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# The Loddon Catchment

## THAMES REGION

# Proposals for Statutory Water Quality Objectives



NRA

*National Rivers Authority*

Guardians of  
the Water Environment



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## INTRODUCTION TO THIS CONSULTATION DOCUMENT

This document sets out the proposals of the National Rivers Authority (NRA) and the Environment Agency (the Agency) for Statutory Water Quality Objectives (SWQOs) for stretches of river in the Loddon catchment. Its purpose is to provide local organisations and individuals with the opportunity to comment before more formal Government consultations take place. This is the start of a process which may ultimately lead to the setting of SWQOs by the Secretary of State. Our role in this is to advise the Secretary of State on which SWQOs should apply, having heard the views of interested parties and taken into account the environmental, technical and economic implications of their views.

SWQOs define a target level of water quality to be met for a river stretch, together with a target date by which this level must be achieved. SWQOs have a statutory basis and therefore, once set, the NRA or the Agency will be required to ensure, as far as is practicable to do so, that they are achieved. Water quality targets for river stretches have not previously been set in this way in England and Wales, so Government has decided, in consultation with us, to test the operation of SWQOs in a series of "pilot" catchments. The Loddon catchment has been selected as a pilot because a Catchment Management Plan (CMP) has already been completed by the NRA for the Blackwater sub-catchment. CMPs integrate all of our water management responsibilities by setting out long-term goals for a range of different uses of the water environment.

In developing our proposals for SWQOs, we have identified the investment necessary - by agriculture, by industry and by the Environment Agency - to deliver

the proposed quality targets. We have also taken account, where appropriate, of the levels of investment by the water industry that were agreed by Government for the purpose of setting revised price limits from 1995 onwards. Our existing River Quality Objectives (RQOs) largely reflect our view of, and longer-term agreements on, the needs of river stretches. In general, we have therefore proposed SWQOs that are consistent with RQOs in keeping with our duty to "maintain and improve" water quality. In a limited number of river stretches, the currently agreed programme of investment in the catchment is inadequate to protect water quality to meet the agreed uses of the watercourses. In these cases we have proposed an interim SWQO which acknowledges current limitations on further investment, and also a further longer-term SWQO that is generally consistent with the agreed use of the river. Where these two tier SWQOs are proposed, the steps necessary to deliver them are outlined, and these should be viewed as priorities for future investment. This document provides an overview of the Loddon catchment, presents our proposals for SWQOs for each river stretch, assesses the state of current compliance with the SWQOs proposed, and assesses the costs and benefits involved in delivering them.

Comments are invited on these draft proposals for SWQOs for this catchment. They should be sent to the Senior Pollution Officer, NRA Thames Region, South East Area, Guildford Office, Eadymead, By-pass Road, Guildford GU1 1BZ by 1st July 1996. The fax number is 01483-561598.



**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.

**How SWQOs will be Set**

SWQOs, currently based only on the River Ecosystem use, will be set on a stretch-by-stretch basis for the major rivers within the catchment; they will not apply to our smallest rivers. The targets will comprise two parts: a River

Ecosystem class; and a date by which compliance should be achieved. Account will be taken of planned investment to ensure that the targets are achievable and, where appropriate, reflect planned improvements in river quality. Where appropriate, we have proposed 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 this consultation, we are seeking the views of those with an interest in this catchment, before submitting our recommendations to Government. Government will then undertake a period of formal consultation. SWQOs will then 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 set, longer-term SWQOs will have a statutory basis, generally protecting the existing planning base currently expressed as RQOs. Therefore, longer-term SWQOs will 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 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 for the Blackwater sub-catchment.

**TABLE 1 STANDARDS FOR RIVER ECOSYSTEM CLASSES**

Class	Dissolved Oxygen	BOD (ATU)	Total Ammonia	Un-ionised Ammonia	pH	Hardness	Dissolved Copper	Total Zinc
	% Saturation	(mg/l)	(mg N/l)	(mg N/l)			(µg/l)	(µg/l)
	10 percentile	90 percentile	90 percentile	95 percentile	lower limit as 5 percentile; upper limit as 95 percentile	mg/l CaCO <sub>3</sub>	95 percentile	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 LODDON CATCHMENT

### Catchment Description

The Loddon catchment covers an area of 680 km<sup>2</sup> in the counties of Berkshire, Hampshire and Surrey and includes 210 km (130 miles) of classified rivers and canals. The River Loddon itself is 45 km long from its source in the chalk downs of Hampshire near Basingstoke to its confluence with the River Thames just east of Reading. It flows through a predominantly agricultural area, with the exception of the expanding town of Basingstoke and the urban fringes of Reading in its lower reaches.

