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Hampshire Avon Catchment Abstraction Management Strategy

July 2005



ENVIRONMENT
AGENCY

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Our work includes tackling flooding and pollution incidents, reducing industry's impacts on the environment, cleaning up rivers, coastal waters and contaminated land, and improving wildlife habitats.

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Contents

Chapter 1	Introduction	3
Chapter 2	Consultation on the Hampshire Avon CAMS	5
Chapter 3	Links with other initiatives in the Hampshire Avon catchment	7
Chapter 4	The CAMS area	9
	4.1 Surface water features	9
	4.2 Geology and hydrogeology	11
	4.3 Hydrometry	13
	4.4 Abstractions	15
	4.5 Discharges	18
	4.6 Landuse and landscape	20
	4.7 Conservation and ecology	21
	4.8 Fisheries	24
	4.9 Recreation and amenity	24
	4.10 Water quality	25
	4.11 Stakeholder feedback	26
Chapter 5	Resource assessment and resource availability status	27
	5.1 Introduction	27
	5.2 Resource assessment of groundwater management units	30
	5.3 Resource assessment of river assessment points	30
	5.4 Integration of the surface water and groundwater resource assessments	32
	5.5 Water Resource Management Units (WRMUs)	34
Chapter 6	Proposed licensing strategy	41
	6.1 Sustainability appraisal	41
	6.2 Existing licensing strategy	41
	6.3 Catchment overview of proposed licensing strategy	41
	6.4 Proposed licensing strategy for water resource management units 1 and 3: Lower Avon and Wylfe	45
	6.5 Proposed licensing strategy for water resource management unit 2 and 4: Upper Avon and Bourne	45
	6.6 Renewals and management of existing licences	46
	6.7 Resource recovery strategy and other changes to existing licences	46
	6.8 Opportunities for licence trading in the Hampshire Avon CAMS area	47
	6.9 The Water Act 2003	48
Chapter 7	Future developments in the CAMS area	49
	6.1 New development	49
	6.2 Water company water resource plans	49
Chapter 8	Key issues for consultation	50
Appendix 1	Glossary	51
Appendix 2	List of abbreviations	57

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Environment Agency Hampshire Avon Catchment Abstraction Management Strategy

Vision for the CAMS area

The River Avon is considered to be one of the most biodiverse Chalk rivers in Britain, supporting habitats and species that are considered rare or threatened on an international scale. The river and its ecology are currently affected by a number of factors including abstraction. Our vision for the catchment is to ensure that the integrity of the riverine

ecosystem is maintained or restored through sustainable water resources management. To achieve this there will be a need to reduce the level and timing of abstraction within the catchment. The Hampshire Avon CAMS will provide a framework to for this to happen in conjunction with our obligations under the EU Birds and Habitats Directives.



Lower River Avon at Burton

Introduction

Catchment Abstraction Management Strategies (CAMS) are strategies for management of water resources at a local level. They make more information on water resources and licensing practice publicly available and allow the balance between the needs of abstractors, other water users and the aquatic environment to be considered in consultation with the local community and interested parties.

CAMS are also the mechanism for managing time-limited licences by determining whether they should be renewed and, if so, on what terms.

Managing Water Abstraction: The Catchment Abstraction Management Strategy Process is the national document that supports the development of CAMS at a local level. It sets out the national policy and the regulatory framework within which CAMS operate, describes the process of developing CAMS and provides information on the structure and content of CAMS documents. This consultation document should be read in conjunction with *Managing Water Abstraction*.

The River Avon is considered to be one of the most biodiverse Chalk rivers in Britain, supporting very rich flora, fish and invertebrate fauna communities that are considered rare or threatened on an international scale. The ecological value of the river is recognised through the designation of a number of Sites of Special Scientific Interest which cover most of the river, its tributaries and associated wetlands. Furthermore, the international importance of the site has been recognised through the designation of most of the River Avon and its tributaries as a Special Area of Conservation and the Avon Valley from Bickton to Christchurch as a Special Protection Area and Ramsar.

