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Technical Department Report

Little Avon Catchment
Water Quality Plan

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Water Quality Planning

March 1995
QP/95/001

M G Booth
Technical Manager

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ENVIRONMENT AGENCY



130088

EXECUTIVE SUMMARY

An assessment of water quality in the Little Avon has been made using the EC Directives data, Water Quality Objectives (Rivers Ecosystem Classification), the General Quality Assessment and Permissive Monitoring data.

This information has been used to identify Water Quality Objectives for the Rivers Ecosystem Classification and to identify water quality issues for the Severnside catchment management plan.

LITTLE AVON CATCHMENT WATER QUALITY PLAN

This is an internal consultation document prepared by the Regional Water Quality Planning team for consideration by the North Wessex Management Team.

An assessment of current water quality for classified stretches of rivers has been made using the River Ecosystem Use Class. The appropriate River Ecosystem Class has been worked out for each stretch, using a standard calculation method, from data stored on the Public Register from 1991 to 1993.

Current water quality has been divided into two classes:

"Optimistic Class" - where statistical methods have been used to allow for the effects of random sampling error

"Face Value Class" - no allowance for random sampling error has been made

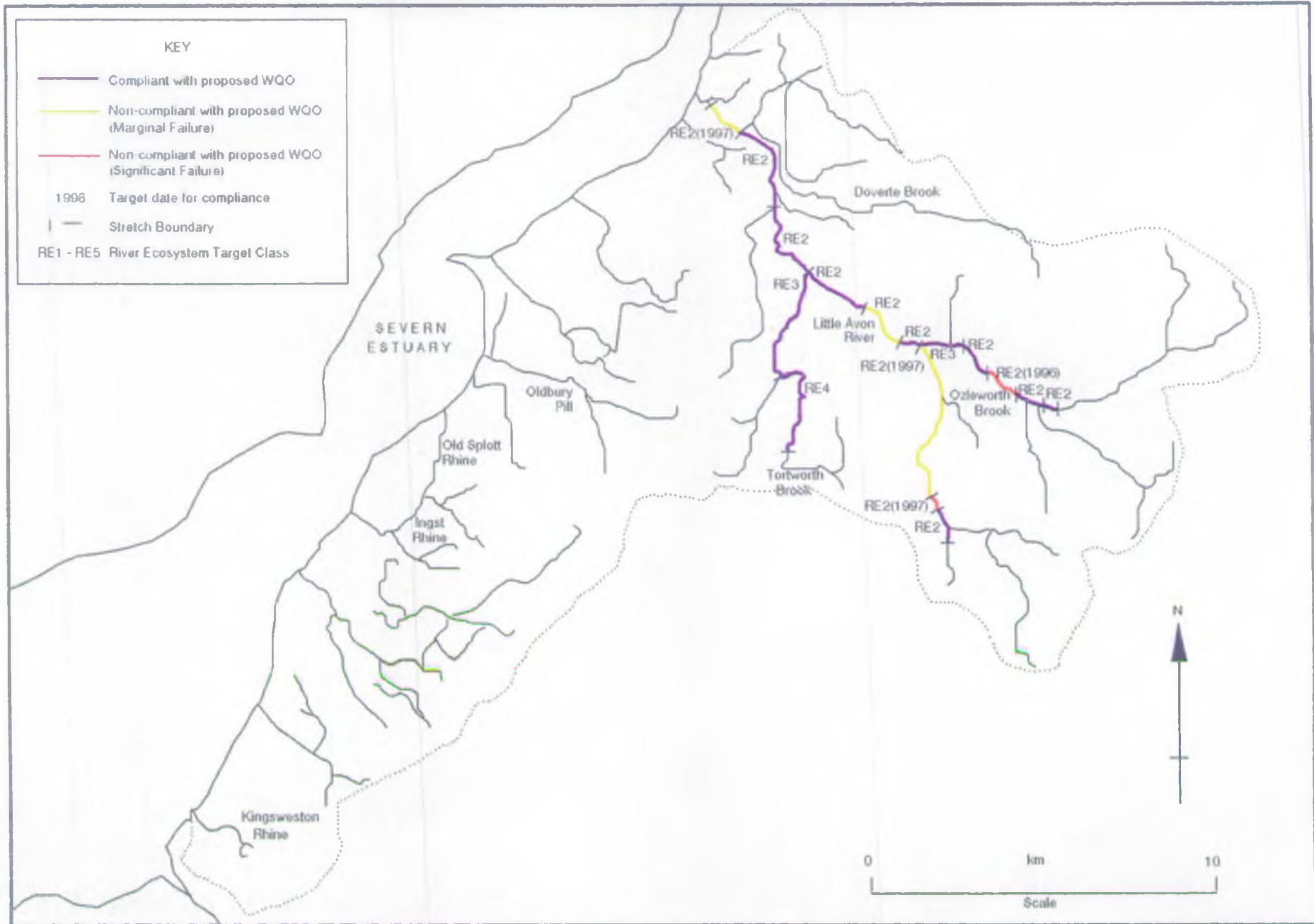
The Regional Water Quality Planning Team are recommending Target Classes for consideration by the North Wessex Area Management Team. These classes have been proposed taking into account neutral translation from RQOs (NWC), current water quality, catchment uses, water quality problems and planned investment in the catchment.

The effect on water quality of discharges from the Avonmouth industrial complex and Avonmouth STW will be dealt with in the Severn Estuary WQP. Although some industries in the Avonmouth area discharge directly to the Severn Estuary others discharge to rhines (man-made drainage channels). As the rhines drain into the Severn Estuary they will have an impact on the water quality of the estuary. It is for this reason that all industrial discharges of the Avonmouth Area and water quality of the rhines will be discussed in the Severn Estuary WQP.

