

Recommendations for Statutory Water Quality Objectives



**ENVIRONMENT
AGENCY**

**THE WORCESTERSHIRE
STOUR CATCHMENT**

MIDLANDS

H/O Water Quality
Box 1

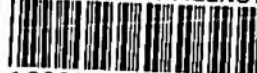
THE WORCESTERSHIRE STOUR CATCHMENT

MIDLANDS

Recommendations for Statutory Water Quality Objectives

Environment Agency
Information Centre
Office

ENVIRONMENT AGENCY



128007

Published by
Environment Agency
Rio House
Waterside Drive
Aztec West
Almondsbury
Bristol BS12 4UD

Tel 01454-624400

31st October 1996

© Environment Agency

*All rights reserved. No part of this publication may be reproduced,
stored in a retrieval system, or transmitted, in any form or by any means,
electronic, mechanical, photocopying, recording or otherwise without the prior written
permission of the Environment Agency.*

INTRODUCTION

The Environment Agency (the Agency) has recently concluded a three-month consultation exercise, initiated by its predecessor organisation, the National Rivers Authority (NRA), in eight "pilot" catchments. The Worcestershire Stour Catchment is one such pilot catchment, and SWQO proposals for the catchment were contained in the consultation document. *The Worcestershire Stour Catchment: Proposals for Statutory Water Quality Objectives*.

This document sets out the recommendations of the Agency to the Secretaries of State for the Environment and for Wales (the SoS) for Statutory Water Quality Objectives (SWQOs) for stretches of river in the Worcestershire Stour Catchment.

To aid interpretation of the Agency's recommendations, the general structure of this document is modelled on the predecessor SWQO proposal document. The primary differences are:

- A new appendix, *Appendix III: Digest of Responses to Consultation*, has been added to provide a summary of responses to our consultation and the actions that we have subsequently taken; and
- Further clarification, in some cases, of the likely costs and benefits associated with proposed water quality maintenance or improvement schemes.

In a minority of river stretches, we proposed two tiers of SWQOs. In these cases, the first tier has a target date within the present investment planning timescale and a further longer-term tier with a target date of 2006. Where an additional longer-term SWQO has been proposed, its purpose is to reflect the long-term water quality planning base agreed previously for the catchment. The longer-term SWQO proposals ensures that this planning base is not forgotten, and provides a mechanism for identifying priorities for future investment which will be necessary to attain the specified quality. These investment proposals will be taken forward as candidates in future investment planning rounds, and will of course be balanced with other priorities at that time. No new investment, additional to current agreements, is sought from the water industry within the present financial planning period.

This document has been sent to the Secretary of State to inform Government of our recommendations for SWQOs. Therefore, no further comments are required by the Agency at this time, although to obtain further copies you may contact the Area Water Quality Manager, Environment Agency, Upper Severn Area, Hafren House, Welshpool Road, Shelton, Shrewsbury, SY3 8BB. On the basis of our recommendations, Government may now proceed with a further period of formal consultation that could ultimately lead to the setting of SWQOs, and will invite further responses during this formal consultation period.

STATUTORY WATER QUALITY OBJECTIVES

The purpose of SWQOs is to establish targets, on a statutory basis, that provide an agreed planning framework for regulatory bodies, dischargers, abstractors and river users. SWQOs will secure achievements to date by providing a statutory "backstop" to existing Consents, as well as providing a vehicle for tackling discharges from non-water sectors of industry, agricultural and other diffuse pollution, and the effects of new or revised abstractions. The SWQO scheme is use-related, based upon a range of water quality standards that protect the "uses" to which waters may be put. There are a number of different potential river uses. River Ecosystem is the only use to date for which standards have been introduced.

The River Ecosystem Use

The River Ecosystem Use is the first of the SWQO uses to be introduced for rivers. The quality standards defining the five River Ecosystem use classes have been introduced by *The Surface Waters (River Ecosystem) (Classification) Regulations 1994*. These standards are reproduced in Table 1. The statistical methods involved in setting SWQOs and further details about application of SWQOs can be found in the document *Water Quality Objectives: Procedures Used by the National Rivers Authority for the purpose of the Surface Waters (River Ecosystem) (Classification) Regulations 1994*, which is available from the Water Quality Planning department of the Environment Agency Regional Offices, or from the address given on page 1.

How SWQOs will be Set

SWQOs, currently based only on the River Ecosystem use, are recommended on a stretch-by-stretch basis for the major rivers within the catchment; they will not apply to our smallest rivers. These targets comprise two parts: a River Ecosystem class; and a date by which compliance should be achieved. Account has been taken of planned investment to ensure that the targets are achievable and, where appropriate, reflect planned improvements in river quality. Where appropriate, we have recommended two-tier SWQOs to protect water quality. The target date for the longer-term SWQOs has been set at 2006 to enable prioritisation of expenditure in future planning rounds, and to enable the SWQO to be reconsidered at the five-yearly review stage.

Through the prior consultation exercise, we sought the views of those with an interest in this catchment, and these views have been taken into account in these recommendations to Government. Government will now proceed with a period of formal consultation, after which SWQOs may be set through Notices served by the Secretary of State. Once formally set, the River Ecosystem classes and dates will represent statutory targets. We will then be under a duty to ensure compliance using the various pollution control powers at our disposal. SWQOs may be reviewed after five years.

Once formally set, SWQOs will have a statutory basis, generally protecting the existing planning base currently expressed as River Quality Objectives (RQOs). SWQOs will therefore provide the basis for the Environment Agency's discharge consenting and water quality planning activities.

Statutory Objectives Introduced by EC Directives

Designations of river stretches, or points on rivers, are also subject to Regulations which enforce standards set by the EC Dangerous Substances Directive (76/464/EEC), and these standards already constitute statutory objectives. The EC Surface Water Abstraction Directive (75/440/EEC) and the EC Freshwater Fisheries Directive (78/659/EEC) also contain mandatory standards. Designations and compliance reports under these three Directives are included in the Catchment Management Plan but do not form part of the recommendations in this document.

TABLE 1: STANDARDS FOR RIVER ECOSYSTEM CLASSES

Class	Dissolved Oxygen % saturation 10 percentile	BOD (ATU) mg/l 90 percentile	Total Ammonia mg N/l 90 percentile	Un-ionised Ammonia mg N/l 95 percentile	pH lower limit as 5 percentile; upper limit as 95 percentile	Hardness mg/l CaCO ₃	Dissolved Copper µg/l 95 percentile	Total Zinc µg/l 95 percentile
RE1	80	2.5	0.25	0.021	6.0 - 9.0	≤ 10 > 10 and ≤ 50 > 50 and ≤ 100 > 100	5 22 40 112	30 200 300 500
RE2	70	4.0	0.6	0.021	6.0 - 9.0	≤ 10 > 10 and ≤ 50 > 50 and ≤ 100 > 100	5 22 40 112	30 200 300 500
RE3	60	6.0	1.3	0.021	6.0 - 9.0	≤ 10 > 10 and ≤ 50 > 50 and ≤ 100 > 100	5 22 40 112	300 700 1000 2000
RE4	50	8.0	2.5	-	6.0 - 9.0	≤ 10 > 10 and ≤ 50 > 50 and ≤ 100 > 100	5 22 40 112	300 700 1000 2000
RE5	20	15.0	9.0	-	-	-	-	-

OVERVIEW OF THE WORCESTERSHIRE STOUR CATCHMENT

Catchment Description

The River Stour and its principal tributary, the Smestow Brook, rise in the Clent Hills and Wolverhampton respectively. The catchment drains an area of 373 km², covering parts of Hereford and Worcester, Staffordshire and the West Midlands, before joining the River Severn at Stourport. A section of the Staffordshire and Worcestershire Canal runs alongside the Smestow Brook and the River Stour, providing a link between the river basins of the Severn and the Trent and, via the Shropshire Union Canal, the Mersey. In all, the NRA routinely monitors the quality of 164 km of watercourses in the Worcestershire Stour catchment. An overview of the catchment is provided on Map 1.

Most of the catchment is underlain by a Sherwood sandstone aquifer, which has a significant influence on river flows and land use within the catchment. The aquifer is an important water resource, abstracted for public water supply and both agricultural and industrial uses.

The headwaters of the Stour and its tributaries rise in rural land before entering urban areas. Although these headwaters receive few consented effluent discharges, they tend to suffer from minor intermittent pollution requiring continuing pollution prevention and control activities to protect the quality of the water.

The total population of the catchment is 540,000 and around two-thirds of the catchment is rural, supporting a mixed agriculture. However, a significant proportion of the catchment is highly urbanised, and 35% of the total area is located in the Metropolitan Boroughs of Wolverhampton (114,700), Dudley and Sandwell (150,000), including the towns of Stourbridge (55,000) and Halesowen (57,500). The lower stretches of the river run through the urban area of Kidderminster (50,750) with its large carpet industry, other smaller settlements include; Wombourne (12,930) and Stourport (17,933).

Information on the number of tourists visiting the Stour catchment has been obtained from the Heart of England Tourist Board and British Waterways (BW) which suggests that the residential population is swelled by up to 10 million seasonal visitors most of whom make day trips from home. Schemes for urban regeneration and development exist for a number of smaller sites of less than 5 hectares, others include Darlestone racecourse, Merryhill former steelworks, housing renewal areas in Lye, central Dudley, Netherton and town centre redevelopment in Kidderminster adjacent to the Stour following decline in the carpet industry. These are not expected to increase population significantly.

Urban watercourses are subject to a range of pollution problems, including contaminated run-off, discharges from sewage treatment works (STWs) and from industry, unsatisfactory combined sewer overflows (CSOs) and contaminated land. The River Stour from Lye to its confluence with the Severn receives major discharges of treated sewage effluent. Considerable expenditure is planned to improve water quality in the catchment, which will have benefits to fishery and other uses.

The Smestow Brook has an important effect on the quality of the Stour. Its quality is determined by the effects of several consented sewage discharges and isolated industrial discharges. Most of these discharges perform better than the formal requirements of their consents, so future water quality will be dependent on the continued efficient operation of these treatment works.