There are many tributaries in the catchment (see Map 1). The Blackwater is 37 km (23 miles) long from its source in the Aldershot area to its confluence with the Loddon at Swallowfield. The upper part of the Blackwater valley is highly urbanised following rapid growth in the last 30 years, and includes the towns of Camberley, Fleet, Aldershot, Farnborough, and Sandhurst. The lower reaches of the river are more rural. The Whitewater and Hart are tributaries of the Blackwater, each approximately 20 km (12 miles) long flowing through predominantly agricultural areas. Between the Hart and the Blackwater, there are large wooded areas, associated with the sandy soils in this area.

Other watercourses in the Loddon catchment include the Lyde, Bow Brook, Emm Brook, Barkham Brook, Fleet Brook, Cove Brook, and Minley Brook. The newly restored Basingstoke Canal runs across the south of the catchment from Odiham, near the Whitewater to Aldershot in the Blackwater valley, from where it continues eastwards to the Wey catchment.

There are many recognised uses of the watercourses. Most rivers contain coarse fish (e.g. barbel, chub, roach and dace), and the upper Loddon, Whitewater, and Lyde contain trout. Sites of Special Scientific Interest (SSSIs) exist on or near to the Fleet Brook, Whitewater, Basingstoke Canal and at a few places near to the Loddon. Abstractions from the rivers for spray

irrigation and fish farms are limited to a few places. Cattle drinking directly from the rivers are a common sight. Public access to the rivers is high in the Blackwater, the Loddon, Basingstoke canal, and the Whitewater. The Vyne Stream flows through a National Trust site.

### Current Water Quality

Recent river quality surveys show the Loddon catchment to be predominantly of "fair" quality, with 23 of the 35 stretches falling into this category. Seven stretches are classed as "good" quality, including the Lyde and the upper Loddon, Whitewater and Basingstoke Canal. Five stretches are classed as having "poor" quality. These are the Pyestock Tributary, Fleet Brook, Minley brook and the Blackwater downstream of Aldershot sewage works.

### Investment in the Catchment

The Blackwater sub-catchment of the Loddon has benefitted from substantial investment by Thames Water Utilities Ltd (TWUL) at their Aldershot, Ash Vale and Camberley sewage treatment works (STWs) in recent years. However, further investment is needed to protect and improve the current water quality. Under agreements with Government (AMP2), TWUL will invest an estimated further £22 million between 1995 and 2005 on capital works to improve the quality of the treated sewage effluents discharged from a number of its works.

We estimate that further expenditure of up to £5 million would be required by TWUL at Aldershot Town STW beyond the AMP2 investment timeframe, in addition to investment of up to £5 million by the Ministry of Defence (MoD) at Aldershot Military STW, in order to ensure water quality is suitable to support a high-class cyprinid fishery in the River Blackwater downstream of these works.

Further expenditure of up to £1 million will be required to solve a problematic landfill site adjacent to the Minley Brook. This will improve the existing poor water quality.

Expenditure of up to £1 million will be required to improve a government STW discharging to the Pyestock Tributary. This will improve the existing poor water quality in the tributary.

In addition, the Environment Agency will maintain an active programme of pollution prevention campaigns, visits and enforcement work. Overall, this investment and our pollution prevention work will help to protect and enhance the fishery, recreation and amenity value of the catchment.

### Catchment Management Plans

A Catchment Management Plan Consultation report and Action Plan for the Blackwater sub-catchment have been published and are available to the public from the NRA. These documents provide more detailed information on the uses made of this catchment and the NRA objectives for the future.

### PROPOSALS FOR STATUTORY WATER QUALITY OBJECTIVES

Map 2 and 3 contain our proposals for SWQOs in the Loddon 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 (discussed previously in this document), 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.

Further details of the proposed SWQOs for each river stretch are contained in Appendix 1.

#### **Compliance with Proposed SWQOs**

Map 4 compares current water quality with the proposed SWQOs. (Where two-tier SWQOs are proposed, the interim 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 river stretches depict those aspects of water quality which do not or marginally meet the standards.

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.

#### **ASSESSMENT OF THE COSTS AND BENEFITS**

##### **Costs**

The majority of the costs associated with achieving the proposed SWQOs are attributable to sewage treatment works improvements. TWUL will spend an estimated total of £22 million on improvements at 8 of their sewage treatment works in the catchment between 1995 and 2005. This includes £3.25 million to be spent at Sandhurst and Ash Vale STWs as part of the Discretionary Expenditure. The remaining works targeted for investment are Aldershot Town, Arborfield, Basingstoke, Easthampstead Park, Sherfield-on-Loddon and Fleet. The removal of the polluting effects of a landfill site at a cost estimated by us of up to £1 million would be required to achieve the SWQO of RE4 (2001) for the Minley Brook.