Integral to the management of water resources in this catchment will be the implementation of the EU Birds and Habitats Directives. These important pieces of legislation require measures to be taken to maintain or restore the natural habitats and wild species at a favourable conservation status, introducing robust protection for those habitats and species of European importance. As a competent and relevant authority, the Environment Agency is reviewing all permitted activities (including abstraction licences and discharge consents) to ensure that they are not having an adverse impact on the integrity of the site, either on their own or in combination with other permitted activities.

This Review of Consents (RoC) is one of a number of projects underway in the Hampshire Avon catchment aimed at improving our understanding of surface and groundwater resources, the interactions between water resources and the dependent ecosystems and the sustainability of the current management practices. The outcomes of these various projects will inform decisions for water resource management that need to be made over the next few years.

The Hampshire Avon CAMS consultation document sets out the availability of water in the catchment and the Environment Agency's proposed options for managing this resource now and into the future.

A technical document (consultation version) for the Hampshire Avon CAMS has been produced which provides the detailed technical information on which the development of the strategy has been based. If you wish to receive this document on CD-ROM, please contact us at the address below. A hard-copy version of the document is also available for viewing at the same office.

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Consultation on the Hampshire Avon CAMS

Consultation is an integral part of the CAMS process. It is important because it ensures that the CAMS process is as transparent as possible and gives everyone the opportunity to get involved. For the Environment Agency to manage water resources in a catchment effectively and sustainably, it is important that as much information as possible is collated on water needs and uses. Comments and suggestions have been gathered during the early stages of development of this strategy through various pre-consultation activities. These were:

- Awareness-raising leaflet
- CAMS Stakeholder Group

The leaflet was distributed in January 2005. Its aim was to raise awareness of the development of the CAMS in the local area and it also invited anyone with an interest to send in written comments, providing information, views and suggestions for consideration during the early development of the CAMS.

©Wiltshire Wildlife Trust



The River Avon and Salisbury Cathedral

A stakeholder group has been set up for the Hampshire Avon CAMS. The role of the stakeholder group is to represent the key interests in the catchment and to help identify issues of local significance, provide views on proposals and to consider the likely implications of different strategy options. The members of the Hampshire Avon CAMS stakeholder group and the interests they represent are as follows:

Name	Interest represented
Brain Chandler	Chairperson
Andrew Cadell	Aggregates / Extractive Industry
Tristram Sykes	Agriculture
Gary Mantle	Environment (Wiltshire Wildlife Trust)
Dagmar Junghanns	Environment (English Nature)
Jeremy Waters	Fisheries
Darren Butterworth	Fish farming
Mark Heaven	Fish farming
Rowan Watts	Ministry of Defence
Bill Dovey	Public Water Supply
Luke de Vial	Public Water Supply
Rachel Hughes	Salisbury District Council
Steven Hobbs	Water customers (WaterVoice Wessex)

This document is the formal part of the Hampshire Avon CAMS consultation process and provides the opportunity for all interested parties to comment on the strategy that is being proposed. Key questions that we are asking you to comment upon are included in section 8.

Responses should be sent, in writing to the address above.

The closing date for the responses is **31 October 2005**. Please ensure that you include, where appropriate, the reference to the element of the proposed strategy that you are addressing or specific question (see section 8).

Once the responses have been analysed, a statement of response will be produced. This will summarise the responses, highlighting the main issues raised. It will be sent to all respondents and will also be available to others on request. Extracts from responses may be included in this statement. If you would like your response to be treated as confidential, please state this clearly.

Links with other initiatives in the Hampshire Avon catchment

The CAMS process and final strategy have many links with other initiatives both within the Environment Agency and those of other organisations. The key things that will influence action in this CAMS area are discussed below.