The Blakedown, Hoo and Drakelow Brooks are clean rural streams, including areas of predominantly mixed agriculture, but receiving some sewage effluent discharges. An important feature in the Blakedown Brook is the problem of low flows which can have a deleterious effect on quality by reduction in dilution of sewage effluents. Agency action to alleviate low flows is in hand, but will not improve dilution enough to significantly improve river water quality. The maintenance of existing quality in the Blakedown Brook downstream of Blakedown STW is dependent upon the continued discharge of a reasonable quality effluent from Hagley STW.

The canals in the catchment share a characteristic flow pattern, a common mode of operation by British

Waterways, and the effects of the treated sewage from Barnhurst STW, which serves Wolverhampton. They are therefore considered together for water quality planning purposes.

Current Water Quality

For water quality planning purposes, the NRA divides the Worcestershire Stour catchment into 48 stretches. The chemical and biological quality of these 48 stretches are monitored routinely. In 1994, 73% of the total length was classified as fair and 3% as good quality. This would be expected to allow the river to support at least a coarse fishery. The remaining 24% of river length was classified as of poor quality, which would limit the quality of the fishery and the diversity of aquatic life.

It has been a long-standing objective of the NRA and its predecessor organisations to reduce the length of poor quality watercourse in this catchment.

Discharges from STWs and CSOs have a dominant polluting impact in the catchment. In the urban areas, contaminated run-off from roads and car parks, contaminated land and redundant waste disposal sites have an adverse impact on the river system. The rural areas are affected by land drainage containing nutrients such as nitrates. There is a continuing need to control pesticide concentrations in the lower Stour originating from the carpet industry in Kidderminster. Residues of moth-proofing agents and sheep dip chemicals are passed through the treatment process at Kidderminster STW, which receives and treats the waste water from carpet manufacturers.

In order to introduce the water quality issues, with associated cost and benefit information, river stretches in the Stour system have been grouped according to common quality and use characteristics. These groupings are used to give more detailed information in Appendix II.

Catchment Management Plan

A catchment management plan (CMP) Consultation Report was produced in 1992. A second annual review of the Action Plan was carried out at the end of 1995. These documents provide more detailed information on uses made of the catchment and the NRA's objectives for the future. Up until 1995, water quality classification and the setting of objectives was carried out using the National Water Council (NWC) scheme. In 1995 the NRA introduced the River Ecosystem (RE) classification scheme. However, because the CMP was produced before the RE scheme was introduced, the quality objectives discussed in the CMP were set in terms of the NWC scheme. There has therefore been no previous consultation on quality objectives in River Ecosystem terms.

PROPOSALS FOR STATUTORY WATER QUALITY OBJECTIVES

Maps 2 and 3 contain our proposals for SWQOs in the Worcestershire Stour catchment.

The Catchment Management Plan (CMP) prepared by the NRA sets out present and planned future uses for river stretches within the catchment. Currently, these uses are defined by non-statutory water quality targets known as River Quality Objectives (RQOs). Generally, RQOs reflect our view of, and long-term agreements on, the needs of river stretches.

Where possible, SWQOs have been proposed at a level consistent with RQOs. Generally, these will be achievable within the 5 to 10 year horizon of investment planning. However, where it has been necessary, owing to restrictions on further investment, to propose an SWQO that is less stringent than the existing RQO, a further longer-term SWQO is proposed. This longer-term SWQO, which has a target date of 2006, is indicated on Map 3. Map 2 is also annotated with the symbol [*] where an additional longer-term target applies.

In 36 of the 48 stretches in the catchment (i.e. 136 km, or 83% of the total river length), the proposed SWQO is consistent with the existing long term RQO. However, in the remaining 12 stretches (Stretch numbers 16, 18, 20, 25, 28, 32, 34, 35, 36, 37, 38, and 39), a second tier of longer-term SWQO is proposed consistent with existing RQOs. These 12 stretches represent 17% of the total river length in the catchment.

Further details of the proposed SWQOs for each river stretch are contained in Appendix I.

COMPLIANCE WITH PROPOSED SWQOS

Map 4 compares current water quality with the proposed SWQOs for 48 stretches of river. Where a longer-term SWQO is also proposed, the short term SWQO provides the basis for this assessment. The colour scheme used in the map is:

- **Blue** (compliant) indicates that the river stretch currently complies with its target ($\leq 50\%$ confidence of failure)
- **Yellow** (marginal) indicates that, although the river stretch currently complies with its target, there is a risk that it might fail to comply (between 50-95% confidence of failure)
- **Red** (failure) indicates that the river stretch does not currently comply with its target, and that this non-compliance is unlikely to be due to statistical chance ($> 95\%$ confidence of failure)

The small diagrams alongside the failing or marginal stretches depict those aspects of water quality which do not meet the standards. The rules for assessing compliance are described in detail in the document *Water Quality Objectives: Procedures Used by the National Rivers Authority for the Purpose of the Surface Waters (River Ecosystem) (Classification) Regulations 1994*, which is available from the contact given at the foot of the Introduction page.

In creating Map 4, data for pH in the Merry Hill Brook on an isolated occasion, has been discounted. Non-compliance with the standard for this determinant is due to circumstances beyond the control of the NRA's powers. We exclude these in order not to jeopardise the maintenance of quality for other determinands defining the targets.

Where compliance is marginal, or where a failure is noted, actions to rectify the problem and deliver the proposed SWQO are identified in Appendix II.

THE WORCESTERSHIRE STOUR CATCHMENT

MAP 1: OVERVIEW OF THE CATCHMENT




Location of the Catchment within Environment Agency
Severn Trent Region

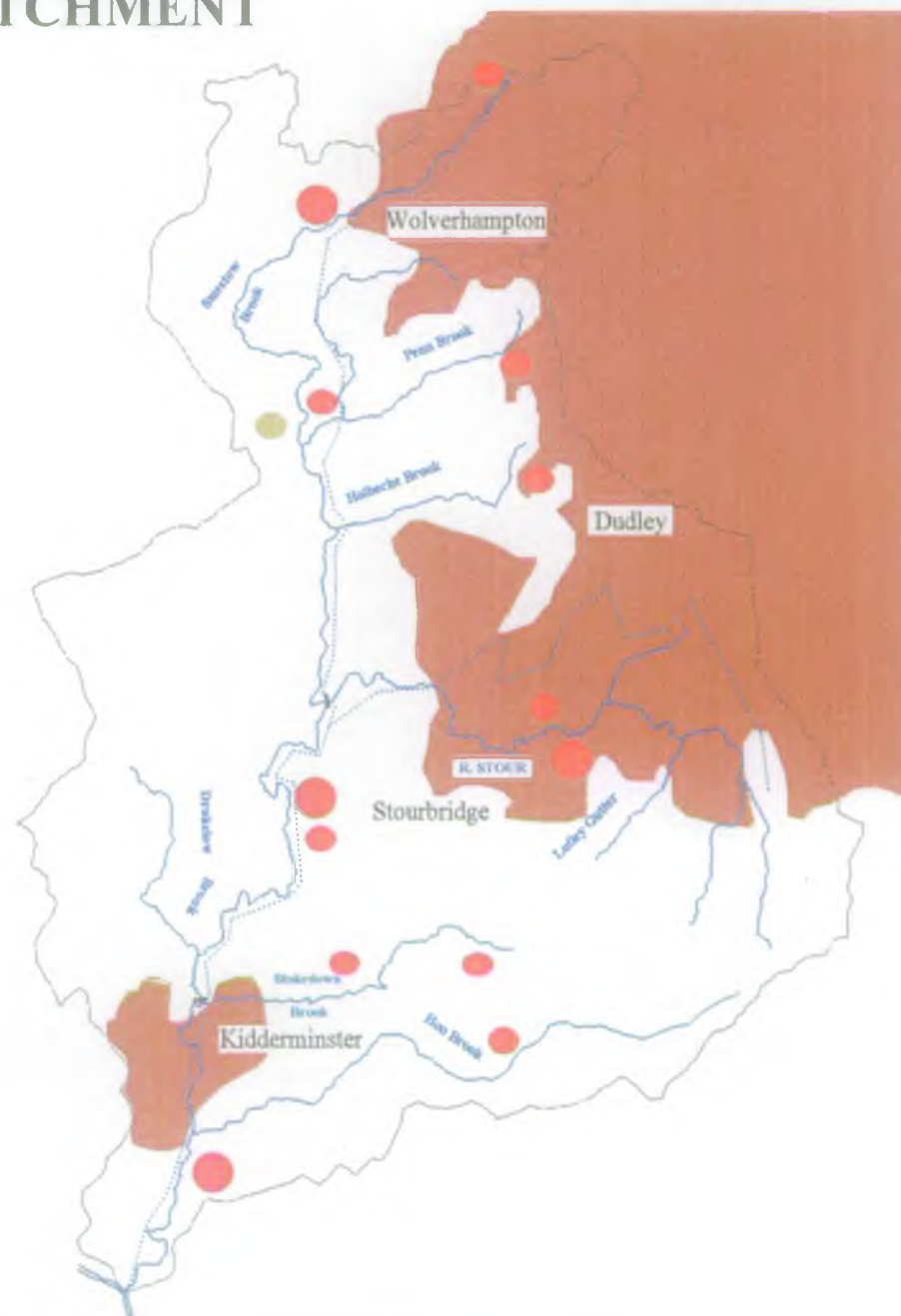


Key

-  Urban Areas
-  Catchment Boundary
-  Rivers
-  Canal

Sewage Treatment Works (DWT: dry weather flow)

