Recommendations for Statutory Water Quality Objectives

ENVIRONMENT AGENCY

THE LODDON CATCHMENT

THAMES

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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 Loddon Catchment is one such pilot catchment, and SWQO proposals for the catchment were contained in the consultation document. *The Loddon 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 Loddon 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 3; 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 for the catchment. The longer-term SWQO proposal 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 Water Quality Planning, Environment Agency, Thames Region, Kings Meadow House, Kings Meadow Road, Reading, RG1 8DQ . 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 those views have been taken into account in these recommendations to Government. Government may 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 for the Blackwater sub-catchment 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 LODDON CATCHMENT

Catchment Description

The Loddon catchment covers an area of 680 km^2 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. The population of the catchment in 1986 (projected in the 1981 census) was 473,000. The population varies in part, due to the movement of military personnel to and from the army camps of Sandhurst, Aldershot and Camberely. Other seasonal migration is estimated at 10% (1991-1996) by the census Special Migration Statistics. Future housing policies for the South East are shaped by government guidance RPG9. The most significant allocation of development in the Loddon catchment is that of approximately 6,500 houses in the Basingstoke area.

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 catchments. 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.

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 Environment Agency. These documents provide more detailed information on the uses made of this catchment and the Agency 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, 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 I.

COMPLIANCE WITH PROPOSED SWQOS

Map 4 compares current water quality with the proposed SWQOs. 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 river stretches depict those aspects of water quality which do not or marginally meet the standards. The rules for assessing compliance are set out exactly in *Water Quality Objectives: Procedures Used by the National Rivers Authority for the Purpose of the Surface Waters (River Ecosystem) (Classification)Regulations 1994.* This is available from the contact given at the foot of the Introduction page.

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 LODDON CATCHMENT

MAP 1: OVERVIEW OF THE CATCHMENT

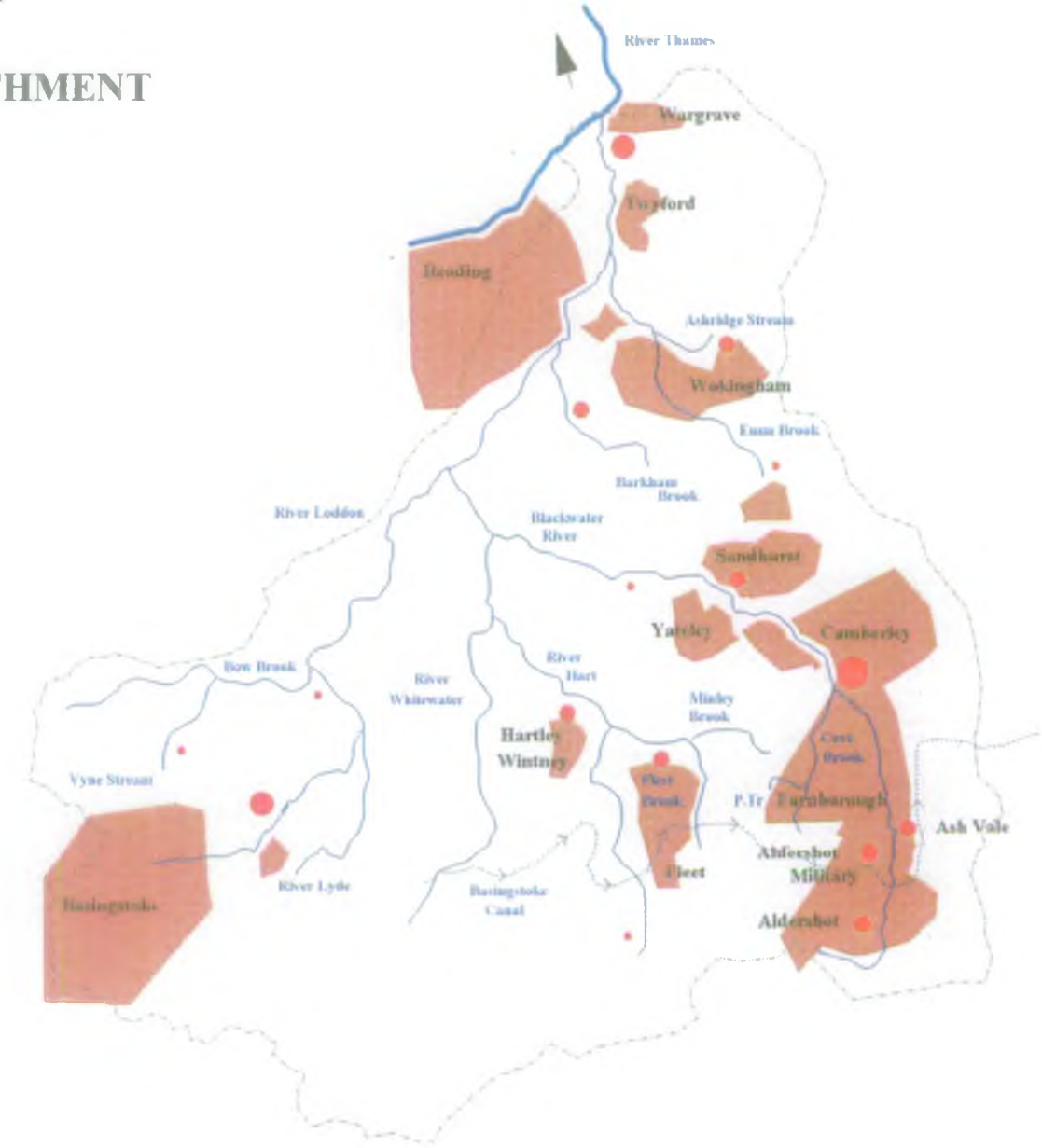
Location of the Catchment within Environment Agency Thames Region