It is not necessary to set RE target classes for rivers with an ADF of less than 0.31 cumecs. These rivers have been noted in the text and, although recommendations for RE target classes have been made, it has been left to North Wessex Area Management Team to decide whether it is appropriate to set them.

For further information on WQOs refer to "Water Quality Objectives for Catchment Management Plans" produced by Regional Water Quality Planning.

Little Avon Catchment - River Ecosystem Classification 1993 Compliance with Water Quality Objectives



**LITTLE AVON CATCHMENT
DATA ANALYSIS TO ASSIGN WQOs**

1. LITTLE AVON

The Little Avon has NWC RQOs of 1B and 2A which "neutrally translates" to RE 2 and RE 3 respectively:

RQO	NGR (From)	NGR (To)
1B	ST 666 999	ST 711 940
2A	ST 711 940	ST 724 930
1B	ST 724 930	ST 733 879

The Little Avon achieved RE 2 or RE 3 (Face Value and Optimistic) in the 1993 classification. The following stretches attained RE 2 in both the Face Value and Optimistic Classification:

URN	STRETCH
23130504	Wickwar to Southwood Farm
23130402	Confluence with Ozleworth Brook to Works
23130401	Damery to confluence with Doverte Stream

In the stretch from Southwood Farm to B4060 (23130505) RE 3 is attained (Face Value and Optimistic Classification) This is due to low DO (66.4% sat, 90%ile Face Value and 69.2% sat, 90%ile Optimistic) and elevated concentrations of BOD (4.2 mg/l, 90%ile Face Value and 3.7 mg/l, 90%ile Optimistic). The next stretch from the B4060 to confluence with Ozleworth Brook is also affected by a marginally higher BOD level in the Face Value Classification (4.0 mg/l, 90%ile) which places this stretch into RE 3 however in the Optimistic Classification RE 2 is achieved. This is an area of agricultural activity which the Area Water Quality Officers have been targeting and the main discharge, Wickwar STW, has received maintenance improvements over the past few years. There has been a noticeable improvement in the water quality since September 1993 at the monitoring site 23130505.

The stretch from Charfield STW to Damery (23130407) achieves RE 3 in the Face Value Classification due to elevated concentrations of total ammonia (0.63 mg/l, 90%ile). However the historical data shows this class is due to one random sample taken at 02.30 on 18 March 1991:

Date	DO %sat	BOD mg/l	TOT AMM mg/l	NH3 NON-IO mg/l	PH
18 Mar 91 0230		5	13.9		8
18 Mar 91 1445	92	10	.17	.0045	8.2

This is not typical of the total ammonia results and it is suggested that as this result is suspect it should be discounted. In the Optimistic Classification RE 2 is achieved.

The lowest stretch confluence with Dovern Brook to Hook Stream achieves RE 3 in the Face Value Classification due to slightly elevated concentrations of BOD (4.3 mg/l, 90%ile). This could be due to land use since the land along the Severn Estuary foreshore and lower half of the Little Avon is flat and comprised of heavy clay based soils and is principally utilised for intensive dairy farming although some of the poorer land is used for sheep, particularly during Winter months. This stretch is also influenced by the water quality of the Dovern Brook, however the monitoring site (23130102) currently lies upstream of the confluence. In the Optimistic Classification RE 2 is achieved.

In the fisheries survey of the Huntingford Mill site a wide range of species was reported. These included minnows, stone loach, roach, eels, grayling, brown trout, perch, gudgeon and bream. The Little Avon is a designated EC Freshwater Fish Directive stretch for salmonids from downstream of Wickwar to the sea.

Target Class for the Little Avon

In general the recommended class for the Little Avon is RE 2. This is currently being achieved at:

URN	STRETCH
23130504	Wickwar to Southwood Farm
23130402	Confluence with Ozleworth Brook to Works
23130407	Works to Damery (suspect random result)
23130401	Damery to confluence with Dovern Stream

At the stretches Southwood Farm to confluence with Ozleworth Brook (23130505, 23130502) a short term target of RE 2 (1997) is recommended. The Area Water Quality Officers have been targeting the agricultural inputs in this area and improvements have been particularly noticeable at site 23130505.

At the stretch confluence with Dovern Brook to Hook Stream (23130102) a short term target of RE 2 (1997) is recommended.

2. TORTWORTH BROOK

The 1990 NWC Classification for the Tortworth Brook was 1B and this has been recommended as the RQO by the North Wessex Area. RQO 1B "neutrally translates" to RE 2.

The 1993 RE Face Value Classification placed the stretch Cromhall to Eastwood Park (23160109) in RE 4 due to low DO (58.8 %sat, 90%ile). This is marginally better in the Optimistic Classification, however this stretch still only achieves RE 3 due to low DO (61.7 %sat, 90%ile). The lower stretch Eastwood Park to confluence with Little Avon achieves RE 3 in the Face Value Classification. This is due to a marginal BOD level (4.0 mg/l, 90%ile) and the DO level has improved to RE 1. In the Optimistic Classification RE 2 is achieved.

The Tortworth Brook has an ADF of less than 0.31 cumecs on a clay soil with little groundwater influence. The larger discharges into the Tortworth Brook are Cromhall STW, Leyhill Prison and Eastwood Park STW. Leyhill Prison is a crown property and is currently unconsented but will receive a consent in the future review of crown properties. Eastwood Park currently is not meeting its consent and the situation is being kept under surveillance by the Area Water Quality Officers. Cromhall STW has no enforcement problems at present.

The fisheries survey at Falfield showed a wide range of fish present in the Tortworth Brook consisting of brown trout, eels, bullheads, gudgeon, stickleback, stone loach and minnows.

