, some farming practices can have a big impact on the environment. Problems include soil erosion, disposal of farm waste, and the use of chemicals that may be harmful to the environment. Soil erosion is a problem because it takes fertility from fields and deposits it in rivers, blocks drains, floods roads and houses, leaves mud on the road and pollutes streams and rivers, sometimes killing river life.

☆ Water-worn gully

The River Tone Catchment Project is a collaborative initiative between the Farming and Wildlife Advisory Group (FWAG), the Somerset Wildlife Trust, Taunton Deane Borough Council and the Environment Agency, set up to improve wildlife habitat and reduce the impact of farming on the River Tone. The project aims to:

☆ Involve farmers in the enhancement of wildlife habitats
☆ Raise the issue of soil erosion and promote ways to tackle it
☆ Reduce the risk of farm waste and chemicals causing environmental damage
☆ Use existing grant schemes on farms to improve the environment

The project has so far advised a third of all farmers in the catchment, and many farmers have already taken steps to reduce the risk of damage to the environment. One method used is the creation of buffer strips. These are bands of unfarmed land between a crop and a river, which prevent soil and chemicals ending up in the river. The problem of erosion from fields left bare after harvesting can also be overcome by undersowing the main crop so the soil is stable after the crop has gone. Most important is risk assessment and the use of minimal tillage methods.

☆ Arable field with buffer strip

One of the main ways the Tone Project can help farmers achieve better environmental practices is through the Countryside Stewardship Scheme administered by the Ministry of Agriculture, Fisheries and Food (MAFF). Successful applicants receive a grant to implement an environmentally friendly ten-year farm plan. All the applications for Stewardship within the Tone catchment during 2000 were successful. To date, a total of £1 million in grants will enable farmers to make changes that will benefit the environment. Following the successes in the Tone catchment, we plan to extend the project to West Somerset, subject to securing funding.

Taunton in Flood: 40th Anniversary of 1960 floods

Over the last 40 years major works have been carried out on the River Tone to protect Taunton from flooding, but in October 1960 Taunton town centre and the surrounding streets were under three feet of water when the River Tone overtopped its banks after torrential rain.

1960 was the wettest year since 1934, and the flooding was caused by over 10 inches of rain falling on Taunton during October. Floodwater swept through many properties in the area, causing thousands of pounds worth of damage. The emergency services had to rescue several stranded people and the army was called in to help the relief effort.

The photo shows the 1960 floods; the County Cricket Ground is top right.

New flood warning code system launched for England and Wales

This autumn the Environment Agency launched a new flood warning system as part of Flood Week. The new codes are the result of a major review following the 1998 floods and replace the old yellow, amber and red warnings, which are no longer used. Under the new system there are four stages of warning:

- **Flood Watch**: Flooding is possible; be aware; be prepared; watch out.
- **Flood Warning**: Flooding of homes, businesses and main roads is expected; act now.
- **Severe Flood Warning**: Severe flooding is expected; imminent danger to life and property; act now.
- **All-Clear**: No flood watches or warnings currently in force in the area; flood water levels receding; check all is safe to return; seek advice.

If you are concerned about the threat of flooding to your home or would like advice on how to prepare, call **Floodline** on **0845 9881188**.

Pollution round-up: a summary of incidents in the Tone area in 2000.

In April Environment Agency Officers were called to a major milk spill on the Galmington Stream, where three thousand litres of milk had escaped from a holding tank. Milk is harmful as it starves the water of oxygen as it breaks down. The effects were limited by pumping the milk out onto surrounding fields, and quick action by the farmer.

In May a company was fined over £19,000 for spreading effluent containing blood on a field next to a public footpath near Wellington, posing a risk to public health. The case was brought by the Environment Agency.

A pollution incident on the Sherford Stream in August resulted in the deaths of around 100 fish. Powerful pesticides entered the stream from a local farm, affecting the entire length of the watercourse and impacting on invertebrates on the River Tone.

To report a pollution incident call our free hotline on **0800 807060**.

Colour photos courtesy of Farming and Wildlife Advisory Group

SW-12/00-0.5K-D-BFSI

MANAGEMENT AND CONTACTS:

The Environment Agency delivers a service to its customers, with the emphasis on authority and accountability at the most local level possible. It aims to be cost-effective and efficient and to offer the best service and value for money.

Head Office is responsible for overall policy and relationships with national bodies including Government.

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Fax: 0118 950 0388

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St Mellons Business Park
St Mellons
Cardiff CF3 0LT
Tel: 01222 770 088
Fax: 01222 798 555

For general enquiries please call your local Environment Agency office. If you are unsure who to contact, or which is your local office, please call our general enquiry line.

ENVIRONMENT AGENCY GENERAL ENQUIRY LINE
0645 333 111

The 24-hour emergency hotline number for reporting all environmental incidents relating to air, land and water.

ENVIRONMENT AGENCY EMERGENCY HOTLINE
0800 80 70 60

For general information about flooding.

ENVIRONMENT AGENCY FLOODLINE
0845 988 1188

BECAUSE FLOODS DON'T JUST HAPPEN TO OTHER PEOPLE

ENVIRONMENT AGENCY

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