Key

- Urban Areas
- Catchment Boundary
- Canal
- P. Tr — Pyestock Tributary

Sewage Treatment Works

	Population Equivalent (Thousands)
1 - 10	
10 - 50	
50 - 100	
100 - 150	



(Not to Scale)

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MAP 2: PROPOSED SWQOs

Key

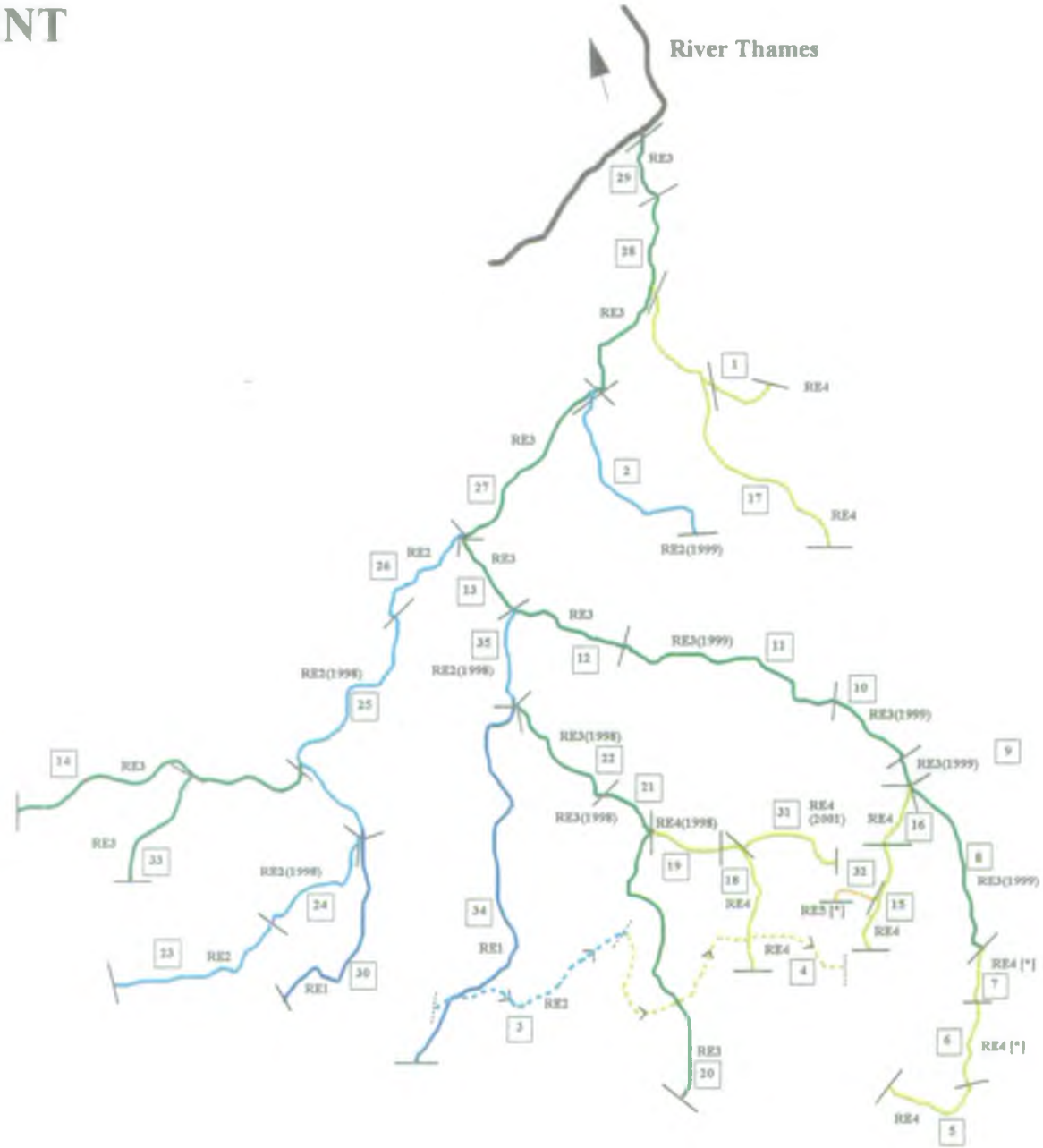
River Ecosystem Class

- RE1
- RE2
- RE3
- RE4
- RE5
- Canal Stretch

[14] 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.