Target Class for the Tortworth Brook

The Tortworth Brook has an ADF of less than 0.31 cumecs and does not need to be included in the WQO Classification. However, if North Wessex Area Management Team wish to include Tortworth Brook the following recommendations for Target Classes are made:

1. For the stretch from Cromhall to Eastwood Park (23160109) a Target Class of RE 4 with a visionary target of RE 3 to protect the cyprinid designation under the EC Freshwater Fish Directive.
2. For the stretch from Eastwood Park to confluence with the Little Avon a Target Class of RE 3 is recommended.

3. DOVERTE BROOK

The 1990 NWC Classification for the Dovere Brook was 2A and this has been recommended as the RQO by North Wessex Area. RQO 2A "neutrally translates" to RE 3.

In the 1993 RE Classification the stretch North Nibley to confluence with the Little Avon (23140103) achieves RE 3 Face Value and RE 2 Optimistic. The Face Value of RE 3 is due to an elevated concentration of BOD (5.0 mg/l, 90%ile).

The Dovere Brook has an ADF of less than 0.31 cumecs. The catchment is intensively farmed and the water course receives the discharge from North Nibley STW. The fisheries section survey in August 1994 showed a deterioration in the number of species reported in the Dovere Brook and only bullheads, stone loach, eels and brook lamprey were found. There was concern about the water quality and the Area Water Quality Officer was informed.

Target Class for the Dovere Brook

The monitoring site on the Dovere Brook is being deleted under the 1995 GQA review as the watercourse has a flow of less than 0.31 cumecs.

4. OZLEWORTH BROOK

Ozleworth Brook has a NWC RQO of 1B and 2A which "neutrally translates" to RE 2 and RE 3 respectively. In the 1993 RE Classification the Ozleworth Brook achieved RE 2 or RE 3 (Face Value and Optimistic).

The following stretches achieved RE 2 in the Face Value and Optimistic Classifications:

URN	STRETCH
23170603	Wortley to confluence with Kilcott Stream
23170503	Confluence with Kilcott Stream to Nind Farm
23170309	Gatehouse to Wotton under Edge STW

The stretch Nind Farm to Gatehouse achieved RE 3 (Face Value and Optimistic Classifications). This is due to low DO and to elevated concentrations of total ammonia:

	FV CLASS 90%ile	OPT CLASS 90%ile
DO	65.9% sat	68.2% sat
TOT AMM	0.71 mg/l	0.64 mg/l

The Hams Gulley Brook drains an intensively farmed area and impacts on the water quality of the Ozleworth Brook. Also Alderley Trout Farm and Nind Mill Fish Farm discharge into the Ozleworth Brook and the Area Water Quality Officers have been targeting this area. Routine monitoring data shows that water quality in this stretch has improved since 1992.

The lowest stretch from Wotton under Edge STW to confluence with the Little Avon achieves RE 3 in both the Face Value and Optimistic Classifications due to elevated concentrations of BOD (4.8 mg/l, 90%ile Face Value and 4.3 mg/l, 90%ile Optimistic) and total ammonia (0.64 mg/l, 90%ile Face Value and 0.56 mg/l, 90%ile Optimistic). This stretch is influenced by the discharge from Wotton under Edge STW, however there appears to have been an improvement since June 1992.

Capital works were carried out at Wotton under Edge STW under AMP1 leading to the upgrading of the performance of the works and downstream water quality. However the consent has not been reviewed to reflect these improvements and Wessex Water have been notified (AMP2 meeting, 5.1.95) that a consent review will be carried out.

Wotton under Edge STW has been identified for minor improvements under AMP2 under containment of effluent load. Wessex Water have confirmed this would be with respect to current performance, not consent conditions.

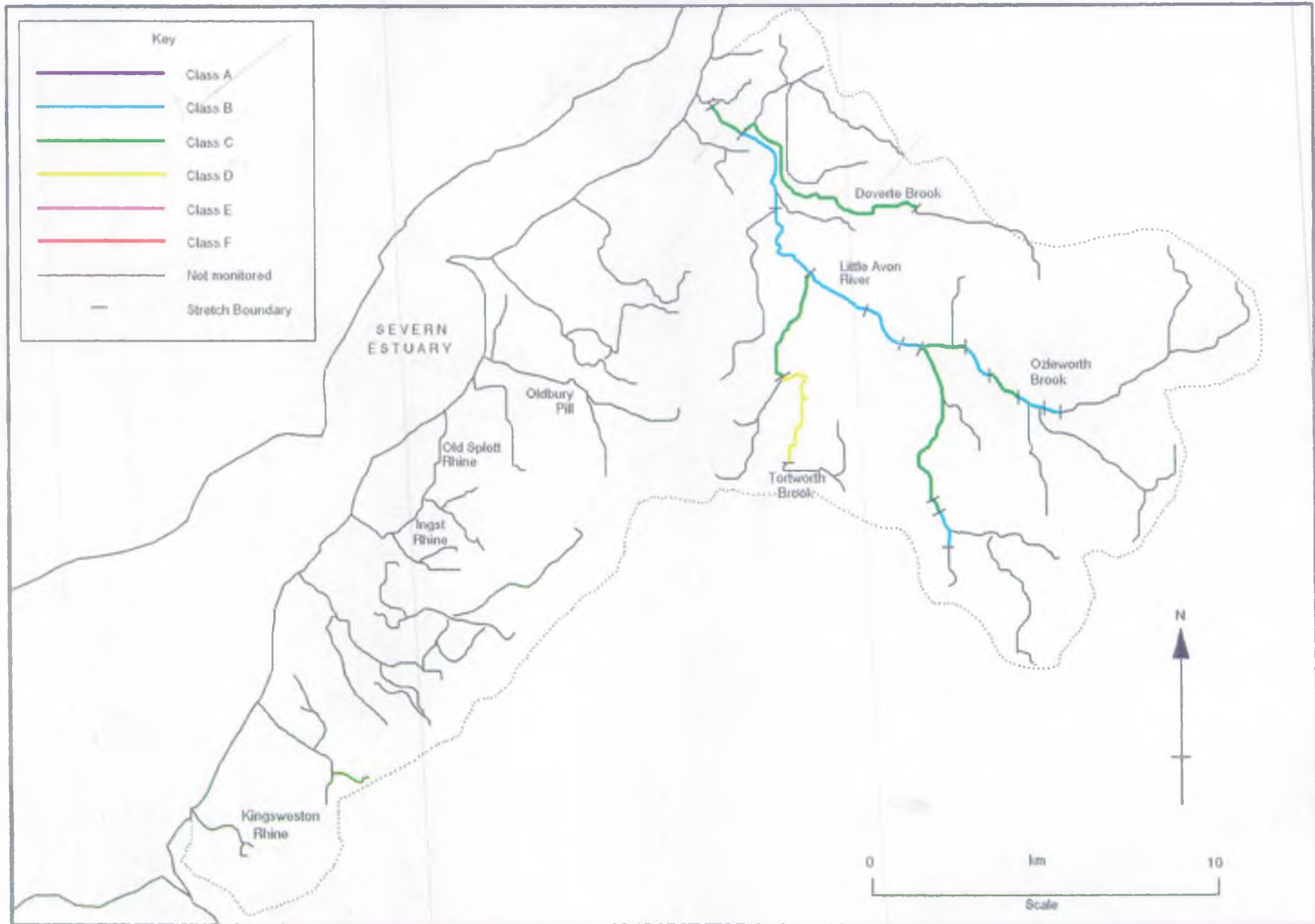
In the fisheries survey the site at Hill Mill reported brown trout and bullheads, the Kingswood site was disappointing and the Lower Barns Farm reported minnows, stone loach, brown trout, eels, bullheads, grayling and gudgeon.