-  DWF 1,000 - 9,999 m³/d
-  DWF more than 10,000 m³/d
-  Trade Discharges



THE WORCESTERSHIRE STOUR CATCHMENT

MAP 2: PROPOSED SWQOs

Key

River Ecosystem Class

RE1

RE2

RE3

RE4

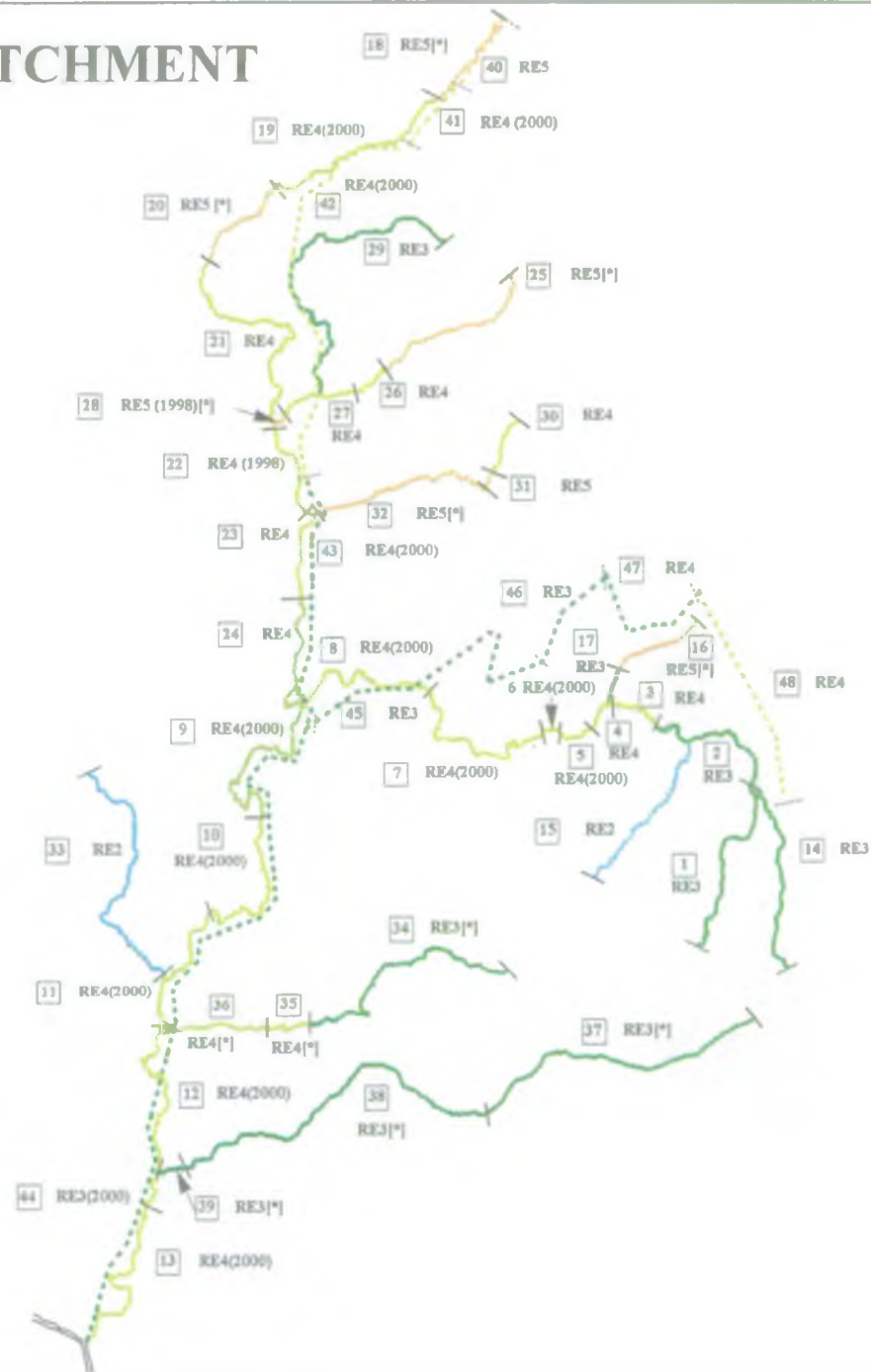
RE5

Canal Stretch

Stretch Numbers

[*] Indicates where a longer-term SWQO is proposed (see Map 3).

Notes: SWQOs have a target date of 1996 unless otherwise indicated on the map.



THE WORCESTERSHIRE STOUR CATCHMENT

MAP 3: LONGER-TERM SWQOs

Key

River Ecosystem Class



RE1



RE2



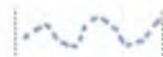
RE3



RE4



RE5



Canal Stretch

14

Stretch Numbers

[RE]

Indicates a
longer-term
SWQO

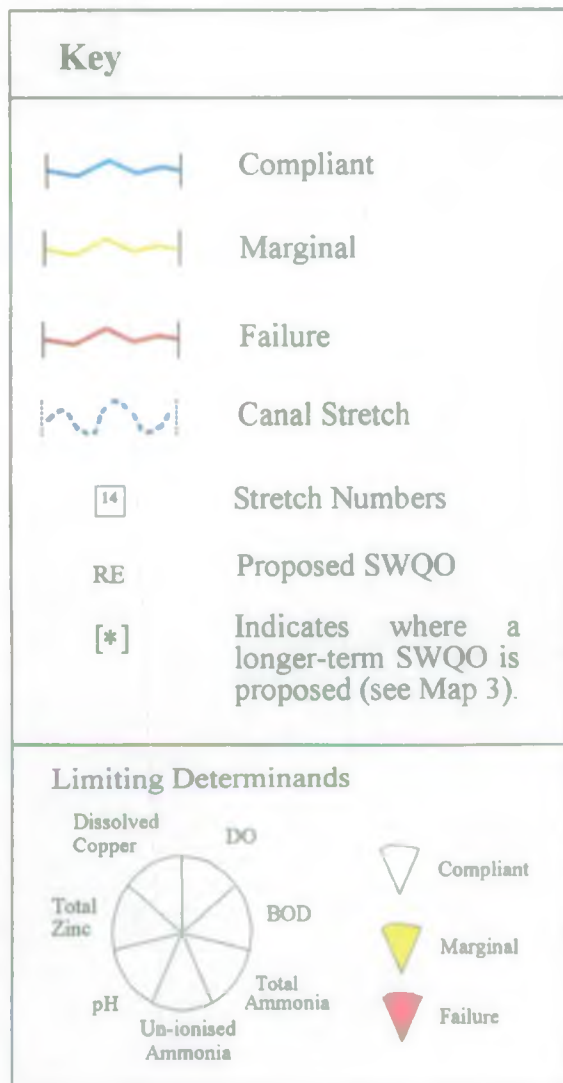
Notes:

- Longer-term SWQOs will have a target date of 2006.
- A river stretch with no longer-term target is coloured according to the SWQO on Map 2.



THE WORCESTERSHIRE STOUR CATCHMENT

MAP 4: COMPLIANCE WITH SWQOs



ASSESSMENT OF COSTS AND BENEFITS

Costs

The costs associated with water quality schemes within the catchment are those necessary to prevent river quality from deteriorating or, where desirable and justifiable, to improve the quality of river stretches within the catchment. Maintenance of river quality, or improvement to support new river uses where recommended, it is consistent with the future needs that we may place upon our water resources, and therefore with the broad aims of sustainable development.

These costs do not necessarily reflect new investment. Rather, they provide a summary of investment already sought or committed to meet various international commitments such as those identified by the EC Directive on Urban Waste Water Treatment, other national obligations such as Regulations governing farming practices, or other agreements already in place. Further, as yet uncommitted, investment is also identified. The broad costs for the catchment as a whole are broken down into the following categories:

- £15 million of already committed water industry expenditure that is necessary to maintain river quality against a background of potential deterioration, or meet other legal obligations (predominantly those required by European Directive);
- £40 million of additional investment by the water industry that has already been committed to support nationally agreed priorities for environmental improvements; and
- £630,000 of investment by agriculture, or industry sectors other than the water industry, which will be required to maintain the quality of river water to support the identified uses to which the river is put. Again, this is not necessarily new investment, but reflects schemes necessary to maintain river quality or to comply with existing regulations (Farm Regulations etc).

In addition to the investment, a further, as yet uncommitted, £15 million of water industry investment is identified to deliver longer-term SWQOs. This investment, which will be necessary to maintain the quality of river stretches within the catchment at their planned level, is not being sought in the present water industry investment planning round, but will be put forward as candidates in future planning rounds and will be assessed relative to other priorities at the time. Figures on Water Company costs are estimates based on discussions with the company during the AMP2 negotiations. The company were reluctant or unable to provide categorical figures and have registered their concerns about costings particularly in relation to the expenditure beyond AMP2.

Benefits

During consultation on the Catchment Management Plan (CMP), we identified the uses to which the local community wishes to put stretches of river in the Worcestershire Stour catchment. Some of these uses are reflected in our recommendations for SWQOs. The beneficiaries of proposed investment include not only the 540,000 people, and future generations, that live within the catchment, but also its up to 10 million annual visitors (most of whom make day trips from home) and the trade that they bring with them. Where legal requirements are in place (for example compliance with EC Directives), we have not sought to justify the expenditure necessary to deliver them, although Appendix II indicates the broad benefits that will accrue from such investment.

Longer term benefits, that will become increasingly important as population growth and climate change affect the catchment, include preserving future options for the abstraction of water from river stretches that are currently not utilised as sources for public and agricultural supply. Both the groundwater in sandstone underlying a large part of the catchment and the River Severn downstream of the Stour have abstractions for public water supply. Improved quality in the Stour and its tributaries will make both of these sources more suitable for public water supply and will reduce the costs of treatment. Protecting water quality will also help

to sustain uses downstream of the catchment.

Maintaining river quality within the catchment, and improving it where suggested will also aid urban regeneration in parts of the Black Country in the Dudley and Sandwell Borough areas including Netherton, Lye, Merryhill, Darlestone and Kidderminster.

Comparison of Costs and Benefits

The Worcestershire Stour catchment has benefitted from investment by the water industry, by other sectors of industry and by agriculture over many years in making progress to solve long standing water quality problems rooted in the urban and industrial nature of land use. More investment is needed to move the quality of the river and its environs to a position where a full range of water uses can be sustained.

Uses most at risk should water quality deteriorate are the existing and high potential coarse fisheries and the informal recreation/tourism facility available for a large population in the West Midlands. Abstractions for potable, agricultural and industrial use have a direct link to quality in the Stour.

As detailed in Appendix II, the majority of costs associated with achieving the proposed SWQOs are attributable to the AMP2 expenditure by Severn Trent Water Ltd (STWL). This will be split between the main part of the Stour and the Staffordshire and Worcestershire Canal. Smaller amounts of expenditure under the EC Urban Waste Water Directive will take place at a number of sites but are not expected to produce significant water quality improvements. Expenditure will take place with associated benefits by 2000.