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MAP 3: LONGER-TERM SWQOs

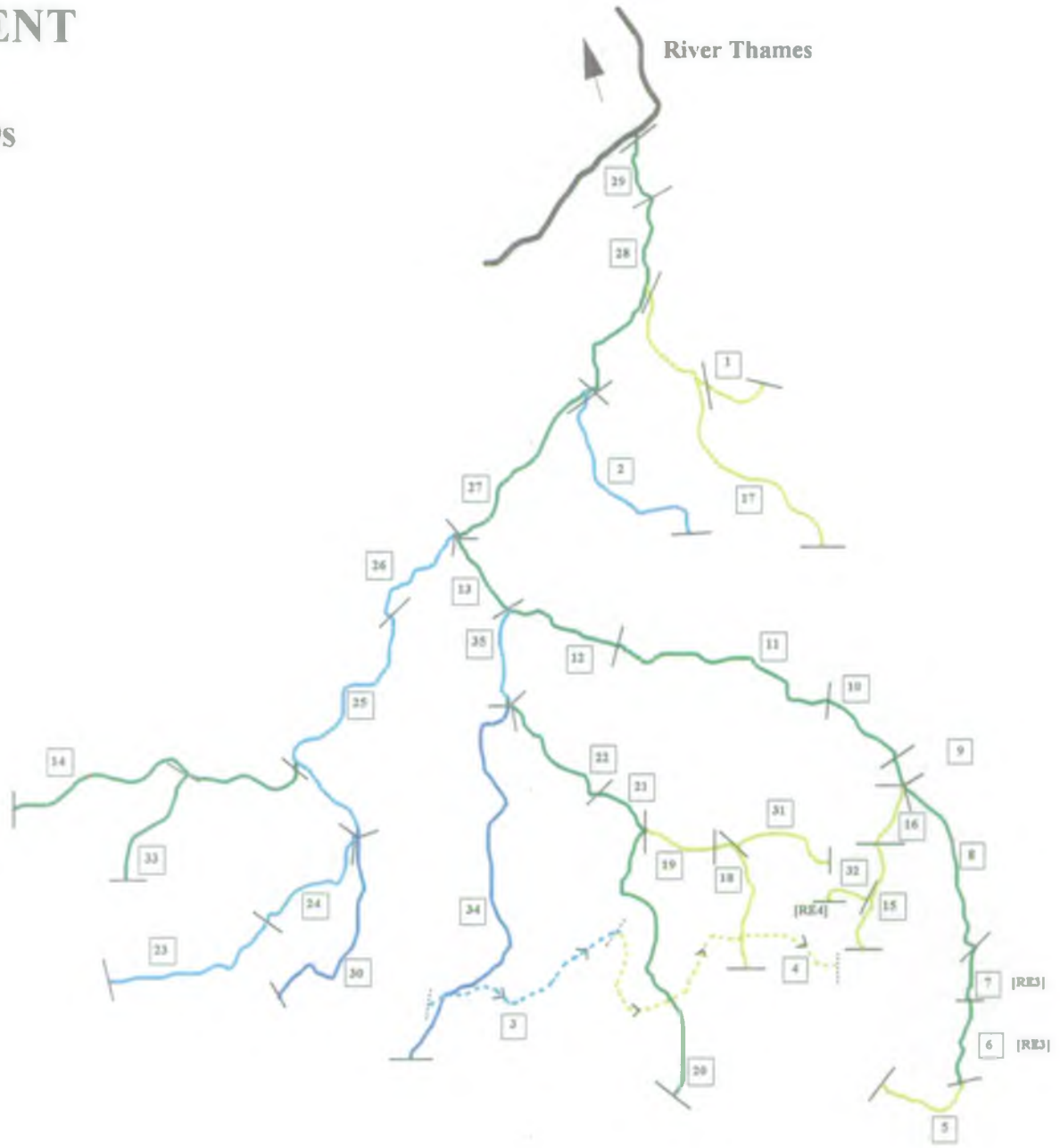
Key

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.