Target Class for Ozleworth Brook

The following Target Classes are recommended for the Ozleworth Brook:

1. For the stretches Wortley to Nind Farm (23170603, 23170503) and Gatehouse to Works (23170309) a Target Class of RE 2 is recommended.
2. For the stretch from Nind Farm to Gatehouse (23170501) a short term Target Class of RE 2 (1996) is recommended.
3. For the stretch Works to confluence with Little Avon (23170302) a Target Class of RE 3 is recommended along with a visionary target of RE 2 which will protect the salmonid use of this stretch.

Little Avon Catchment - 1993 General Quality Assessment

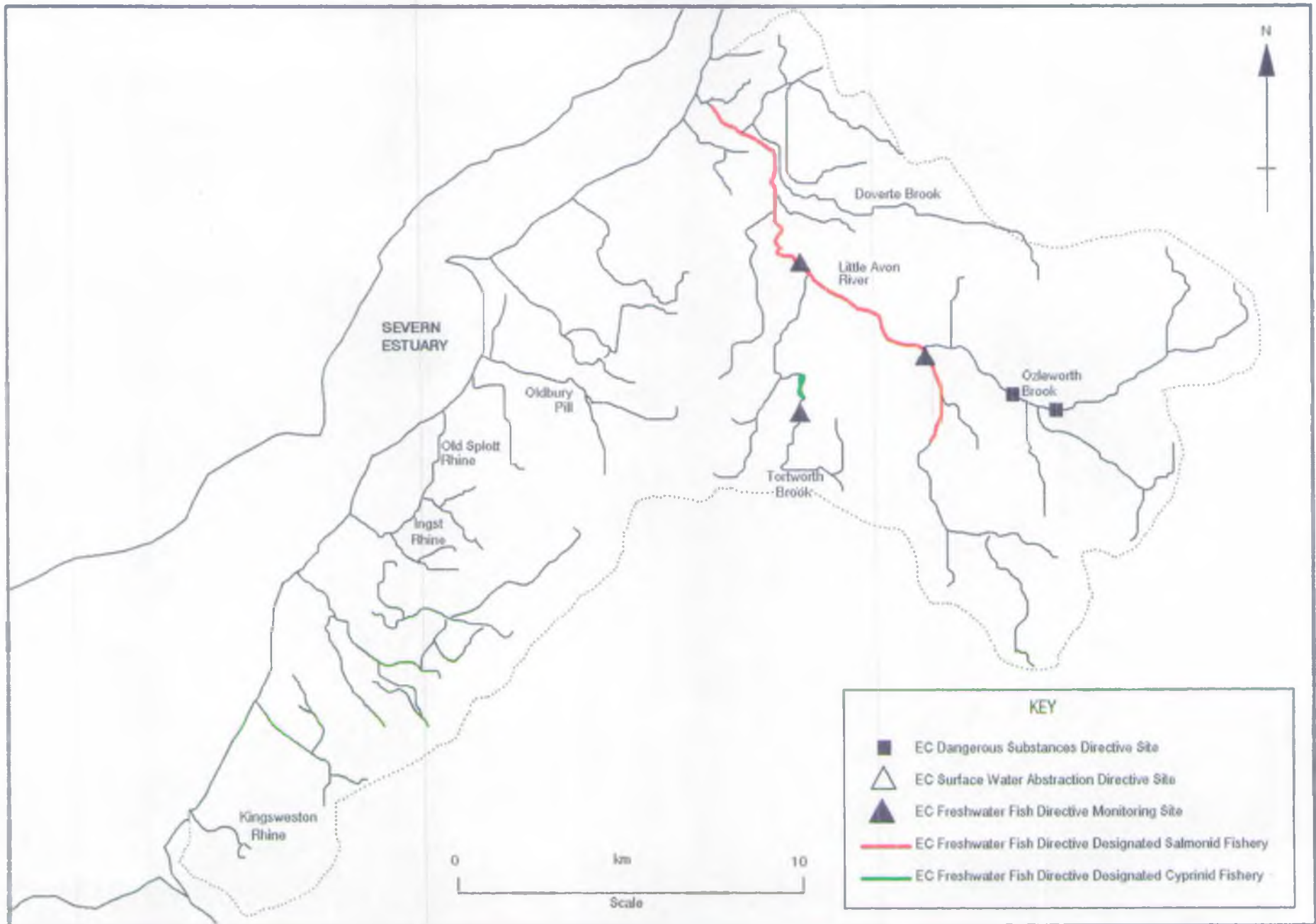


GENERAL QUALITY ASSESSMENT

An assessment of water quality in the catchment has been made using the General Quality Assessment (GQA) chemical grading using data stored on the Public Register from 1991 to 1993.