Habitats Regulations

The Directive on the Conservation of Natural Habitats and of Wild Flora and Fauna (referred to as the Habitats Directive) is a major piece of European legislation, which along with the EU Birds Directive, has been implemented in UK law through the Conservation (Natural Habitats &c.) Regulations 1994 (referred to as the Habitats Regulations). The aim of the Habitats Regulations is to contribute towards protecting biodiversity through the conservation of natural habitats and wild plants and animals by the creation of a network of protected areas across the European Union to be known as "Natura 2000" sites (which include SAC's and SPA's). The majority of the Hampshire Avon and its tributaries have been designated as a Special Area of Conservation (SAC) and the Avon Valley as a Special Protection Area (SPA) under the Habitats Regulations.

The Environment Agency (along with other competent authorities) needs to establish if any activities permitted would be harmful to the wildlife and habitats. Existing permissions are being evaluated through the review of consents process. If they are found to have a detrimental impact, then action must be taken to remove the impact or potential risk of impact.

The review of consents is undertaken in four stages.

- Stage 1 identifies the types of permission that might affect the site (e.g. abstractions, discharges and waste management licences).
- For each type of permission, Stage 2 identifies which permissions have the potential to have a significant effect on the site.
- For the permitted activities highlighted in Stage 2, an appropriate assessment is undertaken in Stage 3, which identifies whether the activities may or may

not be having an adverse impact on the integrity of the site. Permissions can be identified as having no impact or have the potential to have an impact alone or in-combination with other permissions.

- Finally, Stage 4 will be to affirm, amend or revoke permissions in order for the site to meet the conservation objectives.

An integrated approach to the review of consents has been adopted based on the Resource Assessment and Management (RAM) Framework used for CAMS but incorporating a greater number of assessment points compared to CAMS to reflect local sub catchment processes. The ecological river flow objectives are the same as those used for CAMS.

As a high priority SAC site, the review of consents for existing permissions in the Hampshire Avon was originally scheduled for completion in March 2006. However due to the size and complexity of the catchment, the deadline has been extended to March 2008, in consultation with English Nature. This will also allow issues from the Avon Valley SPA investigation and findings of AMP 4 to be taken into account.

The requirements of the Habitats Regulations must be met in the Hampshire Avon catchment and therefore it is this legislation that directs the options and actions that are being considered in this CAMS (see section 6). However, the Habitats Regulations deadlines in this catchment are after the publication of the first CAMS document (spring 2006), therefore the outcomes of the Habitats Regulations will primarily feed into the second round of CAMS.

The outcome of the Habitats Regulations review of consents must be a conclusion of no adverse effect from abstraction on the integrity of the SAC. The aim of this first round of CAMS is to determine an appropriate licensing strategy (see section 6) to ensure the resource availability status of the CAMS area does not deteriorate through further licensing while the Habitats Regulations review work is ongoing.

Water company investment programme 2005–2010

The Environment Agency influences water company investment through the Asset Management Planning (AMP) process. Within the Hampshire Avon CAMS catchment, the Environment Agency has identified several sites affected by water company abstraction under AMP 3 (2000–2005) and AMP 4 (2005–2010).

During the AMP4 period the water companies, in consultation with the Environment Agency and English Nature, will carry out a major programme of investigations looking at the effects of public water supply abstractions on the Avon catchment. These projects will provide information on the impact of abstraction on the ecology of the river and will inform the Habitats Regulations review of consents. The results will therefore primarily be integrated into the next round of CAMS.

Investigations in the Hampshire Avon CAMS during the AMP 4 period include:

Wessex Water

- Development of a better quantitative understanding of the surface water – groundwater interfaces and their implications for the general biology and ecology of the Hampshire Avon catchment. This will include an assessment of the extent of impact of abstraction on the SAC interest features.
- Investigation into the impacts of public water supply abstractions on the integrity of the Avon Valley SPA and Ramsar sites.
- Continued investigations into the impacts of abstraction on both the ecological and fisheries interests of the Bourne and Nine Mile rivers.
- In collaboration with the Environment Agency development of an integrated groundwater model of the whole of the Hampshire Avon catchment.
- As part of the statement of intent between Ofwat, Wessex Water, the Environment Agency and English Nature a package of measures will be implemented to minimise the impact of abstraction on the Chitterne Brook and River Wylye. These measures include maximising the bulk transfer of water from Bristol Water, minimising the use of the Chitterne source, optimising the use of other sources and stream support of the Chitterne Brook.
- Investigation into the impact of abstraction on the fishery of the Fonthill Brook and concern that abstraction may have a significant impact on the winterbourne ecology.
- Investigation to determine the optimum stream support regime for the Upper Wylye, to promote ecological improvements.