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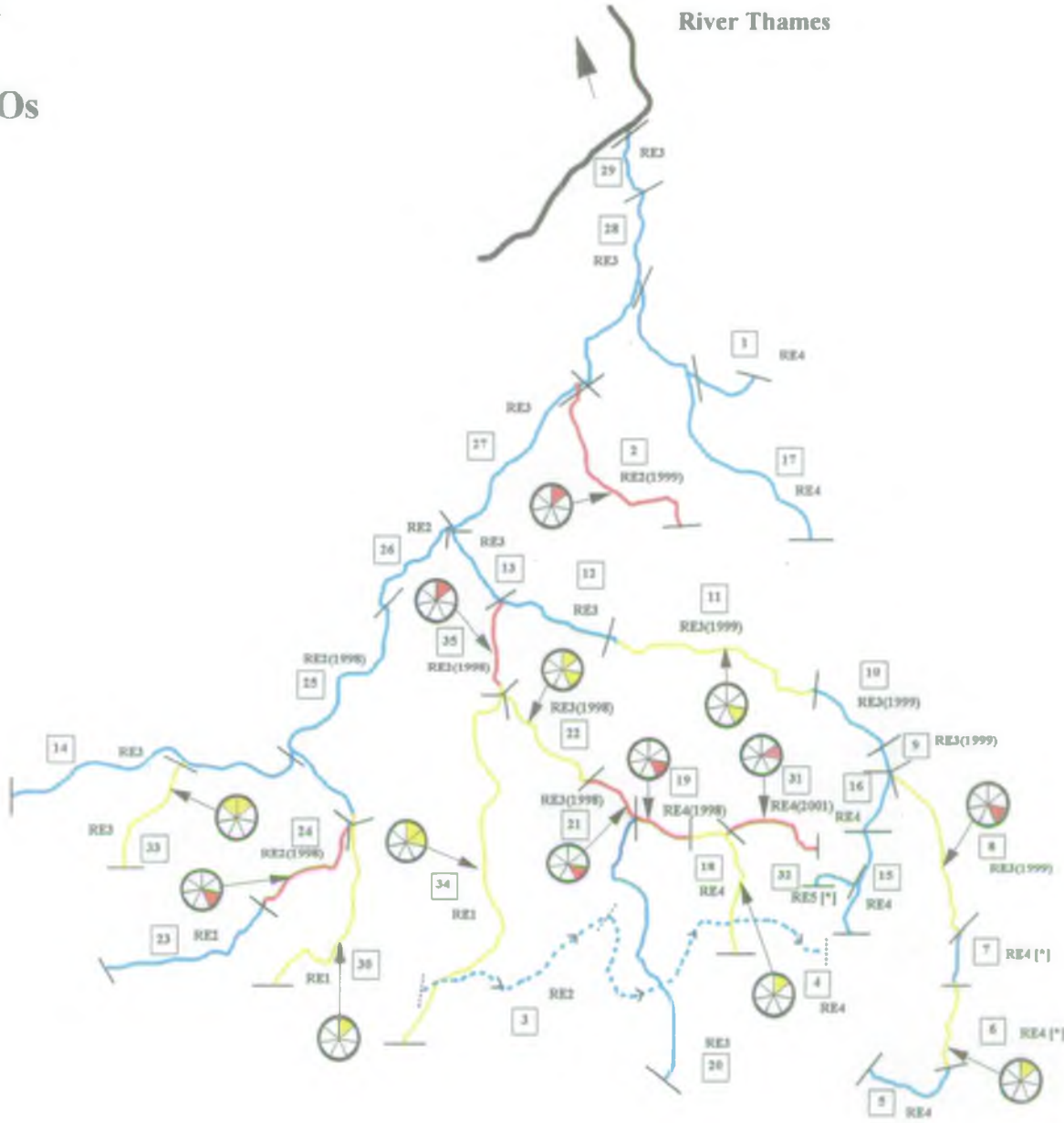
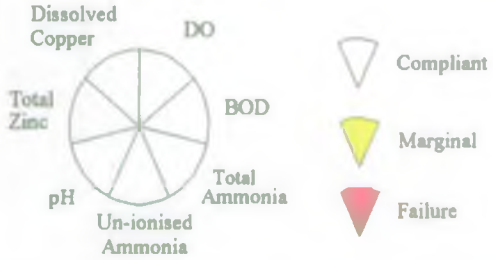
MAP 4: COMPLIANCE WITH SWQOs