Further investment at Aldershot Town STW and at Aldershot Military STW (owned by the MoD), each at a cost estimated by us of up to £5 million, would be required to achieve the proposed longer-term SWQO of RE3 for the River Blackwater below Aldershot. Investment at a government STW that we estimate as up to £1 million would be required to achieve the proposed longer-term SWQO of RE4 for the Pyestock Tributary.

##### **Benefits**

The proposed SWQOs will ensure that current water quality is maintained

and in some cases enhanced. This in turn will help to protect and in some cases enhance valuable salmonid and cyprinid fisheries and the recreational and amenity value of the catchment. In particular, the salmonid fisheries of the Loddon, the River Lyde and the Whitewater will be protected and the fishery of the River Hart will be improved to a high class cyprinid fishery over the next five years. The Minley Brook will be improved by 2001 to support a cyprinid fishery.

In addition, investment post-AMP2 will result in an increase in the water quality of the River Blackwater downstream of Aldershot sufficient to support a high-class cyprinid fishery. The quality of the Pyestock Tributary will also be improved after 2006 sufficiently to support cyprinid fisheries.

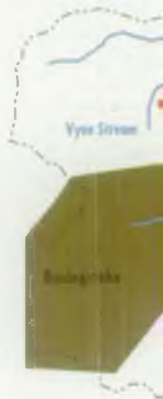
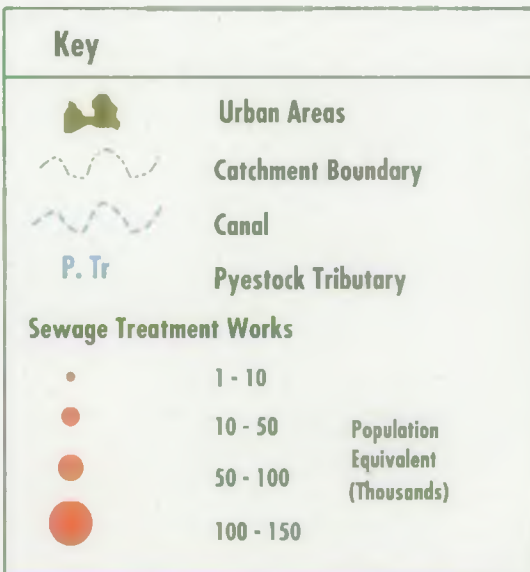
##### **Comparison of Costs and Benefits**

A summary of the costs and their associated benefits is included in Appendix II. The substantive benefits of the improvements are considerable in terms of protecting and enhancing the fisheries, river ecosystem, recreation opportunities and the amenity and tourism value over most parts of the catchment. The value of these benefits is further increased by the fact that the Loddon catchment is situated in a densely populated part of England.

In the NRA's view, these benefits substantially outweigh the costs involved in achieving the necessary level of protection of water quality.

# THE LODDON CATCHMENT

## MAP 1: OVERVIEW OF THE CATCHMENT













(Not to Scale)



# THE LODDON CATCHMENT

## MAP 2: PROPOSED SWQOs

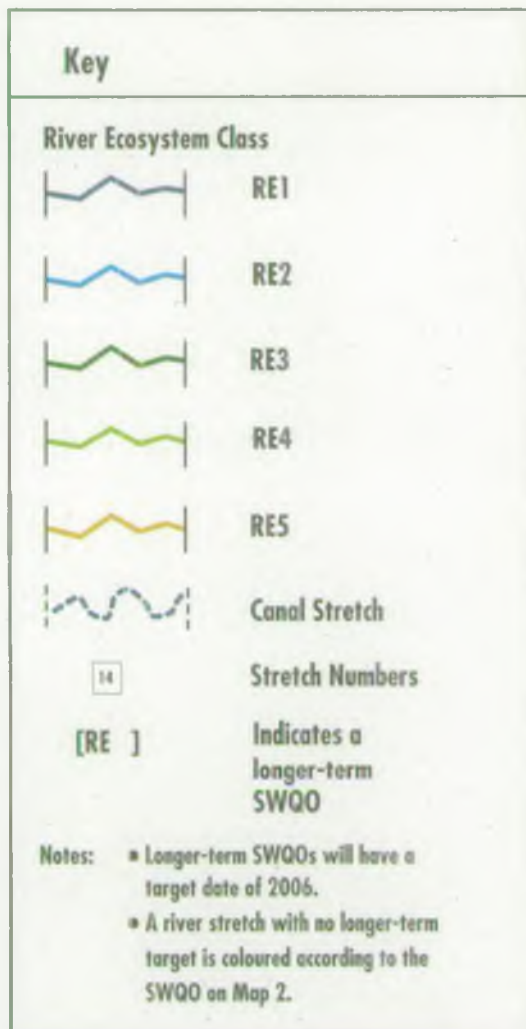
Key	
<b>River Ecosystem Class</b>	
	RE1
	RE2
	RE3
	RE4
	RE5
	Canal Stretch
	Stretch Numbers
	Indicates where a longer-term SWQO is proposed (see Map 3).
<b>Notes:</b>	SWQOs have a target date of 1996 unless otherwise indicated on the map.