The 1993 river quality survey indicated that the catchment was mostly of good quality (Class B). However some stretches of fair quality (Class C) were found on the Little Avon (Southwood Farm to confluence with Ozleworth Brook and confluence with Doverte Brook to Hook Stream), on the Ozleworth Brook (Nind Farm to Gatehouse and Works to confluence with Little Avon), on the Tortworth Brook (Eastwood Park to confluence with Little Avon) and on the Doverte Brook (North Nibley to confluence with Little Avon). One stretch of fair quality (Class D) was found on the Tortworth Brook (Cromhall to Eastwood Park).

Little Avon Catchment EC Directives



LITTLE AVON CATCHMENT MONITORING OF EC DIRECTIVES

1. EC FRESHWATER FISH DIRECTIVE

- 1.1 The Little Avon from downstream of Wickwar to Sea has been designated as salmonid fishery. The monitoring sites at Charfield (23130502) and downstream of Michaelwood STW (23130424) were within the imperative standards from 1991 to 1993.
- 1.2 Tortworth Lake at Leyhill has been designated as cyprinid fishery. The monitoring site is upstream of the lake on the Tortworth Brook at Abbotside (23160109). During the years 1991 to 1993 the monitoring site was within the imperative standards.

Recommendations

1. It is recommended that the Tortworth Lake designation is reviewed since it is used as a trout fishery according to NRA Severn Trent Region (Fisheries Section).
2. It is recommended that the monitoring site for Tortworth Lake is reviewed as it lies upstream of the lake on Tortworth Brook.

2. EC DANGEROUS SUBSTANCES DIRECTIVE

2.1 LIST I SUBSTANCES

There are no designated List I sites in the catchment.

2.2 LIST II SUBSTANCES

Alderley Trout Farm was consented in 1986 as a discharger for copper (50 µg/l maximum) into the Ozleworth Brook. This is a List II substance and during 1991 - 1993 compliance was achieved in the receiving water.

Nind Mill Fish Farm was consented in 1986 as a discharger for copper (50 µg/l maximum) into the Ozleworth Brook. This is a List II substance and during 1991 - 1993 compliance was achieved in the receiving water.

Recommendation

It is recommended that a review takes place of fish farms designated under the EC Dangerous Substances Directive to ensure that a consistent approach is taken for the south western region.

AMP 2

Wotton under Edge STW is listed in the Wessex AMP2 guidelines as requiring work under Priority 1E "Containment of the Effluent Load within that Implicit in Confirmed Consents".

	Current Consent		Proposed Consent		Parametric 95%ile Performance (1991-1993)	Impact of current performance on d/s water quality
	DWF (m ³ /d)	Conditions	DWF (m ³ /d)	Conditions		
Wotton under Edge	980	40/50/20	1200	30/40/15	17/36/4	Current performance meets new consent

See Section Data Analysis to Assign WQOs - Ozleworth Brook for further details

SUGGESTIONS FOR WATER QUALITY ISSUES

1. FARMING ACTIVITY

The water quality in the following stretches is affected by farming activities:

RIVER	STRETCH
Little Avon	Southwood Farm to B4060 B4060 to confluence with Ozleworth Brook Doverte Brook to Hook Stream
Doverte Brook	North Nibley to confluence with Little Avon
Ozleworth Brook	Impact of Hams Gulley Brook

Where the Area Water Quality Officers have been targeting the impact of farming activities (eg Southwood Farm to B4060) there has been a noticeable improvement in water quality

2. FISH FARMS

The water quality in the following stretch is affected by the activities of fish farms:

RIVER	STRETCH
Ozleworth Brook	Nind Farm to Gatehouse

The Area Water Quality Officers have been targeting this problem and the routine monitoring data shows an improvement in water quality since 1992

3. CROWN PROPERTY DISCHARGES

Tortworth Brook receives the discharge from Leyhill Prison. This is a crown property which in the past was crown exempt and did not require a consent to discharge. However the NRA can now issue consents on such properties and a future review should set consents for crown properties including Leyhill Prison.

4. FISH FARMING (P Hart)

A number of relatively small, commercial trout fish farms are located at the confluence of the Ozleworth Brook and main Little Avon, just upstream of the urban settlement of Kingswood. Each fish farm is subject to abstraction and discharge consenting and although compliance is generally satisfactory there is a perception amongst the residents of Kingswood that the farms are responsible for a variety of local problems including deterioration of water quality, diminishment of natural fish numbers, low flows during summer and flooding during winter. Although much has been done to reassure local people that their fears are largely unfounded,

largely through liaison with Kingswood Parish Council, they remain unconvinced and continue to voice their complaints via both NRA South Western and Severn Trent Region.

One complaint which has often been voiced and which to some small degree may be substantiated is that the flow regime through the fish farms is not strictly as specified on the various licences leading to localised deprivation of water from some of the various small back channels and mill races that are a local feature of the river.

Options

Conduct a thorough review of the flow management practices through the fish farms and where these are found to be at variance with what is specified either change the licences to more accurately reflect actual practices or enforce against transgressions.