Key

- Compliant
- Marginal
- Failure
- Canal Stretch
- [14] Stretch Numbers
- RE Proposed SWQO
- [*] Indicates where a longer-term SWQO is proposed (see Map 3).

Limiting Determinands



ASSESSMENT OF THE 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, 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:

- £24 million of already-committed water industry expenditure that is necessary to maintain river quality against a background of potential deterioration, or to meet other legal obligations (predominantly those required by European Directives). This investment will protect the water quality of up to 42 kilometres of watercourse in this catchment, including over 25 km of watercourse designated under the EC directive for Freshwater Fisheries;

- £3.25 million of additional investment by the water industry that has already been committed to support nationally-agreed priorities for environmental improvement. This investment will protect and enhance 20 kilometres in the Loddon catchment;

- Investment by 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 the Loddon catchment an investment of up to £1 million for removal of a landfill site, will be required to improve 10 kilometres of watercourse. General improvements are expected from the long term investments in improvements to agricultural practice.

In addition to this investment, a further, as yet uncommitted, estimated £5 million of water industry investment is identified to deliver longer-term SWQOs over 4.9 kilometres. 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 that time. In addition an estimated £5 million of investment would be required for Aldershot Military STW to improve the quality of 3.2 km of the Blackwater and an estimated £1 million pounds for a government discharge to improve 1.6 kilometres of the Pyestock Brook to deliver long term SWQOs for these two water courses.

Benefits

During consultation on the Catchment Management Plan (CMP), we identified the uses to which the local community wished to put the stretches of river in the Blackwater catchment. Some of these uses are reflected in our recommendations for SWQOs. The beneficiaries of proposed investment include not only half a million people that live within the Loddon catchment and their future generations, but also its variable military population. 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. Protecting water quality will also help sustain uses downstream of the catchment.

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

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 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 that 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).
Fisheries 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 - million litre 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).
Site 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 gramme per litre.
Zinc	See Total Zinc

APPENDIX I: PROPOSED SWQOs FOR THE LODDON CATCHMENT

RIVER STRETCH	NAME OF WATERCOURSE	START OF STRETCH	MAP REF	END OF STRETCH	MAP REF	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	Crondall	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.

BENEFITS	POTABLE SUPPLIES	AGRICULTURAL ABSTRACTION	FISHERIES	RIVER ECOSYSTEM	RECREATION/ AESTHETICS	AMENITY	TOURISM
	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. Studies have recorded up to 68,000 cars visiting a single site on the Blackwater in one summer month. 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 SAW (estimated as up to £10 million).