# THE LODDON CATCHMENT

## MAP 3: LONGER-TERM SWQOs

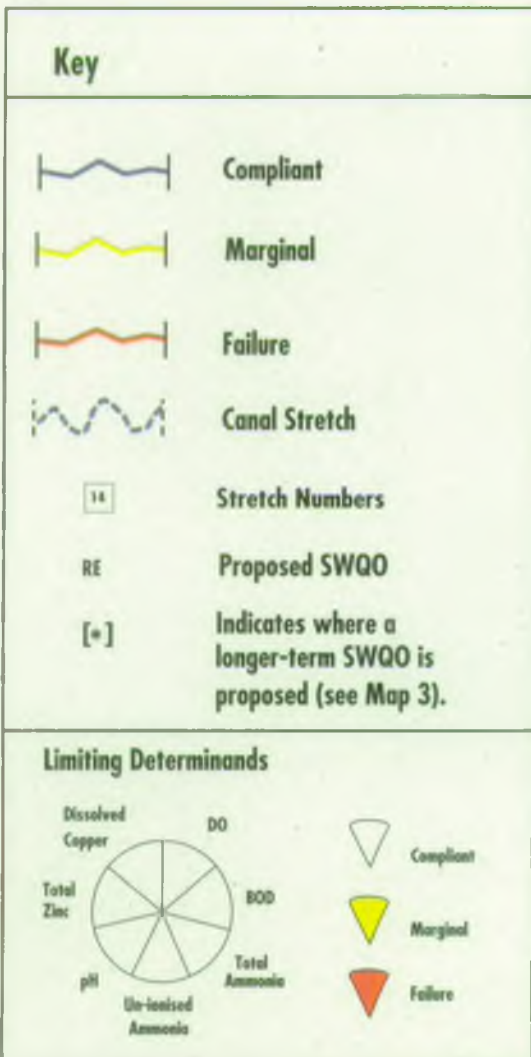




*The Loddon Catchment*

# THE LODDON CATCHMENT

## MAP 4: COMPLIANCE WITH SWQOs





## 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 NRA 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 flows 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 NRA 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).

**Fisheries Directive**

The Freshwater Fish (ibid) Directive (ibid) (78/659/EEC).

**General Quality Assessment (GQA)**

The NRA'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<sub>3</sub>**

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 - million litres per day.

**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.

**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).

**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.

**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).

**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 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 gramme per litre.