In recognition that abstraction is having an adverse impact on the river and its ecology, Wessex Water have been funded to carry out studies into possible alternative sources of water. Twin-tracking these studies with the detailed investigations looking at impacts will enable decisions to be made on alternative sources of water sooner than would otherwise have been the case. The water company investigations will inform the Environment Agency's Habitats Regulations review of consents, which is the key mechanism for achieving sustainable water resource management.

Bournemouth and West Hampshire Water

- Investigation into the impact of abstraction and impoundment on salmon entry and in-river health of the salmon population in the Lower Hampshire Avon.

Other important initiatives in the catchment which will inform the Hampshire Avon CAMS include water company Water Resource Plans, the Environment Agency's Water Level Management Plans, Salmon Action Plans, Catchment Flood Management Plans and Biodiversity Action Plans. CAMS will also contribute to the implementation of the Water Framework Directive.

The CAMS area

4.1 Surface water features

The Hampshire Avon CAMS area comprises the entire catchment of the River Avon and its tributaries. The CAMS area covers parts of Wiltshire, Hampshire and Dorset, with a catchment area of approximately 1,700km². The main tributaries of the Avon are the River Nadder, River Wylde, River Ebble, River Bourne. There are also numerous streams draining to the Avon from the New Forest. The River Mude drains directly to Christchurch Harbour at the bottom of the catchment.

The headwater tributaries of the catchment are crossed by the Kennet and Avon Canal, which is managed by British Waterways.

There are a number of rivers in the CAMS area which have winterbourne stretches. In summer, flow in the winterbournes retreats to the permanent spring head further downstream leaving the upper reaches dry. This is the natural pattern expected for tributaries including the Chitterne Brook, River Till, Nine Mile River, River Bourne and River Ebble.

© LIFE



Ranunculus

Map 1

Catchment overview



4.2 Geology and hydrogeology

The CAMS area is dominated by Chalk, which supplies water to feed the upper catchment tributaries. The Chalk is underlain by the upper Greensand, which is exposed in the Vale of Pewsey and the valley of the upper Wylde south of Warminster. In the upper Nadder valley the Chalk is overlain by geology including Weald Clay and Purbeck and Portland limestones. Between Fordingbridge and the coast the Chalk is overlain by lower permeability Tertiary formations (Reading Beds, London Clay and other sandy-silty formations).