Work carried out will concentrate on ensuring that sewage works produce high quality effluents and there will be investment to bring sewerage systems up to an acceptable performance, reducing overflows of untreated sewage and emission of sewage litter thus helping to ensure that these urban watercourses have better aesthetic quality.

Money spent at Barnhurst STW will improve conditions in the Staffordshire and Worcestershire canal, ensuring compliance with the EC Freshwater Fisheries Directive. This canal system provides a popular recreational venue for local residents as well as attracting boat users and anglers from a wide area.

In addition to the expenditure by the water company, there are a number of pollution problems that are being dealt with as a result of the continuing work of the Agency and its predecessor organisations. These include, smaller scale spending (in the region of tens of thousands of pounds) to deal with the pollution incidents and follow up at the industrial sites, the identification and realistic planned remediation of the effects of contaminated land and disused tip sites, which may cost many hundreds of thousands of pounds and the investment by the local authorities, private interest groups and the Agency to develop the potential of the Stour catchment as a conservation and amenity resource. It has not been possible to produce detailed lists of projects and costings but estimated figures are given where available. This type of improvement work is very important to complement the catchment wide quality changes expected from the AMP2 spending by the water company. Identification and remedying of potentially toxic pollution will encourage the development of a healthy and diverse aquatic flora and fauna.

Improvements in quality and benefits summarised above will be realised in 34 km of the Stour, 22 km of Smestow Brook and its tributaries and 37 km of the Staffordshire and Worcestershire canal. More than 57% of the total classified length will be improved or have current uses secured.

Quantitative information on participation rates for benefits such as fishing, recreation and tourism have been difficult to obtain for all stretches. British Waterways have supplied some information for the canals in the catchment which is summarised in Appendix II and which indicates that there are large numbers of people prepared to travel to or within the catchment to use the waterways. It is the view of tourist organisations such as the Heart of England Tourist Board that environmental quality is a potent factor in encouraging tourism and

water based leisure.

The Stour, its tributaries and the associated canal network occupy an important place in history and geography of this area on the edge of the West Midlands conurbation. Water quality in the Stour affects water supply abstraction locally and further down the Severn as well as angling, recreational use and ecology of the area. Expenditure to maintain and improve water quality will have benefits which outweigh the costs in all above uses and will help redress the historically important effects of industrialisation in the region.

GLOSSARY

Action Plan	A document produced by the NRA as a result of a Catchment Management Plan (ibid). It lists the actions required in the next 5 - 10 years.
Aquifer	Layers of underground porous rock which contain water and allow water to flow through them.
ATU	Allyl Thio-Urea. See Biochemical Oxygen Demand.
Ammonia (or Total Ammonia)	A chemical found in water often as the result of pollution by sewage effluent. Ammonia affects fisheries and abstractions for potable water supply.
AMP2	An acronym for Asset Management Plan, Number 2. These are the plans of the Water Companies for future investment. This expenditure is committed and has been justified as part of the national negotiations with the Water Industry on future charges for water. See also Statutory Expenditure and Discretionary Expenditure.
BOD and BOD(ATU) Biochemical Oxygen Demand	A measure of the amount of oxygen consumed in water, usually by organic pollution (ibid). Oxygen is vital for life so the measurement of the BOD tests whether pollution could affect aquatic animals. The value can be misleading because much more oxygen is taken up by Ammonia (ibid) in the test than in the natural water. This effect is suppressed by adding a chemical (Allyl Thio-Urea) to the sample of water taken for testing. Hence BOD(ATU).
Catchment	The area of land over which rainfall drains to the river.
Catchment management planning	The consultative process by which the Agency plans to meet all the issues in any catchment, and not just water quality and RQOs. It involves the production of a Consultation Report and liaison with local people in forming an Action Plan (ibid). One outcome of the process is draft proposals for SWQOs (ibid).
Classified River or Classified Watercourse	Rivers big enough to be included in the national quinquennial reports on river water quality. Generally these are rivers whose flow is bigger than about 5 million litres per day, though smaller rivers may be included if they are particularly important. Only classified rivers are being considered for SWQOs (ibid), though all rivers can have RQOs (ibid).
Combined Sewer Overflows	Most sewers receive flows of sewage and flows of rainfall that run off our roads and paved areas. After heavy rainfall, the flows in the sewer may exceed the capacity of the sewers or the capacity of sewage treatment works. Combined Sewer Overflows allow the diluted and excess flow to discharge to a receiving water. The conditions under which flows may overflow into receiving waters are specified in the Consent (ibid).
Compliance Assessment	A procedure applied to the results of a monitoring programme to determine whether a water has met its Quality Standards (ibid).
Confidence of Failure	The outcome from compliance assessment (ibid). This might conclude with the statement, for example, that we are 93 % certain of failure - the Confidence of Failure is 93 %. We are often less than 100% sure of failure because we cannot monitor continuously everywhere.
Consent	A statutory document issued by the Agency which defines the legal limits and conditions on the discharge of an effluent to a water.
Copper	See Dissolved Copper
CSO	An acronym for Combined Sewer Overflow (ibid).
Cyprinid Fish	Coarse fish belonging to the carp family (roach, dace, bream, etc).
Dangerous Substances Directive	Substances defined by the European Commission as in need of special control because they are toxic, accumulate in plants or animals and are persistent. Subjects of the Dangerous Substances Directive (76/464/EEC).
Directive	A type of legislation issued by the European Community which is binding on Member States in terms of the results to be achieved but which leaves to Member States the choice of methods.
Discretionary Expenditure	A special category within AMP2 (ibid) for expenditure over and above Statutory Expenditure (ibid). Discretionary Expenditure is targeted at meeting a specific national set of environmental improvements.
Dissolved Copper	A metal, toxic to fish.
Dissolved Oxygen	The amount of oxygen dissolved in water. Oxygen is vital for life so this measurement is a test of the health of a river.
Freshwater Fish Directive	A Directive (ibid) that sets water quality standards for rivers designated as freshwater fisheries (78/659/EEC).
Fish Directive	The Freshwater Fish (ibid) Directive (ibid) (78/659/EEC).
General Quality Assessment (GQA)	The Agency's way of placing waters in categories according to assessments of water quality based on measurements of BOD, Dissolved Oxygen and Ammonia. Used for the national reporting of trends.
Hardness	A measure of the dissolved minerals in water. Important because this affects the toxicity of Copper and Zinc (ibid)

Invertebrates	Animals which lack a vertebral column. They include, for example, insects, crustaceans, worms and molluscs.
MAFF	Ministry of Agriculture Fisheries and Food.
mg/l	Unit of concentration: Milligrammes per litre.
mg/l CaCO ₃	Unit of concentration: Milligrammes per litre (expressed as Calcium Carbonate).
mgN/l	Unit of concentration: Milligrammes per litre (expressed as nitrogen).
Ml/d	Unit of river flow, megalitres per day - millions of litres per day.
NWC	National Water Council Scheme: classification scheme historically used by the NRA and its predecessors to manage and assess river water quality.
Organic Pollution	A term used to describe the type of pollution which through the action of bacteria consumes the Dissolved Oxygen (ibid) in rivers. It applies to the effects of sewage, treated sewage effluent, farm wastes and the waste from many types of industry like dairies, breweries and abattoirs. The effects of organic pollution are described by the levels of BOD, Ammonia and Dissolved Oxygen (ibid).
Percent Saturation (% saturation)	Unit of measurement for Dissolved Oxygen. The amount of oxygen expressed at a proportion of the maximum which can be dissolved in pure, sterile, water.
Percentile	A level of water quality, usually a concentration, which is exceeded for a set percentage of the time. Hence: 90-percentile (ibid).
pH	A measure of the acidity of water.
90-percentile	A level of water quality, usually a concentration, which is exceeded for 10-percent of the time. Similarly, 95-percentile and 10-percentile.
90-percentile Standard	A level of water quality, usually a concentration, which must be achieved for at least 90-percent of the time. Similarly, 95-percentile and 10-percentile.
Quality Standard	A level of a substance or any calculated value of a measure of water quality which must be bettered. The pairing of a specific concentration or level of a substance with a summary statistic like a 90-percentile (ibid).
River Quality Objective (RQO)	The category of water quality that a body of water should match, usually in order to be satisfactory for use (ibid) as a fishery or water supply etc. Mostly expressed as the River Ecosystem Class.
Salmonid Fish	Game fish of the Salmon Family (trout, salmon, etc).
Sites of Special Scientific Interest	A legal designation applied by English Nature /Countryside Council for Wales to land of particular importance for nature conservation.
SSSI	Acronym for Site of Special Scientific Interest (ibid).
Statistically significant	A description of a conclusion which has been reached after making proper allowance for the effects of random chance.
Statutory Expenditure	AMP2 (ibid) expenditure which is mainly aimed at meeting legal duties, especially those imposed by European legislation. For sewage treatment, it is dominated by the requirements of the Directive on Urban Waste Water Treatment (ibid).
Statutory Water Quality Objective (SWQO)	A Quality Objective given a statutory basis by Regulations made under the Water Resources Act 1991.
STW	Acronym for Sewage Treatment Works
Surface Water Abstraction Directive on)	A Directive (ibid) that sets water quality standards for surface waters used, after treatment, as a supply of drinking water to the public (75/440/EEC).
Total Ammonia	See Ammonia.
Total Zinc	A metal, toxic to fish.
Unionised Ammonia	A species of Ammonia (ibid). A small component of the amount of Total Ammonia which is particularly toxic to fish and which therefore has its own standard.
Urban Waste Water Treatment (Directive on)	A Directive (ibid) that sets standards for discharges from sewage treatment works and sewerage systems (and similar discharges). The Directive also sets out the dates by which the standards must be achieved.
Use	Attributes of a river like a fishery or a water supply.
Use-related Objective	An aim to achieve a particular Use(ibid).
Use-related Standards	Water quality standards needed to protect a Use (ibid).
µg/l	Unit of concentration: Microgrammes per litre - one millionth of a grammes per litre.
Zinc	See Total Zinc