**Zinc**

See Total Zinc



## APPENDIX I: PROPOSED SWQOs FOR THE LODDON CATCHMENT

RIVER STRETCH	NAME OF WATERCOURSE	START OF STRETCH	MAP REFERENCE	END OF STRETCH	MAP REFERENCE	LENGTH OF STRETCH (km)	PROPOSED SWQOs (with date)
1	Ashridge Stream	Source	SU 8184 7041	Emm Brook	SU 7983 7047	2.4	RE4 (1996)
2	Barkham Brook	Source	SU 7961 6577	River Loddon	SU 7577 6951	6.9	RE2 (1999)
3	Basingstoke Canal	Greywell	SU 7189 5142	Winchfield	SU 7775 5375	7.6	RE2 (1996)
4	Basingstoke Canal	Winchfield	SU 7775 5375	Eelmore Bridge, Aldershot	SU 8432 5292	12.3	RE4 (1996)
5	Blackwater	Aldershot	SU 8582 4947	Aldershot STW	SU 8830 5030	4.5	RE4 (1996)
6	Blackwater	Aldershot STW	SU 8830 5030	Aldershot Military STW	SU 8840 5270	3.2	RE4 (1996); RE3 (2006)
7	Blackwater	Aldershot Military STW	SU 8840 5270	Ash Vale STW	SU 8860 5390	1.7	RE4 (1996); RE3 (2006)
8	Blackwater	Ash Vale STW	SU 8860 5390	Cove Brook	SU 8606 5890	6.9	RE3 (1999)
9	Blackwater	Cove Brook	SU 8606 5890	Camberley STW	SU 8580 5950	0.8	RE3 (1999)
10	Blackwater	Camberley STW	SU 8580 5950	Sandhurst STW	SU 8360 6090	3.3	RE3 (1999)
11	Blackwater	Sandhurst STW	SU 8360 6090	Eversley	SU 7750 6250	8.2	RE3 (1999)
12	Blackwater	Eversley	SU 7750 6250	River Whitewater	SU 7416 6356	4.3	RE3 (1996)
13	Blackwater	River Whitewater	SU 7416 6356	River Loddon	SU 7258 6564	2.9	RE3 (1996)
14	Bow Brook	Ramsdell	SU 5855 5692	River Loddon	SU 6754 5895	13.2	RE3 (1996)
15	Cove Brook	Source	SU 8516 5356	Hawley Lake Stream	SU 8554 5671	3.8	RE4 (1996)
16	Cove Brook	Hawley Lake Stream	SU 8554 5671	River Blackwater	SU 8608 5890	2.7	RE4 (1996)
17	Emm Brook	Pinewood	SU 8388 6566	River Loddon	SU 7818 7326	12.7	RE4 (1996)
18	Fleet Brook	Church Crookham	SU 8166 5281	Fleet STW	SU 8050 5650	5.8	RE4 (1996)
19	Fleet Brook	Fleet STW	SU 8050 5650	River Hart	SU 7837 5708	2.7	RE4 (1998)
20	Hart	Crandall	SU 7962 4900	Fleet Brook	SU 7790 5616	11.0	RE3 (1996)
21	Hart	Fleet Brook	SU 7790 5616	Hartley Wintney STW	SU 7660 5800	2.4	RE3 (1998)
22	Hart	Hartley Wintney STW	SU 7660 5800	River Whitewater	SU 7410 6080	5.1	RE3 (1998)
23	Loddon	Source	SU 6200 5206	Basingstoke STW	SU 6800 5520	7.8	RE2 (1996)
24	Loddon	Basingstoke STW	SU 6800 5520	River Lyde	SU 6918 5756	4.6	RE2 (1998)
25	Loddon	River Lyde	SU 6918 5756	Stanford End Bridge	SU 7067 6286	8.9	RE2 (1998)
26	Loddon	Stanford End Bridge	SU 7067 6286	River Blackwater	SU 7258 6564	4.7	RE2 (1996)
27	Loddon	River Blackwater	SU 7258 6564	Barkham Brook	SU 7577 6951	5.6	RE3 (1996)
28	Loddon	Barkham Brook	SU 7577 6951	Wargrave STW	SU 7790 7760	12.3	RE3 (1996)
29	Loddon	Wargrave STW	SU 7790 7760	River Thames	SU 7788 7868	1.3	RE3 (1996)
30	Lyde	Source	SU 6721 5163	River Loddon	SU 6918 5756	8.7	RE1 (1996)
31	Minley Brook	Source	SU 8420 5607	Fleet Brook	SU 8112 5657	3.6	RE4 (2001)
32	Pyestock Tributary	Source	SU 8414 5486	Cove Brook	SU 8546 5482	1.6	RE5 (1996); RE4 (2006)
33	Vyne Stream	Sherborne Saint John	SU 6257 5530	Bow Brook	SU 6429 5842	4.2	RE3 (1996)
34	Whitewater	Source	SU 7128 4984	River Hart	SU 7415 6087	15.6	RE1 (1996)
35	Whitewater	River Hart	SU 7415 6087	River Blackwater	SU 7416 6356	3.5	RE2 (1998)

**APPENDIX II: SUMMARY OF COSTS, BENEFITS AND ISSUES**

**RIVER BLACKWATER AND COVE BROOK (Stretches 5 to 13; 15 & 16).**

The Blackwater Valley includes the towns of Camberley, Fleet, Aldershot, Farnborough and Sandhurst, all of which have experienced rapid growth in the last 30 years. As a result, the headwaters of the river are urbanised. The lower reaches are more rural. The river currently supports a cyprinid fishery. However, poor fish populations are found immediately downstream of the STWs. There have been substantial improvements in river quality since investment at a number of STWs in the early 1990s.

**PROPOSED COSTS:**

To achieve the proposed short-term SWQOs, improvements are required at Aldershot Town STW (up to £1 million), Ash Vale STW (up to £0.25 million) and Sandhurst STW (up to £3 million), and this investment is committed under AMP2 agreements. To achieve the proposed longer-term SWQOs, further improvements at Aldershot Town STW and improvements at Aldershot Military STW will be required.

<b>BENEFITS</b>	<b>POTABLE SUPPLIES</b>	<b>AGRICULTURAL &amp; INDUSTRIAL ABSTRACTION</b>	<b>FISHERIES</b>	<b>RIVER ECOSYSTEM</b>	<b>RECREATION</b>	<b>AMENITY &amp; AESTHETICS</b>	<b>TOURISM</b>
	Low	Low	High	High	High	Medium	Low

**SUBSTANTIVE BENEFITS:**

**FISHERIES:**

The proposed SWQOs and the planned improvements at Ash Vale and Sandhurst STWs scheduled for completion by the end of 1998 will ensure that a high class cyprinid fishery is maintained in the river downstream of Ash Vale STW. The proposed SWQOs will also help to ensure that a cyprinid fishery is maintained in the river between the town of Aldershot and Ash Vale STW. The proposed longer-term SWQOs and further improvements at Aldershot Town and Aldershot Military STWs will ensure water quality suitable for a high-class cyprinid fishery.