Undertake a thorough chemical and biological survey of the Ozleworth Brook and Little Avon upstream and downstream of the fish farms to determine whether there is any detectable change in water quality and use this information as the basis of consent enforcement or revision if found to be appropriate.

5. OVERLOADED SEWERAGE (P Hart)

Sewage effluent from the urban settlements of Kingswood and Wotton under Edge is conveyed to a treatment works on the downstream side of Kingswood for disposal. Wotton under Edge is at a considerable elevation from the works and the main trunk sewer operates at great flow velocity. The sewer is old and overloaded and frequently discharges, both via consented storm overflows to the Dyers Brook and via surcharging manhole covers on agricultural land. The latter occurrence in particular has been the cause of complaint from land owners and operators.

Wessex Water have begun discussions regarding the Drainage Area Plan for the Kingswood and Wotton under Edge area and, although in the early stages it was suggested that improvements may be made to the infrastructure, more recent discussions have indicated that the cost of this may be considered prohibitive and changes to the operation of storm overflows are now being suggested to prevent surcharging manhole covers.

Options

Undertake modelling of the catchment and operation of storm overflows to establish the likely impact of increased operation. Issue revised consents taking account of modelling data, incorporating greater solids control than at present to ensure no visual deterioration brought about by increased operation.

Continue to apply pressure to Wessex Water for improvements to the sewerage infrastructure.

6. FARM DISCHARGES AFFECTING WATER QUALITY (P Hart)

Although the water quality of the Little Avon is generally good to fair, agricultural discharges cause localised problems. Accidental discharges cause temporary water quality problems in the main river stretches and intermittent and permanent discharges of slurry, silage and run-off from land lead to an ongoing poor quality in several of the minor tributaries and headwaters.

Options

Organise strategic investigation of minor tributaries to identify those farms causing pollution and ensure steps are taken to eliminate the polluting discharges.

Work with MAFF and other bodies towards the establishment of riverside buffer zones and set aside areas.

7. IMPACT OF LOW FLOWS (P Hart)

There is concern amongst the residents of the urban settlement of Kingswood that summer flows in the Little Avon which runs through the town have diminished substantially in the past decade. Although local perception is that this is due to the impact of fish farming this is unlikely to be the case as although fish farming requires substantial volumes of river water, none is permanently removed from the system. There are no known major abstractions of surface or groundwater within the catchment upstream of Kingswood.

Options

Conduct seasonal flow monitoring investigations and compare with historical records.

Ensure all licensed abstractors are operating within specified conditions. Increase frequency of checks for non-licensed abstractions.

APPENDIX 1

RIVER NAME	STRETCH	URN	NGR	RQO	FISH	1993 FV CLASS	1993 OP CLASS	MAR. FAIL	SIG. FAIL	TARGET CLASS
LITTLE AVON	WICKWAR-SOUTHWOOD FM	23130504	ST 728 889	1B	S	2	2			2
LITTLE AVON	SOUTHWOOD FM-B4060	23130505	ST 727 897	1B	S	3	3		YES	2(1997)
LITTLE AVON	B4060-CONF WITH OZLEWORTH BK	23130502	ST 728 926	1B	S	3	2	YES		2(1997)
LITTLE AVON	CONF WITH OZLEWORTH BK-WKS	23130402	ST 722 930	2A	S	2	2			2
LITTLE AVON	WKS-DAMERY	23130407	ST 717 935	2A	S	3	2	YES		2
LITTLE AVON	DAMERY-CONF WITH TORTWORTH BK	23130401	ST 706 943	1B	S	2	2			2
LITTLE AVON	CONF WITH TORTWTH BK-CONF WITH FAL BK	23130401	ST 706 943	1B	S	2	2			2
LITTLE AVON	CONF WITH FAL BK-CONF WITH DOVERTE BK	23130401	ST 706 943	1B	S	2	2			2
LITTLE AVON	CONF WITH DOVERTE BK-HOOK ST.(ESTUARY)	23130102	ST 682 987	1B	S	3	2	YES		2(1997)
TORTWORTH BK	CROMHALL-EASTWOOD PK	23160109	ST 690 907	1B*	C/S	4	3			4(visionary 3)
TORTWORTH BK	EASTWOOD PK-CONF WITH LITTLE AVON	23160105	ST 686 934	1B*	S	3	2			3
DOVERTE BK	NORTH NIBLEY-CONF WITH LITTLE AVON	23140103	ST 699 973	2*	S	3	2			
OZLEWORTH BK	WORTLEY-CONF WITH KILCOTT STR	23170603	ST 767 913	1B	S	2	2			2
OZLEWORTH BK	CONF WITH KILCOTT STR-NIND FM	23170503	ST 7563 914	1B	S	2	2			2
OZLEWORTH BK	NIND FM-GATEHOUSE	23170501	ST 754 915	1B	S	3	3		YES	2(1996)
OZLEWORTH BK	GATEHOUSE-WKS	23170309	ST 743 927	1B	S	2	2			2
OZLEWORTH BK	WKS-CONF WITH LITTLE AVON	23170302	ST 741 929	2A	S	3	3			3(visionary 2)

* RQO based on 1990 NWC quality

NATIONAL RIVERS AUTHORITY - SOUTH WESTERN REGION
 WATER QUALITY OBJECTIVES - RIVERS ECOSYSTEM USE CLASSES
 1993 FACE VALUE THREE YEAR CLASSIFICATION