APPENDIX I: PROPOSED SWQO FOR THE STOUR CATCHMENT

RIVER STRETCH	NAME OF WATERCOURSE	START OF STRETCH	MAP REF	END OF STRETCH	MAP REF	LENGTH OF STRETCH (k)	PROPOSED SWQOS (with date)
1	River Stour	Tack Farm Bridge	SO960 824	Confluence with Illey Brook	SO960 840	1.5	RE3(1996)
2	River Stour	Confluence with Illey Brook	SO969 840	Footbridge at Lodge Forge	SO943 853	4.0	RE3(1996)
3	River Stour	Footbridge at Lodge Forge	SO943 853	Mousesweet Brook	SO934 857	1.0	RE4(1996)
4	River Stour	Confluence with Mousesweet Brook	SO934 857	Confluence with Salt Brook	SO930 852	1.0	RE4(1996)
5	River Stour	Confluence with Salt Brook	SO930 852	Freehold STW	SO920 850	2.0	RE4(2000)
6	River Stour	Freehold STW	SO920 850	Caledonia STW	SO917 848	1.0	RE4(2000)
7	River Stour	Caledonia STW	SO917 848	Confluence with Audnam Brook	SO892 859	3.5	RE4(2000)
8	River Stour	Confluence with Audnam Brook	SO892 859	Confluence with Smestow Brook	SO863 855	3.0	RE4(2000)
9	River Stour	Confluence with Smestow Brook	SO863 855	Roundhill STW	SO853 828	4.5	RE4(2000)
10	River Stour	Roundhill STW	SO853 828	Cookley Road Bridge	SO842 804	3.3	RE4(2000)
11	River Stour	Cookley Road Bridge	SO842 804	Blakedown Brook	SO829 775	4.5	RE4(2000)
12	River Stour	Blakedown Brook	SO829 775	Kidderminster STW	SO826 738	4.0	RE4(2000)
13	River Stour	Kidderminster STW	SO826 738	Confluence with River Severn	SO812 707	5.0	RE4(2000)
14	Illey Brook	Footbridge at Twiland Wood	SO976 811	Confluence with River Severn	SO969 841	3.5	RE3(1996)
15	Lutley Gutter	Road Bridge, Lutley Lane	SO942 829	Confluence with River Stour	SO952 847	2.4	RE2(1996)
16	Mousesweet Brook	Withymoor Road	SO955 876	Confluence with Black Brook	SO937 862	2.2	RE5(1996); RE4(2006)
17	Mousesweet Brook	Confluence with Black Brook	SO937 862	Confluence with River Stour	SO935 848	0.8	RE3(1996)
18	Smestow Brook	Aldersley Stadium	SO898 007	Compton Overflow	SO885 992	2.0	RE5(1996); RE4(2006)
19	Smestow Brook	Compton Overflow	SO885 992	Trescott STW	SO855 976	3.5	RE4(2000)
20	Smestow Brook	Trescott STW	SO855 976	Confluence with Unnamed Tributary	SO839 959	2.5	RE5(1996); RE4(2006)
21	Smestow Brook	Confluence with Unnamed Tributary	SO839 959	Confluence with Wom Brook	SO855 920	6.0	RE4(1996)
22	Smestow Brook	Confluence with Wom Brook	SO855 920	Confluence with Holbeche Brook	SO865 899	2.8	RE4(1998)
23	Smestow Brook	Confluence with Holbeche Brook	SO865 899	Confluence with Dawley Brook	SO863 881	2.0	RE4(1996)
24	Smestow Brook	Confluence with Dawley Brook	SO863 881	Confluence with River Stour	SO863 855	3.0	RE4(1996)
25	Wom/Penn Brook	Gospel End STW	SO904 943	A643 Road Bridge	SO885 937	2.0	RE5(1996); RE4(2006)
26	Wom/Penn Brook	A643 Road Bridge	SO885 937	Gravel Hill Road Bridge	SO875 927	1.1	RE4(1996)
27	Wom/Penn Brook	Gravel Hill Road Bridge	SO875 927	Wombourne STW	SO858 921	2.0	RE4(1996)
28	Wom/Penn Brook	Outfall Wombourne STW	SO858 921	Smestow Brook	SO856 919	0.5	RE5(1998); RE4 (2006)
29	Merryhill Brook	Road Bridge Newhouse Farm	SO878 965	Confluence with Wom Brook	SO864 927	5.8	RE3(1996)
30	Bobs Brook	Spout House	SO912 926	Lower Gornal STW	SO902 909	2.0	RE4(1996)
31	Bobs Brook	Lower Gornal STW	SO902 909	Holbeche confluence	SO899 907	0.5	RE5(1996)

RIVER STRETCH	NAME OF WATERCOURSE	START OF STRETCH	MAP REF	END OF STRETCH	MAP REF	LENGTH OF STRETCH (km)	PROPOSED SWQOS (with date)
32	Holbeche Brook	Confluence with Bobs Brook	SO899 907	Confluence with Smestow Brook	SO866 899	3.3	RE5(1996); RE4(2006)
33	Drakelow Brook	Lydiates Farm	SO821 832	Confluence with River Stour	SO829 792	5.0	RE2(1996)
34	Blakedown Brook	Gallows Brook	SO876 682	Blakedown STW	SO868 782	0.9	RE3(1996); RE2(2006)
35	Blakedown Brook	Blakedown STW	SO868 782	Road Bridge Hurcot	SO778 852	1.9	RE4(1996); RE2(2006)
36	Blakedown Brook	Road Bridge Hurcot	SO852 778	Confluence with River Stour	SO830 778	2.0	RE4(1996); RE2(2006)
37	Hoo Brook	Belbroughton	SO918 770	Hillpool Road Bridge	SO897 761	2.5	RE3(1996); RE2(2006)
38	Hoo Brook	Hillpool Road Bridge	SO897 761	Spennells Road Bridge	SO839 750	7.0	RE3(1996); RE2(2006)
39	Hoo Brook	Spennells Road Bridge	SO839 750	Confluence with River Stour	SO829 749	1.1	RE3(1996); RE2(2006)
40	Staffs & Wores Canal	Oxley Railway Bridge	SJ902 014	A41 New Bridge	SO893 999	2.0	RE5(1996)
41	Staffs & Wores Canal	A41 New Bridge	SO893 999	Compton Locks	SO883 988	1.2	RE4(2000)
42	Staffs & Wores Canal	Compton Locks	SO883 988	Road Bridge Swindon	SO862 906	10.0	RE4(2000)
43	Staffs & Wores Canal	Swindon	SO862 906	Worcester Rd, Kidderminster	SO828 758	20.0	RE3(2000)
44	Staffs & Wores Canal	Worcester Road, Kidderminster	SO828 758	River Severn	SO810 706	6.2	RE3(2000)
45	Stourbridge Canal	Dudley Canal	SO917 864	Staffs & Wores Canal	SO862 851	5.5	RE3(1996)
46	Dudley Canal	Junction with Stourbridge Canal	SO905 874	Blackbrook Bridge	SO934 882	5.0	RE3(1996)
47	Dudley Canal	Blackbrook Brook	SO934 882	Doulton Road, Rowley Regis	SO959 878	3.5	RE4(1996)
48	Dudley Canal	Doulton Road, Rowley Regis	SO959 878	Halesowen	SO974 842	4.0	RE4(1996)

APPENDIX II - SUMMARY OF COSTS, BENEFITS AND ISSUES

RIVER STRETCHES: 1, 2,3,4,5,14,15,16,17,18,29 &30.

(stretches 16 and 18 also have longer term SWQOs) These stretches arise in rural areas on the urban fringe and run through urban areas of the west midlands/ Black Country. There are no significant consented STW or industrial discharges to these stretches but there are a number of problems including unsatisfactory CSOs, poor quality surface water sewers and diffuse input from land contaminated by traditional Black Country industries such as galvanising, iron pickling, coal mining and metal finishing. The proposed SWQOs aim to maintain the better quality stretches or to improve the poor quality by one RE class. Improvement is needed to ensure achievement of quality objectives downstream.

PROPOSED COSTS:

There will be part of STWL's £10 million of committed expenditure on CSOs at sites to be agreed to improve the Stour. £10,000 has been spent by the former NRA investigating Old Hill Cradley contaminated land site on Mousesweet Brook. Dudley and Sandwell Metropolitan Borough Councils and the Agency are spending significant amounts of money to develop river based recreation. Further expenditure of up to £1 million, beyond that currently committed under AMP2 agreements, will be necessary to improve sewers in order to meet longer-term SWQOs in stretches 16 and 18. There is a need to continue pollution control and prevention activities to maintain current quality. There is a continuing small risk of intermittent oil pollution at the urban fringe.

BENEFITS	POTABLE SUPPLIES	AGRICULTURAL ABSTRACTIONS	FISHERIES	RIVER ECOSYSTEM	RECREATION	AMENITY/ AESTHETICS	TOURISM
	Low	Low	Medium	High	High	Low	Medium

SUBSTANTIVE BENEFITS:

FISHERY: Although the watercourses are small they have the potential to support angling and act as recruitment areas for fish stocks, particularly in downstream stretches of the Stour. This will increase in importance as water quality improves in the lower Stour allowing migration of all fish species

RIVER ECOSYSTEM: Although there are no water-based Sites of Special Scientific Interest (SSSIs), there are however isolated communities of uncommon fish species (for example, lampreys) in some stretches which are of value to retain in a watercourse close to urban areas. In addition there are a number of Sites of Importance for Nature Conservation (a local planning designation) associated with wildlife. The Saltwells Nature Reserve on the Black Brook tributary of the Stour in the Dudley area had a population of Damsel flies which is unusual for this urban area.

RECREATION: The upper Stour has more than 7 km of footpaths associated with the river with a network of paths crossing. Dudley and Sandwell councils are creating open space and a walkway along the river in the urban area. This Stour Valley project will enhance more than 10 km of river valley to give a green corridor for recreation and a valuable habitat for wildlife. The Old Kingswinford Railway path gives access to the Merryhill, Penn, Bob's and Himley Brooks. The Staffordshire Way long distance path gives good access to the rural Stour and Smestow valleys. There are popular country parks and visitor centres at Windmill Hill, the Clent Hills and Baggeridge.

OTHER ISSUES:

These stretches are seen as potentially important in recruitment of fish stocks, including trout, to the main River Stour. This will increase in importance as water quality improves in the lower Stour allowing free migration of all fish species.