**RIVER ECOSYSTEM:**

The proposed SWQOs will help to protect the conservation value of the Blackwater Valley. A part of the valley consists of wetland meadows, swamp and woodland and is designated as the Blackwater Valley SSSI. This site supports a rare elongated sedge and a rich assemblage of insects including many rare or scarce species. A small area of the site is managed as a Berkshire, Buckinghamshire and Oxfordshire Naturalists' Trust (BBONT) nature reserve.

**RECREATION/AESTHETICS:**

The Blackwater Valley is a highly populated area and the river is of significant recreational value to local residents. The 30 km Blackwater Valley footpath provides easy access to the river. The planned improvements at Aldershot, Ash Vale and Sandhurst STWs, and the further investment at Aldershot Town and Aldershot Military STWs, will ensure that the recreational value of the river is enhanced and protected.

**WHITewater, RIVER LYDE, RIVER HART, FLEET BROOK (Stretches 18 to 22; 30; and 34 to 35).**

The Whitewater, River Hart and Fleet Brook are tributaries of the Blackwater draining predominantly agricultural and wooded areas. The River Lyde is a headwater tributary of the Loddon. The Whitewater and the River Lyde are two of the best watercourses in the region and both currently support a salmonid fishery. The Hart and the Fleet Brook currently support cyprinid fisheries.

**PROPOSED COSTS:**

Improvements at Fleet STW (estimated as up to £10 million):

BENEFITS	POTABLE SUPPLIES	AGRICULTURAL & INDUSTRIAL ABSTRACTION	FISHERIES	RIVER ECOSYSTEM	RECREATION	AMENITY & AESTHETICS	TOURISM
	Low	Medium	High	High	Medium	Medium	Low

**SUBSTANTIVE BENEFITS:**

**FISHERIES:**

The proposed SWQOs for the Whitewater and the River Lyde will help to maintain water quality within the rivers and as a result help to protect the salmonid fisheries. The proposed SWQOs for the Hart and the Fleet, and the planned improvements at Fleet STW due to be completed by 1997, will ensure that a water quality suitable for a high class cyprinid fishery is restored in the River Hart and that a water quality suitable for a cyprinid fishery exists in the Fleet Brook.

**RIVER ECOSYSTEM:**

The proposed SWQOs will help to protect the conservation value of the Whitewater. Greywell Fen, a calcareous valley adjacent to the Whitewater, has been designated as an SSSI. This site supports a wide range of rich fen plants, including orchids, and part of the site is managed by Hampshire Wildlife Trust as a nature reserve.

**OTHER ISSUES:**

Risk of Whitewater failing to comply with SWQO of RE1: Analysis of the available water quality data indicated that there was a small risk of the river failing its proposed SWQO of RE1. The sampling point was situated in a slow flowing weir pool. The point was moved downstream of the weir in 1992. The new sampling point is thought to be more representative of the true water quality in the river and the proposed SWQO should be consistently achieved in future.

Risk of River Lyde failing to comply with SWQO of RE1: Analysis of the available water quality data indicated that the river was at risk of failing its proposed SWQO of RE1 as a result of occasional low dissolved oxygen results. Although there is a small risk of failing the objective, an SWQO of RE1 is appropriate to protect the quality of other determinands. These changes in water quality are thought to be due to natural causes, so no immediate action is proposed though the issue will be raised in future CMPs.

**RIVER LODDON (Stretches 23 to 29).**

The headwaters of the Loddon are surrounded by the expanding town of Basingstoke and its lower reaches meet the urban fringes of Reading. The middle reaches of the river flow through a predominantly rural area. The river currently supports a salmonid fishery downstream of Basingstoke STW as far as the confluence with the Blackwater and a high class cyprinid fishery in the rest of the river.

**PROPOSED COSTS:**

Improvements at Basingstoke STW (estimated as up to £10 million).

<b>BENEFITS</b>	<b>POTABLE SUPPLIES</b>	<b>AGRICULTURAL &amp; INDUSTRIAL ABSTRACTION</b>	<b>FISHERIES</b>	<b>RIVER ECOSYSTEM</b>	<b>RECREATION</b>	<b>AMENITY &amp; AESTHETICS</b>	<b>TOURISM</b>
	Low	Low	High	High	High	High	High

**SUBSTANTIVE BENEFITS:**

**FISHERIES:**

The proposed SWQOs and the planned investment at Basingstoke STW due to be completed by the end of 1998 should ensure that a quality of water suitable for a salmonid fishery is maintained in the river between the works and the confluence with the Blackwater. The proposed SWQOs should also help to ensure that a high class cyprinid fishery is protected in the rest of the river.