APPENDIX 2

RIVER	STRETCH	URN	SAN	DISSOLVED OXYGEN		BOD		TOTAL AMMONIA		UNIONISED AMMONIA		pH LOW		pH HIGH		MET	DISSOLVED COPPER		TOTAL ZINC		HARDNESS mg/l CaCO3 MEAN B	RE CLASS
				% SAT		mg/l		mg N/l		mg N/l			5%ile C	95%ile C	N		95%ile C	95%ile C				
			N	90%ile	C	90%ile	C	90%ile	C	95%ile	C	5%ile	C	95%ile	C	N	95%ile	C	95%ile	C		
LITTLE AVON	WICKWAR-SOUTHWOOD FM	23130504	79	76.1	2	3.5	2	0.17	1	0.004	1	7.9	1	8.3	1	0						2
LITTLE AVON	SOUTHWOOD FM-B4060	23130505	80	66.4	3	4.2	3	0.26	2	0.006	1	7.9	1	8.3	1	17	6.2	1	22.6	1	(D)	3
LITTLE AVON	B4060-CONF WITH OZLEWORTH BK	23130502	62	78.5	2	4.0	3	0.25	2	0.006	1	7.9	1	8.4	1	13	5.6	1	16.5	1	(D)	3
LITTLE AVON	CONF WITH OZLEWORTH BK-WKS	23130402	51	83.1	1	3.5	2	0.28	2	0.008	1	8.0	1	8.3	1	0						2
LITTLE AVON	WKS-DAMERY	23130407	80	78.9	2	4.0	2	0.63	3	0.008	1	7.9	1	8.3	1	17	5.0	1	13.7	1	355 D	3
LITTLE AVON	DAMERY-CONF WITH TORTWORTH BK	23130401	42	76.8	2	3.9	2	0.26	2	0.005	1	7.8	1	8.3	1	0						2
LITTLE AVON	CONF WITH TORTWTH BK-CONF WITH FAL BK	23130401	42	76.8	2	3.9	2	0.26	2	0.005	1	7.8	1	8.3	1	0						2
LITTLE AVON	CONF WITH FAL BK-CONF WITH DOVERTE BK	23130401	42	76.8	2	3.9	2	0.26	2	0.005	1	7.8	1	8.3	1	0						2
LITTLE AVON	CONF WITH DOVERTE BK-HOOK ST.(ESTUARY)	23130102	56	71.0	2	4.3	3	0.36	2	0.008	1	7.7	1	8.4	1	0						3
TORTWORTH BK	CROMHALL-EASTWOOD PK	23160109	77	58.8	4	2.9	2	0.19	1	0.002	1	7.5	1	7.9	1	16	5.1	1	57.1	1	(D)	4
TORTWORTH BK	EASTWOOD PK-CONF WITH LITTLE AVON	23160105	40	80.7	1	4.0	3	0.30	2	0.009	1	7.9	1	8.3	1	0						3
DOVERTE BK	NORTH NIBLEY-CONF WITH LITTLE AVON	23140103	30	78.5	2	5.0	3	0.35	2	0.007	1	7.8	1	8.3	1	0						3
OZLEWORTH BK	WORTLEY-CONF WITH KILCOTT STR	23170603	48	71.3	2	3.0	2	0.54	2	0.011	1	7.6	1	8.0	1	11	1.6	1			(D)	2
OZLEWORTH BK	CONF WITH KILCOTT STR-NIND FM	23170503	33	73.9	2	3.0	2	0.32	2	0.008	1	7.8	1	8.2	1	0						2
OZLEWORTH BK	NIND FM-GATEHOUSE	23170501	87	65.9	3	3.1	2	0.71	3	0.018	1	7.7	1	8.1	1	11	1.2	1			(D)	3
OZLEWORTH BK	GATEHOUSE-WKS	23170309	51	82.7	1	3.3	2	0.34	2	0.011	1	8.0	1	8.3	1	0						2
OZLEWORTH BK	WKS-CONF WITH LITTLE AVON	23170302	51	77.9	2	4.8	3	0.64	3	0.017	1	7.9	1	8.2	1	17	3.4	1	18.7	1	309 D	3

**NATIONAL RIVERS AUTHORITY - SOUTH WESTERN REGION
 WATER QUALITY OBJECTIVES - RIVERS ECOSYSTEM USE CLASSES
 1993 OPTIMISTIC THREE YEAR CLASSIFICATION**