RIVER STRETCHES: 6 to 13

These stretches on the Stour pass through urban areas and have been of bad quality for many years as a result of sewage effluent and pollution from industry, urban run-off, an inadequate sewerage system, contaminated land and disused tip sites. It is proposed to improve quality to RE4 (consistent with the existing RQO). There is also an input of BOD caused by algal growth in the Staffordshire and Worcestershire Canal, which overflows to the Stour.

PROPOSED COSTS:

As part of AMP2 expenditure, a figure of more than £40 million will be spent at Severn Trent Water's STWs at Freehold and Roundhill. Caledonia STW is to be abandoned. The NRA will be pursuing non Water Company improvements via continued pollution prevention enforcement action. There is a need to control the discharge of pesticides from Kidderminster STW to ensure the effectiveness of AMP2 expenditure in producing a healthy population of fish and other biota in the Stour. Industry will incur unquantified costs in altering operations, eg. reducing residues of moth-proofing agents in their products which may affect their commercial competitiveness.

BENEFITS	POTABLE SUPPLIES	AGRICULTURAL ABSTRACTIONS	FISHERIES	RIVER ECOSYSTEM	RECREATION	AMENITY/ AESTHETICS	TOURISM
	High	Low	High	High	High	Medium	High

SUBSTANTIVE BENEFITS:

POTABLE SUPPLY: There are major abstractions from groundwater which is supported by river flow. Improved water quality will enhance the groundwater resource. The Stour is a major input to the Severn. Flows on the River Severn at Bewdley are regulated by reservoirs in the upper stretches and by controlling abstractions. This ensures that minimum flows are maintained to support abstractions and to dilute the polluting effects of the River Stour. Improving the quality of the Stour would reduce the need for dilution in the Severn, and hence increase its potential as a water resource.

FISHERIES: Currently there is a restricted coarse fishery with minor species in the upper reaches and some improvements in lower reaches. The planned improvements will allow a development of the full potential of this river as a coarse fishery. The habitat is good and it is expected that the fishery will attract large numbers of anglers from the West Midlands conurbation where there is great demand for such facilities.

RIVER ECOSYSTEM: There are two SSSIs in these stretches linked to the floodplain. Improving water quality will protect these SSSIs and increase the diversity of species, including birds and possibly even otters. The NRA is undertaking schemes of floodplain habitat creation in the river corridor in the lower stretches. Kingfishers nest in the rural midreaches of the Stour valley.

RECREATION: The local authorities in this area are actively seeking to develop river walkways to cater for demand for such informal recreation in the West Midlands conurbation. The National Trust manage a popular country park at Kinver Edge. Kidderminster town centre is being redeveloped and the Stour will be a feature providing opportunities for informal recreation. A nearby attraction is the Severn Valley Railway which had 185,000 visitors in 1994.

TOURISM: There are a number of sites of historical and archaeological importance (for example, water mills on the river) linked to the industrial revolution which attract significant numbers of visitors from a wide area. Kinver village straddles the river and canal. The canal has up to 500,000 annual visitors in this area. Stourport Basin, marina and river front is a popular venue for visitors from Birmingham and further afield.

OTHER ISSUES:

Owing to the urban nature of the catchment there will need to be continued work to deal with current relatively minor intermittent pollution problems which will have a proportionately greater impact as overall water quality improves.

RIVER STRETCHES: 19 to 32

These stretches are in the Smestow Brook or its tributaries. Stretches 20, 25, 28 and 32 also have further longer-term SWQOs. These stretches drain part of Wolverhampton and other towns on the edge of the West Midlands. Current quality varies from poor, where sewage effluents affect headwaters of tributaries, to fair where effluent qualities are good. The first tier of SWQOs are set to take account of the AMP2 commitments and any scope for maintaining current quality where this is feasible. The Staffs & Worcs Canal affects quality in the Smestow Brook.

PROPOSED COSTS:

There is limited AMP2 expenditure at Wombourne STW. It is hoped that this will secure current quality. There has been a significant industrial discharge problem and the company plan to spend about £150,000 on treatment plant to ensure consent compliance. Improvements in CSO operation in Wolverhampton will result from AMP2 expenditure on the Wolverhampton System.

Achievement of the proposed longer-term SWQOs will require additional expenditure over and above that currently committed under AMP2 agreements. The total expenditure will be required in the order of £10 million at the following sewage treatment works: Trescott, Gospel End, Wombourne and Lower Gornal.

BENEFITS	POTABLE SUPPLIES	AGRICULTURAL ABSTRACTIONS	FISHERIES	RIVER ECOSYSTEM	RECREATION	AMENITY/AESTHETICS	TOURISM
	Low	High	Medium	High	High	Low	Medium

SUBSTANTIVE BENEFITS:

AGRICULTURAL ABSTRACTION: There are 14 licensed abstractions from surface water or the sandstone aquifer underlying these stretches. Licensed volume is less than 5 Ml/d and actual abstraction is estimated as no more than half the figure. Main agricultural use is for irrigation of potatoes and if any water is left, sugar beet. A small amount is used on brassicas and there are a number of nurseries on the urban fringe that use brook water informally in production of high value hardy shrubs. Quality problems restrict abstraction in the Wombourne and Wolverhampton area but longer term quality improvements are expected to enhance the resource.

FISHERIES: These stretches are small watercourses that have had limited use as fisheries in the past. Quality problems in the catchment have limited colonisation but with improved water quality elsewhere in the catchment there will be considerable potential for these stretches to provide both angling and fish recruitment areas.

RIVER ECOSYSTEM: Quality improvement in these stretches will lead to a significant enhancement in the diversity of flora and fauna.

RECREATION: The Smestow valley is a predominantly rural area with limited public access. However, it has potential for development as an informal recreation facility in proximity to the West Midlands conurbation.

TOURISM: Sites of historical and archaeological interest attract limited tourism with further potential for development.

OTHER ISSUES:

The Smestow Brook and its tributaries are a major element of the flow of the Stour. Adverse quality changes in these stretches may pose some risk to maintenance and improvement of quality in the lower reaches of the Stour.

Stretches 20 to 24: The first tier SWQO of RE5 is proposed for stretch 20. This assumes good operational practice at the works including continued nitrification and limited planned population growth. Further improvements to Trescott STW will ensure achievement of the longer-term SWQO. Compliance with first tier SWQOs in Stretches 22-24 relies on maintenance of quality at Trescott and Wombourne STWs and at a frozen food manufacturing plant.

Stretch 25: An SWQO of RE5 is proposed, and it is assumed that Gospel End STW will continue to nitrify and give a good quality in terms of BOD. This is felt reasonable given that the works is a large, well run filter works. Further improvements to Gospel End STW will allow achievement of the longer-term SWQO of RE4.

Stretch 28: This is a short length downstream of Wombourne STW which will receive some expenditure under AMP2 which should ensure compliance with the proposed first tier SWQO of RE5. Further improvements to Wombourne STW will allow achievement of the longer-term SWQO of RE4.

Stretch 31 and 32: Lower Gornal STW had some improvement in AMP1 which, if linked with good operational practice, will allow achievement of the first tier SWQO of RE5. Further improvements at this STW will ensure achievement of the proposed longer-term SWQO of RE4.

NOTE: Water quality in the Smestow Brook is dependent on overflow of good quality water from the Staff/Worcester Canal at Compton. This is in turn dependent on good quality effluent being discharged from Barnhurst STW. The volume of water overflowing from the canal is seasonally affected by boat traffic. Experience gained in 1995 showed that a combination of dry weather and increased boat traffic reduced the overflow to a minimum, with a consequent effect on the dilution of sewage effluents discharging into Smestow Brook and its tributaries.

RIVER STRETCHES: 33 to 39.

These stretches are in rural areas, and the first tier SWQOs are proposed to maintain current water qualities. A major feature in the Blakedown and Hoo Brooks is a problem of low flows caused by over-abstraction from the underlying aquifer. Stretches 34 to 39 all have further longer-term SWQOs.

PROPOSED COSTS:

Achievement of the proposed longer-term SWQOs will require total expenditure of between £1 million and £5 million at Blakedown, Hagley and Belbroughton STWs, and to alleviate the effects of low flows. This expenditure is not currently included in AMP2 agreements.

BENEFITS	POTABLE SUPPLIES	AGRICULTURAL ABSTRACTIONS	FISHERIES	RIVER ECOSYSTEM	RECREATION	AMENITY/AESTHETICS	TOURISM
	Medium	High	Medium	High	High	Low	Low

SUBSTANTIVE BENEFITS:

POTABLE SUPPLIES: Water is abstracted for potable supply from groundwater underneath these stretches. Severn Trent Water and South Staffs Water are licensed to abstract 58 Ml/d in 10 licences and actually pump 46 Ml/d. This water is supplied to households in Kidderminster, Stourbridge, Dudley, Wombourne, parts of Wolverhampton and more widely in the Black Country serving a population of more than 494,000. There is close connection between the watercourses and aquifer therefore maintenance of quality is important for safeguarding abstractions and reducing treatment costs.

AGRICULTURAL ABSTRACTION: In addition to abstraction for public water supply there are a total of 35 licences associated with these stretches, 23 of which are for spray irrigation and 7 for other agricultural use. Licensed volume is 5 Ml/d with actual use typically 3 Ml/d. Information supplied by ADAS indicates that arable farming is practised in the catchments of the Blakedown and Hoo Brooks with 95 % of irrigation water used equally on potatoes and sugar beet. The remainder is used on vegetables including onion and carrots. All of these are high value crops. Farmers currently rely on the maintenance of a reasonable water quality. Of concern is the lack of available water at times of low flow. A solution to this problem is being considered as a priority for AMP3 which would also address the longer term water quality issues.

FISHERIES: Over abstraction and low flows currently aggravate effluent dilution problems and restrict habitat leading to a restricted fishery. However the remnant populations of native brown trout are an important source of colonisation for the Stour and tributaries when water quality improves. There are still water fisheries on the Blakedown Brook at Ladies, Hurcott, Churchill and Bellington Pools. They are actively fished by syndicates or as day ticket facilities. Angler numbers are not available at present. Amelioration of the water quality and flow problems are expected to enhance the potential of these fisheries.