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

SUBSTANTIVE BENEFITS:

FISHERIES: Of the reaches listed above the Lade and the Whitewater are regularly fished. The Lade and the Whitewater are fished by syndicates, fishing clubs and some landowners (Lade). The Lade had trout fishery for 9 kilometres of its length and consists mainly of "put and take" fishery. The Whitewater fisheries are 15 kilometres of trout, 3.5 kilometres of coarse and 3 to 4 kilometres of mixed fishery. Both the Lade and the Whitewater are significant trout spawning rivers. The Fleet and the Hart have the potential to be spawning grounds if water quality improves.The proposed SWQOs for the Whitewater and the River Lade 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 SAW 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.

RECREATION/AESTHETICS: The reaches listed above are accessible to the populace by way of public footpaths at several points, though there is no footpath designed specifically to take advantage of these rivers. The categorisation of benefits as medium recognises the unused potential in recreation and aesthetics, for these reaches however further developments or recreation may not be possible or desirable.

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 Lade 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 SAW 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 SAW (estimated as up to £10 million).

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

SUBSTANTIVE BENEFITS:

FISHERIES: The proposed SWQOs and the planned investment at Basingstoke SAW 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. The estate is open to the public, and so in addition to helping to protect the amenity value of the estate, 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 SAW (estimated cost up to £1 million).

BENEFITS	POTABLE SUPPLIES	AGRICULTURAL ABSTRACTION	FISHERIES	RIVER ECOSYSTEM	RECREATION/ AESTHETICS	AMENITY	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 SAW 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 ABSTRACTION	FISHERIES	RIVER ECOSYSTEM	RECREATION/ AESTHETICS	AMENITY	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 high recreation value also takes account of the use of the canal for navigation. Its popular fishery is an important recreational benefit. 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 SAW (estimated cost of up to £1 million).

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

SUBSTANTIVE BENEFITS:

FISHERIES: Bow Brook has a limited fishery and Vyne Stream has an on-line pond which is fished. Both sites are fished by fishing clubs. There is coarse fishing along the length of Bow Brook but the Vyne stream fishery is confined to the pond. Bow Brook has some limited spawning areas. The proposed SWQOs will help to maintain the current water quality and, as a result, protect the fisheries.

RIVER ECOSYSTEM: The SWQOs will help to protect the current quality of these watercourses. Deterioration of the quality would have adverse effects on the ecology of these watercourses and could affect downstream reaches of high ecological value.

RECREATION, AESTHETICS AND AMENITY: The fishery value of these reaches means that they are visited by the public hence the SWQOs will help maintain the current standards of these reaches.

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 SAW (estimated cost up to £1 million) and Easthamstead Park SAW (estimated cost up to £1 million).

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

SUBSTANTIVE BENEFITS:

FISHERIES: The maintenance of current water quality and, therefore, the protection of the existing cyprinid fish populations.

ABSTRACTIONS: There are currently a total of 7 agricultural abstractions on the Emm Brook licensed to withdraw a total of 280,000 m^3/yr. The SWQO will help to maintain the quality for these abstractions.

APPENDIX III: DIGEST OF RESPONSES TO CONSULTATION

A total number of 428 copies of our document *The Loddon Catchment: Proposals for Statutory Water Quality Objectives* were issued during the three-month consultation period, which was also supported by 3 local radio interviews and 1 television interviews.

In total, we received some 36 responses, which are summarised below in Table 2. We have recognised the need to clarify details of the likely benefits and costs associated in water quality schemes.