**RIVER ECOSYSTEM:**

The proposed SWQOs will help to protect the conservation value of the Loddon. A 4 kilometre stretch of the river and some of the adjacent land is designated as part of the Stanford End Mill and River Loddon SSSI. This site supports a variety of coarse fish, water voles and nesting birds, including the Little Grebe and the Kingfisher. The water meadows at Stratfield Saye are also nationally important for their botanical community, including the endangered Snake's Head Fritillary.

**RECREATION, AESTHETICS, AMENITY AND TOURISM:**

The river flows through the Stratfield Saye estate owned by the Duke of Wellington. The estate is open to the public, and so in addition to helping to protect the amenity value of the estate for its owner, the proposed SWQOs will help protect the recreation and aesthetic benefits of the estate for local residents and tourists.

**OTHER ISSUES:**

- River Loddon downstream of Blackwater confluence

It may be possible to provide and maintain a quality of water in the Loddon downstream of its confluence with the Blackwater that is suitable for salmonids if a clear need exists. In line with this, a longer-term SWQO of RE2 would need to be set. A preliminary assessment has been carried out to see if this is achievable. The position will be reviewed following completion of the planned investment in the catchment; a longer-term SWQO has not been proposed at this stage. This issue will be raised in future CMPs.

**MINLEY BROOK AND PYESTOCK TRIBUTARY (Stretches 31 & 32).**

The Minley Brook and Pyestock Tributary are tributaries of the Fleet Brook and Cove Brook respectively. Both have a history of poor water quality. In the case of the Minley Brook, this is due to a landfill tip leachate problem. In the case of the Pyestock Stream, the poor water quality results from a mixed sewage and trade discharge from a government site.

**PROPOSED COSTS:**

Removal of landfill site (estimated cost of up to £1 million) will improve the quality of the Minley Brook.

In the longer term, the Pyestock Tributary will benefit from improvements to a government STW (estimated cost up to £1 million).

BENEFITS	POTABLE SUPPLIES	AGRICULTURAL & INDUSTRIAL ABSTRACTION	FISHERIES	RIVER ECOSYSTEM	RECREATION	AMENITY & AESTHETICS	TOURISM
	Low	Low	Medium	Medium	Medium	Medium	Low

**SUBSTANTIVE BENEFITS:****AESTHETICS/RIVER ECOSYSTEM:**

The proposed SWQO and the removal of a landfill site adjacent to the Minley Brook will ensure that the quality of the brook will be improved to a point where it is no longer a public nuisance and to enable the brook to support a greater diversity of aquatic life including cyprinid fish.

**AMENITY/AESTHETICS:**

The proposed longer-term SWQO and the improvements to a government STW and habitat enhancements will ensure that the Pyestock Tributary is aesthetically acceptable to local residents and the general public.

**BASINGSTOKE CANAL (Stretches 3 & 4).**

The Basingstoke Canal runs west to east through the catchment from Odiham, near the Whitewater to Aldershot in the Blackwater valley, from where it continues eastwards to the Wey catchment. It supports good fish populations in many sections. The canal has a number of designated Sites of Special Scientific Interest (SSSIs).

**PROPOSED COSTS:**

None

BENEFITS	POTABLE SUPPLIES	AGRICULTURAL & INDUSTRIAL ABSTRACTION	FISHERIES	RIVER ECOSYSTEM	RECREATION	AMENITY & AESTHETICS	TOURISM
	Low	Low	High	High	High	Low	High

**SUBSTANTIVE BENEFITS:****FISHERIES:**

The proposed SWQOs will help maintain the current water quality and thus help to protect the fishery.

**RIVER ECOSYSTEM:**

The proposed SWQOs will help to protect the conservation value of the canal. The canal, together with associated "flashes" and heathland, is nationally important for aquatic plants and invertebrates. Part of the canal is designated as the Basingstoke Canal SSSI. In addition, the Greywell Tunnel supports the largest population of bats of any known site in Britain.

**RECREATION, AESTHETICS AND TOURISM:**

The canal is accessible along its towpath and therefore has a high recreational and aesthetic value for local residents and visitors. The bat populations of the Greywell Tunnel are an important tourist attraction. The proposed SWQOs would help to protect these substantial benefits.

**BOW BROOK AND VYNE STREAM (Stretches 14 & 33).**

These tributaries are both headwaters of the Loddon. The Bow Brook and the Vyne Stream currently support high class cyprinid fisheries.