RIVER ECOSYSTEM: There are several lakes, with associated SSSIs associated with this group of river stretches. These river stretches also support a diverse flora and fauna, which is a valuable asset in relation to the rest of the catchment and needs protection by maintenance of good water quality and possible alleviation of low flows.

RECREATION: Public access to the Hoo Brook is good with footpaths running by the brook or within 100 metres for most of its 22 k length. Blakedown Brook has fewer footpaths but five crossing points. Both brooks provide high value amenity linking Kidderminster and the outskirts of Stourbridge and Halesowen. They arise in the Clent Hills which is a popular area for walkers with an established country park and several thousand visitors per year.

OTHER ISSUES:

Problems of low flow are being considered and addressed. The NRA spent some £50,000 in field scale river flow augmentation works. This maintains water levels in one of the pools and a short length of a tributary of the Blakedown Brook. It is planned to negotiate with STWL on how to reduce the effects of lowering groundwater levels. This is beyond the scope of AMP2. Blakedown STW has a current problem with failure of consent which is not currently addressed by expenditure agreed under AMP2.

RIVER STRETCHES: 40 to 48.

These stretches are all canals. The Stourbridge and Dudley Canals are mainly clean and have no major pollution problems, so the proposed SWQOs will maintain the current level of quality. In the Staffordshire and Worcestershire Canal, flow and quality is dominated by the effect of the effluent discharge from Wolverhampton (Barnhurst) STW. SWQOs have been proposed at a level that will protect the current quality of the canal, though compliance depends upon effluent being of a quality better than its Consent through continued good operational practice at Barnhurst STW. SWQOs are set at RE5 immediately downstream of the effluent, and then RE4 improving to RE3 in stretches 43 and 44 which are designated as cyprinid fisheries under the EC Freshwater Fisheries Directive.

PROPOSED COSTS:

Approximately £12 million of AMP2 expenditure has been committed at Barnhurst STW to ensure compliance with the EC Fisheries Directive in the canal, which will improve the pattern of storm discharge from unsatisfactory CSOs.

BENEFITS	POTABLE SUPPLIES	AGRICULTURAL ABSTRACTIONS	FISHERIES	RIVER ECOSYSTEM	RECREATION	AMENITY/ AESTHETICS	TOURISM
	Low	Low	High	Low	High	Low	High

SUBSTANTIVE BENEFITS

FISHERIES: The canals, particularly the Staffordshire and Worcestershire Canal, are considered high class coarse fisheries. Angling is controlled by British Waterways and is a commercial activity. Maintenance of quality is more important than improvement. AMP2 expenditure will ensure compliance with the EC Freshwater Fisheries Directive in Stretches 43 and 44, which have proposed SWQOs of RE3. In Stretch 40 a SWQO of RE5 is proposed; this SWQO is worse than current quality but reflects the effluent consent and may be reviewed in future. It is proposed to set an SWQO of RE4 in Stretch 41 reflecting the improved effluent quality. Owing to arrangements for storm discharge there have been fish mortality incidents but it is anticipated that there will be improvements. There is a conflict between the intensive leisure boating on the canal and angling. British Waterways (BW) 1995 Visitor survey gives a figure of 55,000 angling visits to the Staffordshire and Worcestershire canal over its 40 k. Birmingham Anglers Association and Wolverhampton Angling Association are the main clubs but several smaller ones such as Kinver Freeliners also participate. A figure £6.1 per visit is quoted as a typical spend.

RECREATION: There is a large volume of leisure boat traffic on the canals because of their links with other catchments. This is encouraged by British Waterways who have serious concerns to maintain quality in waters they control. The canals run through attractive rural areas and have good access is a major informal recreation resource for the area. Figures for recreational use (informal and cycling) of the canals given by BW were 1.87 million for 1995. Boat use is important and is expressed as person days per year which is estimated by BW as 77114 for 1995.

TOURISM: There are sites with historical interest in these stretches which attract significant influx of visitors. These include the Kinver caves, which is on a section of canal that attracted over 500,000 visitors in 1995, the Glass Industry museum in Stourbridge and Brindley's Georgian canal basin at Stourport.

OTHER ISSUES:

There is a large CSO on the Wolverhampton sewerage system that discharges to the headwaters of the Smestow Brook where improvement will need to be considered when planning for achievement of the longer-term SWQO for the Smestow Brook. There are no SSSI on the canals but BW have a Wildlife site Register which shows 7 sites on the canals having a water or wetland significance. Aquatic spider, dragonfly and damselfly species have been recorded in parts of the Stourbridge canal in the urban areas.

APPENDIX III: DIGEST OF RESPONSES TO CONSULTATION

A total number of 140 copies of our document The Worcestershire Stour Catchment: Proposals for Statutory Water Quality Objectives were issued during the three month consultation period, which was also supported by advertising in the local press and on radio.

In total we received 25 responses to the consultation exercise which are summarise below.

TABLE 2: RESPONSES AND ACTIONS ARISING FROM SWQO CONSULTATION

No.	Organisation / Individual	Key Points	Action(s) taken by Agency
1	P.Cotterill Private Individual, 27/3	Concerned about impact of proposed Western Orbital Motorway on quality of underground water resources used for public supply.	Take account of comments in discussion with Highway Authority.
2	R J Kidson Private Individual, 23/4	Supports proposals. Concerned about aesthetic and bacteriological impacts of sewage discharge to the Wolverhampton canal system, which is used for recreation.	Aesthetic problems addressed in AMP2; disinfection is not likely to be sought in short term and recreation is subject of a different scheme to be developed.
3	D G Macfarlane Private Individual, 10/5	Ecology and water quality of Blakedown Brook declined. Sought confirmation that SWQOs would lead to an improvement.	Short term SWQO will not lead to improvement but long term will address the problem.
4	Mr M Courtis Dudley MBC Environmental Services Committee 18/6	i) Support for improving quality of River Stour from RE5 to RE4, which is considered a minimum. ii) The Committee objected to the proposal for the first stretch of the R.Stour of RE3 not RE2 iii) and the long term objective for the Bobs Brook being only RE5.	ii) RE3 is a realistic objective now RE2 is not sustainable at present. Will be reviewed. iii) Bobs Brook has restricted use with nearly all flow sewage effluent, no benefits seen from improving to RE4, RE5 does not prejudice downstream use.
5	F W Wilson Kidderminster & District Carpet Spinners & Manufacturers Assoc, 19/6	Support for aims of the NRA (EA) to improve and maintain water quality. KDCSMAs has already demonstrated a significant reduction in the discharge of mothproofing chemicals. i) Concerned that other substances could be added to statutory schemes where control was a problem. The specific issue here is the presence of sheep-dip chemical residues on incoming raw material - a situation over which, the companies have no control. ii) Stressed that improvement works to achieve SWQOs must be environmentally justified, technically feasible and with practical timescales to avoid jeopardising employment	Acknowledged part played by KDCSMAs in complementing improvements resulting from improved sewage treatment over a number of years. Other concerns noted

No.	Organisation / Individual	Key Points	Action(s) taken by Agency
6	T Foster MAFF Environmental Protection Division, 21/6	<p>Welcomed SWQO approach. Reserved judgement on two-tier system.</p> <p>i) Long term objectives would not have a significant impact on agriculture.</p> <p>ii) Accepted the cost/benefit approach for point source discharges. Requested an industry sector breakdown and a fuller cost/benefit analysis for tackling diffuse pollution issues as well as an assessment of the practicability of remedial actions.</p> <p>iii) Suggested improving future consultation reports by a) improving the base map to show roads, and b) including a river map showing current quality levels.</p>	<p>ii) Costs in consultation document are broken down showing that 99% will be committed by Severn Trent Water. The Costs and Benefits assessment procedures are being developed. Other points noted.</p>
7	Anonymous, 26/6	Suggested stocking tributaries with trout and salmon.	No action
8	C Wilkinson OFWAT Central Customer Service Committee, 28/6	<p>i) Concerned over affordability of water bills. Would wish to see demonstration of customer support for expenditure additional to that already agreed with the Water Industry and OFWAT.</p> <p>ii) Suggested that the proposals to address the water quality effects of low flow should be extended to include a cost/benefit comparison of reducing abstractions.</p>	<p>i) Assurance given that expenditure to achieve long term SWQO will have to be part of any future AMP agreement. No current procedure for direct evaluation of public opinion on environmental improvements outside of institutional framework of the Agency.</p> <p>ii) Cost benefit of control of abstraction is being considered for AMP3</p>
9	K Ridout OFWAT Quality Enhancements Branch, 1/7	<p>i) Noted NRAs proposals that achievement of long term SWQOs would require an extra £11-16 million investment by the Water Company above that allowed in current price limits. ii) Long term SWQOs should therefore be derived from identified river needs rather than an aspiration to improve river quality or maintain current quality which is better than RQO.</p> <p>iii) Should be supported by more evidence on cost/benefit analysis and an identification of the direct benefits to water customers in terms of the services provided by the Water Company.</p>	<p>i) Assurance given that expenditure to achieve long term SWQO will have to be part of any future AMP agreement.</p> <p>ii) SWQO will protect current uses or planned improvements and account will be taken of costs and benefits.</p>