TABLE 2: RESPONSES AND ACTIONS ARISING FROM SWQO CONSULTATION

No.	Organisation/Individual	Key Points	Actions to be Taken by Agency
1	ADAS	Reply via MAFF	None
2	Almshouse Association	Welcomes SWQOs	None
3	Basingstoke and Deane	No adverse comments	None
4	Berkshire County Council	Welcomes SWQOs. Targets should include bacteria, viruses and oestrogenic mimics.	Response to County Council on pathogenic organisms.
5	Blackwater Valley Management Service	Welcome SWQOs. Document clear. Concern that no recreation standards, RE4 objective for stretch 5. Would like to see whole of Blackwater as RE2. SWQOs should be stronger in improving quality.	Response to BWVMS including discussion of recreation, setting of objectives for reach 5 and methodology of setting objectives.
6	Bracknell Forest Borough Council	Concern over sewage works changes.	Response to include discussion of SAW changes.
7	Bramley parish Council	Too technical.	None
8	Bramshill Police Staff College	No adverse comments look forward to improvements in Hart	None
9	Chineham Parish Council	Supports the objectives of protection and improvement. Sampling timing questioned. No mention of effects of agricultural fertilizers and animal rendering.	Response to Parish Council including discussion of agriculture and sampling.
10	Council for the Protection of Rural England	Supports aims of SWQOs	None
11	Earley Town Council	Too technical	None
12	Elvetham Park Hall	Supports SWQOs	None

No.	Organisation/Individual	Key Points	Actions to be Taken by Agency
13	English Nature	Supports SWQOs. Do not agree with initial cost benefit evaluations. RE4 on Basingstoke canal unacceptable.	Response to English Nature including discussion of objective on Basingstoke canal. Cost benefit revised.
14	Gresham Angling Society	Disappointed in RE2 objectives rather than RE1 on Loddon. SAW sampling too infrequent. Would like to see Biological classifications included.	Response to Gresham to include limitations on Loddon quality, sampling limitations and biological classification.
15	Greywell Parish Council	Supports SWQOs	None
16	Guy Luck of Hartley Witney	Supports SWQOs	None
17	Hampshire Wildlife Trust	Too technical. Explain reviews and review period more clearly. Concern over Basingstoke canal objectives.	Explain Basingstoke canal problems in response to Trust.
18	Hook Parish Council	Supports SWQOs. Concern about Whitewater quality.	Response to Parish Council
19	James Guinness of Heckfield	Document too technical but generally in support.	None
20	MAFF	In general welcomes SWQOs however concerns over cost to agriculture.	Response to MAFF.
21	Mr PJ Bushnell Hartley Witney	Looks forward to improvements in water quality	None
22	National Trust	Fully endorse the objectives of the scheme. Concern over the quality of Vyne stream.	Response to National Trust, the Vyne stream problem has already been discussed with them.
23	NFU	Do not support SWQOs see them as additional cost burden. Insufficient consideration of agriculture in report.	Response to NFU. Form for agriculture input to be considered.
24	OFWAT Thames Customer Service Committee	Concern over additional costs due to SWQOs. Doubt value of fisheries protection.	EA to clarify costs in response to OFWAT.
25	OFWAT Office of Water Services	Concern over cost imposition of long-term SWQOs and possible ratcheting. More evidence should be used in cost benefit analyses.	Response to include explanation of objective setting. Cost benefit section revised.

No.	Organisation/Individual	Key Points	Actions to be Taken by Agency
26	Old Basing Parish Council	Overall approval. Some concerns over protection of Petty's Brook which is unclassified.	Response to include discussion on Petty's Brook.
27	River Thames Society	Appreciated consultation too technical but support any river improvements	None.
28	Rushmoor Borough Council	Concern over low objectives for stretch 5. Would like to see contact sports objectives.	Response to council to include discussion of objectives on stretch 5.
29	Shinfield Parish Council	Support SWQOs and the EA in their objectives.	None
30	Surrey County Council	Support SWQOs, but concerned that no comparison possible with the past values. Questions the feasibility and likelihood of achieving the targets proposed.	Response to include explanation of comparison with past results and methodology for setting objectives.
31	Swallowfield Parish Council	Acknowledgement only	None
32	Thames Water Utilities Ltd	Detail several RQOs that they feel are inconsistent with SWQOs set and reservations on cost benefit exercise.	Discussion with TWUL to clarify these points has already taken place.
33	Wargrave Parish Council	If SWQOs help in securing improvements they are welcomed. Keen on protection for contact sports and fish.	None
34	Whitewater Valley Preservation Society	Welcome proposals but would prefer to see RE1 on Whitewater.	Response to Society.
35	Woodley Town Council	Main concern - document not user friendly.	None.
36	YSI Ltd	Supports SWQOs	None

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.

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