**PROPOSED COSTS:**

Improvements at Sherfield-on-Loddon STW (estimated cost of up to £1 million).

BENEFITS	POTABLE SUPPLIES	AGRICULTURAL & INDUSTRIAL ABSTRACTION	FISHERIES	RIVER ECOSYSTEM	RECREATION	AMENITY & AESTHETICS	TOURISM
	Low	Low	High	Medium	Medium	Medium	Low

**SUBSTANTIVE BENEFITS:**

**FISHERIES:**

The proposed SWQOs will help to maintain the current water quality and, as a result, protect the fisheries.

**OTHER ISSUES:**

Risk of Vyne Stream failing to comply with SWQO of RE3: Analysis of the available water quality data indicated that the river was at risk of failing its proposed SWQO of RE3 as a result of fluctuating concentrations of DO and BOD indicative of algal activity during the summer. There is a large lake upstream of the sampling point where algae are known to exist. A more intensive water quality survey is planned by the NRA and a way forward will be recommended.

**ASHRIDGE STREAM, BARKHAM BROOK AND EMM BROOK (Stretches 1, 2 & 17).**

All three watercourses support largely cyprinid fish populations and are important nursery tributaries for fish populations in the lower reaches of the River Loddon.

**PROPOSED COSTS:**

Improvements at Arborfield STW (estimated cost up to £1 million) and Easthamstead Park STW (estimated cost up to £1 million).

BENEFITS	POTABLE SUPPLIES	AGRICULTURAL & INDUSTRIAL ABSTRACTION	FISHERIES	RIVER ECOSYSTEM	RECREATION	AMENITY & AESTHETICS	TOURISM
Low	Low	High	Medium	Medium	Medium	Low	

**SUBSTANTIVE BENEFITS:**

**FISHERIES:**

The maintenance of current water quality and, therefore, the protection of the existing largely cyprinid fishery.

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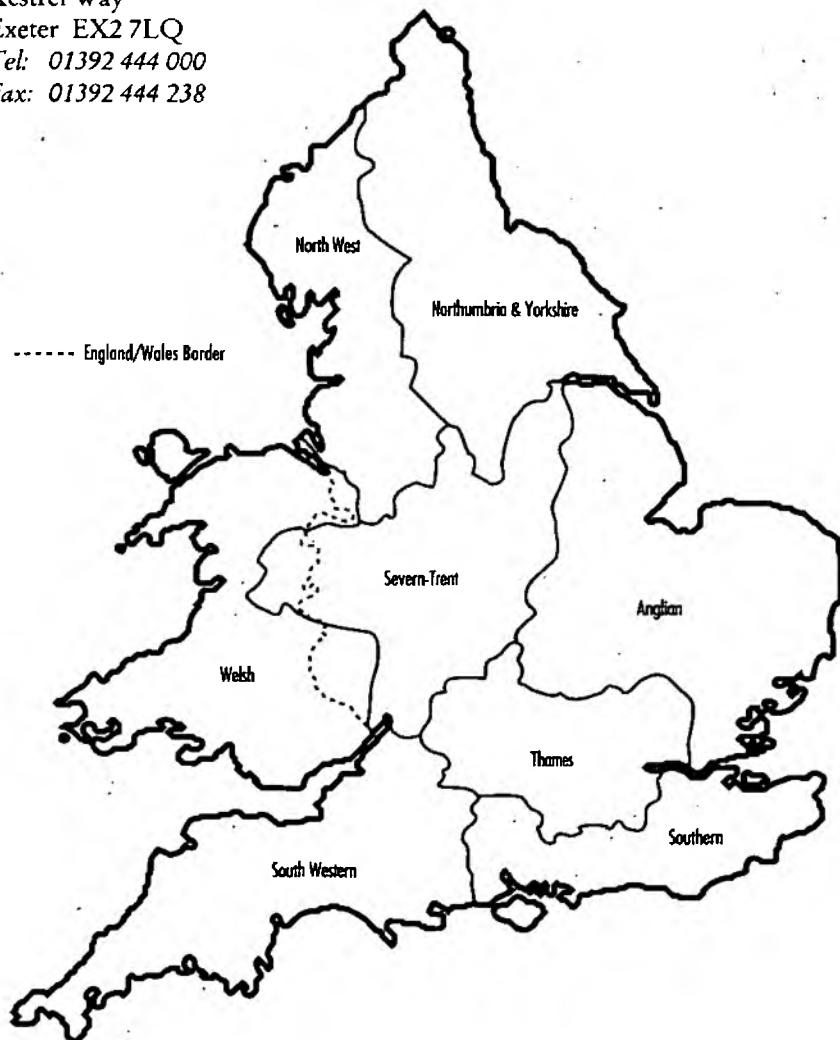
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