No.	Organisation / Individual	Key Points	Action(s) taken by Agency
10	P Braithwaite Institution of Civil Engineers Midlands Branch Assoc. 1/7	<p>General support for the scheme's objectives. Asked that further consideration be given to:</p> <ul style="list-style-type: none"> i) the impact of further base flow restrictions arising from over-abstraction in parts of the catchment, ii) the impact of locally rising water levels in Wolverhampton and Kidderminster and the potential for increased mobilisation of contaminants, iii) the need to identify areas of contaminated land and contaminated groundwater and an assessment of their potential impacts on water quality, iv) a re-assessment of the method used to assess objective compliance, v) the mechanism of enforcing statutory WQOs, vi) a request for guidance on the extension of the scheme to include other determinands. 	<ul style="list-style-type: none"> i) Standards used to control discharges take account of major abstraction influences in the catchment. ii) iii) Sewage discharge now dominates the catchment. After improving these, the scale of problems with contaminated land will be clearer and will be tackled. iv) The method of assessing compliance seeks to reduce the chance of unfairly reporting a failure, which could cause money to be spent on treatment works without equivalent benefits. vi) Further schemes are under consideration.
11	D Wickens Severn Trent Water Ltd, 28/6	<p>Supported the concept of SWQOs. Raised concerns about:</p> <ul style="list-style-type: none"> i) the need to ensure that the arrangements for financing the Water industry are fully taken into account when setting objectives (at present there is no allowance for investment to achieve further improvements beyond the year 2000), ii) the translation of current non-statutory RQOs into SWQOs should be cost neutral and be consistent with the "Effluent Quality Guidelines", iii) in setting SWQOs it should not be presumed that the pattern of flow discharges will remain unchanged (eg to enable closure of some works with diversion of effluents into different catchments), iv) steps should be taken to address water quality problems arising from sites other than water company sites particular concerns about the need to control diffuse sources, v) the water company's own estimate of costs for financing future schemes should be considered, vi) the use of pilot catchments to trial the setting of SWQOs could bias future investment towards these catchments at the expense of more deserving sites vii) specific comments relating to Wombourne STW are out of date as this works is now scheduled to receive AMP2 investment. 	<ul style="list-style-type: none"> i) ii) agreed with company's concerns iii) Cannot accept the company's point because SWQO and related discharge consents have to be based on known situation. They would need to be reviewed if circumstances changed. iv) Other water quality problems are being addressed. v) If the company provide their own cost estimates they will be included in the Agency's proposals. vi) Agreed that SWQO should not prejudice the outcome of any future periodic review of the company's AMP. vii) SWQO proposals altered to take account of plans at Wombourne STW.

No.	Organisation / Individual	Key Points	Action(s) taken by Agency
12	S.Good Wolverhampton Friends of the Earth, 9/7	<p>i) Considered that SWQO proposals for the upper Smestow and the Wolverhampton canals were too relaxed. Commented that the proposal to allow a downgrading of the Upper Smestow Brook was a retrograde step particularly given that improvements have already taken place in parts of the catchment.</p> <p>ii) Suggested that the Agency should work towards stopping sewage effluents discharging to canals and that canals should be dredged to remove historical contaminants.</p> <p>iii) Supported NRAs policy on opposing the culverting of watercourses.</p> <p>iv) Requested that Graisle Brook be included in the scheme and asked that the potential water quality problem of percolation from closed landfill sites be examined.</p>	<p>i) SWQO reflect a realistic view of planned quality given restrictions on investment at certain sewage works.</p> <p>ii) Barnhurst sewage works discharges an effluent of high quality to the canal. Smestow Brook could receive some effluent but flooding must be avoided. A programme to dredge the canal has been agreed with British waterways.</p> <p>iii) Improvements, in the upper Smestow Brook are being pursued by routine pollution control activities.</p> <p>iv) Graisle Brook is not classified at present and therefore will not have an SWQO set. Its quality will be investigated and classification reviewed.</p>
13	G Beard Soil Survey and Land Research Centre, 1/8	<p>i) Considered that a minimum objective for any stretch in the catchment should be RE3 and not RE4.</p> <p>ii) Investment should follow proposals not the other way round as is apparent from the consultation.</p>	Comments noted. They arise partly from a lack of information which will be addressed in subsequent consultation exercises.
14	A Richards NFU West Midlands Region, 8/8	<p>i) Welcomed the approach of proposing SWQOs at a level consistent with existing RQOs and current water quality, and considered the phased improvements over a longer term by setting interim standards helpful.</p> <p>ii) Welcomed the recognition of improvements already made by industry and agriculture and commented that further improvement requires the co-operation of all sectors of industry.</p> <p>iii) Noted the setting of some SWQOs at a level worse than the RQO (so as to take account of a restriction on water industry investment) but cautioned against a fall in standards with the attendant risks to coarse fisheries and other water uses.</p>	Comments noted.

No.	Organisation / Individual	Key Points	Action(s) taken by Agency
15	R Hanbury British Waterways, 3/7	<p>i) Sought confirmation that SWQOs would be flexible enough to allow canals to be managed using a balanced approach, taking account of the needs of all aspects of the environment (not solely water quality).</p> <p>ii) Concerned that the SWQO for the Staffs/Worcs canal between Oxley and Tettenhall was RE5, whereas a minimum of RE4 is considered necessary to support the leisure and tourism business.</p> <p>iii) Also concerned that a translation from GQA quality to RE Objective showed an apparent deterioration for the Staffs Worcs canal between Tettenhall and Kidderminster, and objected strongly to any derogation.</p> <p>iv) Concerned that discharges of storm sewage from Barnhurst STW would affect fish whilst there was compliance with SWQO 90 or 95 percentile standards</p>	<p>i) Concerns acknowledged. The expectation is that SWQO can be set to balance all interests.</p> <p>ii) Concerns acknowledged but the Agency must propose SWQOs that are realistic and achievable, given planned expenditure. Proposals for stretches 40 41 and 42 rechecked and confirmed. RE4 is not sustainable with planned expenditure at Barnhurst but quality will be monitored and the case reviewed at the next periodic review of the company's AMP.</p> <p>iii) This comment arises from the difference between the RE scheme and its predecessor. No actual deterioration has taken place</p> <p>iv) Concern noted. AMP2 at Barnhurst will improve the handling of storm sewage and should minimise the risk of fish deaths.</p>
16	M July English Nature Three Counties Team, 19/8	<p>Supported the principal of SWQOs</p> <p>i) Considered that a number of stretches, which could benefit from enhanced water quality have SWQOs which offer little prospect for improvement. Specifically, considered that four SSSIs in Worcestershire that are watercourse dependent should have SWQOs of RE2/3 (most are RE4).</p> <p>ii) Suggested a re-evaluation of costs/benefits of achieving a higher RE class.</p>	There is no evidence available at present that an SWQO of RE2 would lead to improvement in the SSSI cited. If that information was made available the costs benefits could be investigated.
17	D Aston Bronx Angling Club, 3/9	Welcomed the proposals to upgrade the quality of the River Stour, but concerned about indiscriminate dredging of the river.	Comments on dredging noted.
18	ADAS Worcester 12/8	No objection to proposal	Noted, no action.
19	Bridgnorth District Council Environmental Services 13/8	General support	Noted no action.
20	Sports Council West Midlands Region 23/8	Welcome improvements	Noted no action
21	RSPB Banbury 19/9	No comments	Noted no action
22	Heart of England Tourist Board 9/3	Broad support for proposals	Noted no action
23	Churchill and Blakedown Parish Council 8/8	No comments	Noted no action

No.	Organisation / Individual	Key Points	Action(s) taken by Agency
24	Council for Protection of Rural England Verbal response 2/8	No comments	Noted no action
25	Hereford and Worcester County 2/8	No comments	Noted no action

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.

Rio House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 4UD
Tel: 01454 624 400 Fax: 01454 624 409

ENVIRONMENT AGENCY REGIONAL OFFICES

ANGLIAN

Kingfisher House
Goldhay Way
Orton Goldhay
Peterborough PE2 5ZR
Tel: 01733 371 811
Fax: 01733 231 840

NORTH EAST

Rivers House
21 Park Square South
Leeds LS1 2QG
Tel: 0113 244 0191
Fax: 0113 246 1889

NORTH WEST

Richard Fairclough House
Knutsford Road
Warrington WA4 1HG
Tel: 01925 653 999
Fax: 01925 415 961

MIDLANDS

Sapphire East
550 Streetsbrook Road
Solihull B91 1QT
Tel: 0121 711 2324
Fax: 0121 711 5824

SOUTHERN

Guildbourne House
Chatsworth Road
Worthing
West Sussex BN11 1LD
Tel: 01903 832 000
Fax: 01903 821 832

SOUTH WEST

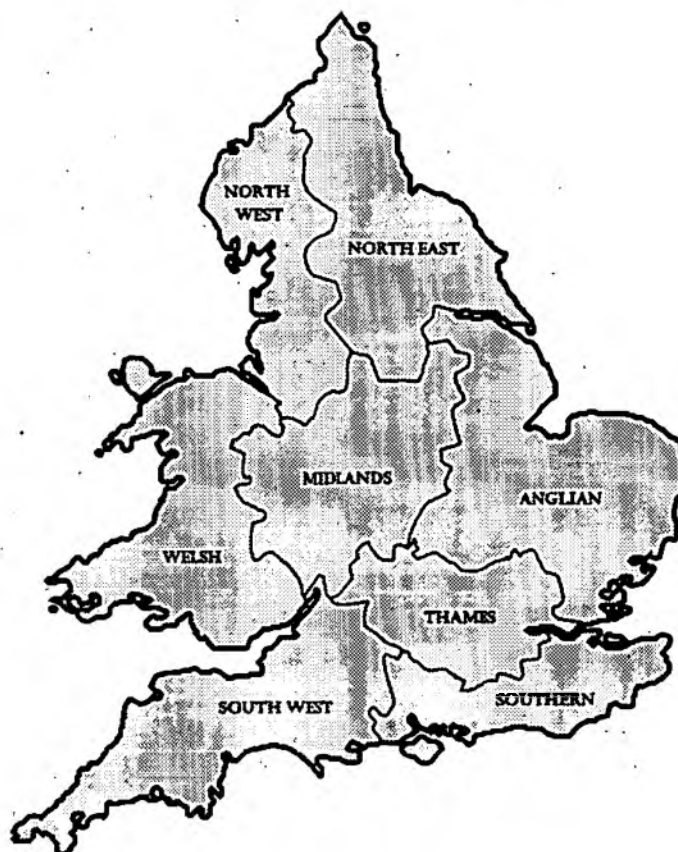
Manley House
Kestrel Way
Exeter EX2 7LQ
Tel: 01392 444 000
Fax: 01392 444 238

THAMES

Kings Meadow House
Kings Meadow Road
Reading RG1 8DQ
Tel: 0118 953 5000
Fax: 0118 950 0388

WELSH

Rivers House/Plas-yr-Afon
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.

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

**ENVIRONMENT AGENCY
GENERAL ENQUIRY LINE
0645 333 111**

**ENVIRONMENT AGENCY
EMERGENCY HOTLINE
0800 80 70 60**



**ENVIRONMENT
AGENCY**