APPENDIX 3

RIVER	STRETCH	URN	SAM	DISSOLVED OXYGEN		BOD		TOTAL AMMONIA		UNIONISED AMMONIA		pH LOW		pH HIGH		MET	DISSOLVED COPPER		TOTAL ZINC		HARDNESS		RE CLASS
				% SAT		mg/l		mg N/l		mg N/l		5%ile c		95%ile c			µg/l		µg/l		mg/l CaCO3		
				N	90%ile C	90%ile C	90%ile C	95%ile C	5%ile c	95%ile c	N	95%ile C	95%ile C	MEAN B									
LITTLE AVON	WICKWAR-SOUTHWOOD FM	23130504	79	78.0	2	3.0	2	0.13	1	0.003	1	7.9	1	8.3	1	0							2
LITTLE AVON	SOUTHWOOD FM-B4060	23130505	80	69.2	3	3.7	2	0.23	1	0.005	1	7.9	1	8.2	1	17	4.8	1	18.0	1		(D)	3
LITTLE AVON	B4060-CONF WITH OZLEWORTH BK	23130502	62	80.8	1	3.5	2	0.20	1	0.004	1	7.9	1	8.3	1	13	4.5	1	12.6	1		(D)	2
LITTLE AVON	CONF WITH OZLEWORTH BK-WKS	23130402	51	84.9	1	3.1	2	0.23	1	0.006	1	8.0	1	8.2	1	0							2
LITTLE AVON	WKS-DAMERY	23130407	80	80.8	1	3.5	2	0.41	2	0.006	1	7.9	1	8.3	1	17	3.6	1	10.4	1		355 D	2
LITTLE AVON	DAMERY-CONF WITH TORTWORTH BK	23130401	42	79.2	2	3.3	2	0.21	1	0.004	1	7.8	1	8.2	1	0							2
LITTLE AVON	CONF WITH TORTWTH BK-CONF WITH FAL BK	23130401	42	79.2	2	3.3	2	0.21	1	0.004	1	7.8	1	8.2	1	0							2
LITTLE AVON	CONF WITH FAL BK-CONF WITH DOVERTE BK	23130401	42	79.2	2	3.3	2	0.21	1	0.004	1	7.8	1	8.2	1	0							2
LITTLE AVON	CONF WITH DOVERTE BK-HOOK ST.(ESTUARY)	23130102	56	75.0	2	3.8	2	0.29	2	0.006	1	7.8	1	8.3	1	0							2
TORTWORTH BK	CROMHALL-EASTWOOD PK	23160109	77	61.7	3	2.1	1	0.15	1	0.001	1	7.6	1	7.9	1	16	3.4	1	46.7	1		(D)	3
TORTWORTH BK	EASTWOOD PK-CONF WITH LITTLE AVON	23160105	40	82.9	1	3.5	2	0.23	1	0.006	1	7.9	1	8.3	1	0							2
DOVERTE BK	NORTH NIBLEY-CONF WITH LITTLE AVON	23140103	30	81.6	1	3.4	2	0.25	1	0.005	1	7.9	1	8.3	1	0							2
OZLEWORTH BK	WORTLEY-CONF WITH KILCOTT STR	23170603	48	73.7	2	2.7	2	0.46	2	0.008	1	7.7	1	8.0	1	11	0.6	1				(D)	2
OZLEWORTH BK	CONF WITH KILCOTT STR-NIND FM	23170503	33	76.7	2	2.6	2	0.27	2	0.006	1	7.8	1	8.1	1	0							2
OZLEWORTH BK	NIND FM-GATEHOUSE	23170501	87	68.2	3	3.0	2	0.64	3	0.014	1	7.7	1	8.1	1	11	0.7	1				(D)	3
OZLEWORTH BK	GATEHOUSE-WKS	23170309	51	84.9	1	2.9	2	0.31	2	0.009	1	8.0	1	8.2	1	0							2
OZLEWORTH BK	WKS-CONF WITH LITTLE AVON	23170302	51	80.8	1	4.3	3	0.56	2	0.014	1	7.9	1	8.2	1	17	2.6	1	13.9	1		309 D	3

NATIONAL RIVERS AUTHORITY - NORTH WESSEX AREA
1993 GENERAL QUALITY ASSESSMENT

INTERNAL DRAFT
V 20/09/94

C - determinand class : N - number of samples : %ile - percentile

APPENDIX 4

RIVER	STRETCH	1993 SITE	1993 SITE NGR	DISSOLVED OXYGEN		BOD		TOTAL AMMONIA		CLASS
				N	%ile C	N	%ile C	N	%ile C	
LITTLE AVON	WICKWAR-SOUTHWOOD FM	23130504	ST 728 889	79	76.0 B	80	3.49 B	80	0.17 A	B
LITTLE AVON	SOUTHWOOD FM-B4060	23130505	ST 727 897	80	66.3 C	82	4.16 C	82	0.46 B	C
LITTLE AVON	B4060-CONF WITH OZLEWORTH BK	23130502	ST 728 926	62	78.4 B	64	4.01 C	64	0.25 A	C
LITTLE AVON	CONF WITH OZLEWORTH BK-WKS	23130402	ST 722 930	76	80.3 A	78	3.53 B	78	0.24 A	B
LITTLE AVON	WKS-DAMERY	23130407	ST 717 935	80	78.8 B	82	3.91 B	82	0.28 B	B
LITTLE AVON	DAMERY-CONF WITH TORTWORTH BK	23130401	ST 706 943	42	76.7 B	42	3.89 B	42	0.26 B	B
LITTLE AVON	CONF WITH TORTWTH BK-CONF WITH FAL BK	23130401	ST 706 943	42	77.7 B	42	3.63 B	42	0.25 A	B
LITTLE AVON	CONF WITH FAL BK-CONF WITH DOVERTE BK	23130401	ST 706 943	42	77.7 B	42	3.63 B	42	0.25 A	B
LITTLE AVON	CONF WITH DOVERTE BK-HOOK ST.(ESTUARY)	23130102	ST 682 987	56	70.8 B	57	4.36 C	57	0.36 B	C
TORTWORTH BK	CROMHALL-EASTWOOD PK	23160109	ST 690 907	77	58.7 D	79	2.90 B	79	0.19 A	D
TORTWORTH BK	EASTWOOD PK-CONF WITH LITTLE AVON	23160105	ST 686 934	40	80.6 A	40	4.05 C	40	0.30 B	C
DOVERTE BK	NORTH NIBLEY-CONF WITH LITTLE AVON	23140103	ST 699 973	30	78.3 B	31	5.03 C	31	0.35 B	C
OZLEWORTH BK	WORTLEY-CONF WITH KILCOTT STR	23170603	ST 767 913	48	71.2 B	50	3.00 B	50	0.54 B	B
OZLEWORTH BK	CONF WITH KILCOTT STR-NIND FM	23170503	ST 7563 9140	33	73.8 B	34	3.06 B	34	0.32 B	B
OZLEWORTH BK	NIND FM-GATEHOUSE	23170501	ST 754 915	87	65.8 C	90	3.11 B	90	0.71 C	C
OZLEWORTH BK	GATEHOUSE-WKS	23170309	ST 743 927	86	70.9 B	89	3.25 B	89	0.47 B	B
OZLEWORTH BK	WKS-CONF WITH LITTLE AVON	23170302	ST 741 929	76	79.4 B	78	4.34 C	78	0.58 B	C