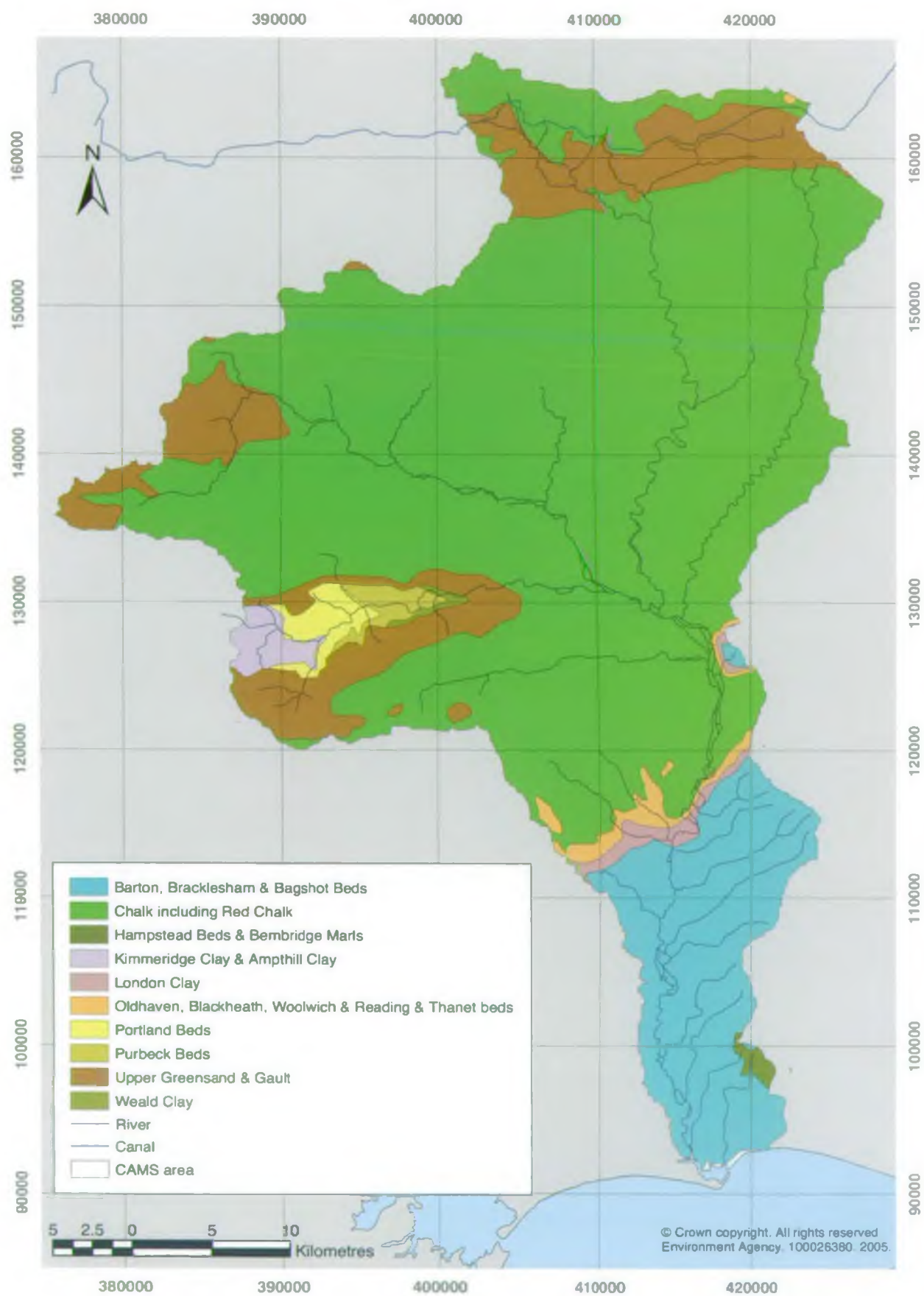
See Map 2.

The Chalk and upper Greensand are classified as major aquifers. Such formations contain large quantities of water and, because of the rock properties, allow it to be easily abstracted. The strata are highly productive and of regional importance and are used for large abstractions of drinking water.

The remaining beds are classified as minor aquifers, which can support locally important abstractions, or non-aquifers that are only capable of supporting very minor abstractions, if any. This is reflected by the greater use of surface water abstractions in the lower CAMS area.

In the lower part of the catchment the Blashford Lakes complex near Ringwood have been formed as a result of gravel extraction from the floodplain. These lakes are used for public water supply, amenity and gravel washing.

The Chalk streams of the upper Avon catchment are generally well connected to the underlying aquifer. All Chalk groundwater becomes baseflow (see glossary) in the river system and any consumptive groundwater abstraction will therefore result in baseflow depletion somewhere and at some time within the Avon catchment system.



4.3 Hydrometry

An extensive hydrometric network monitors water resources in the catchment. Data from this network is used for drought and flood monitoring, abstraction licence determinations, and has also been the basis of the resource assessment for this CAMS area.

River flows are measured at 16 permanent gauging stations in the catchment, see Table 1. The locations of these sites often reflect major confluences, the water resources issues and previous investigations carried out in the catchment.

Rainfall is currently measured daily at 23 gauges across the catchment and continually at four gauges.

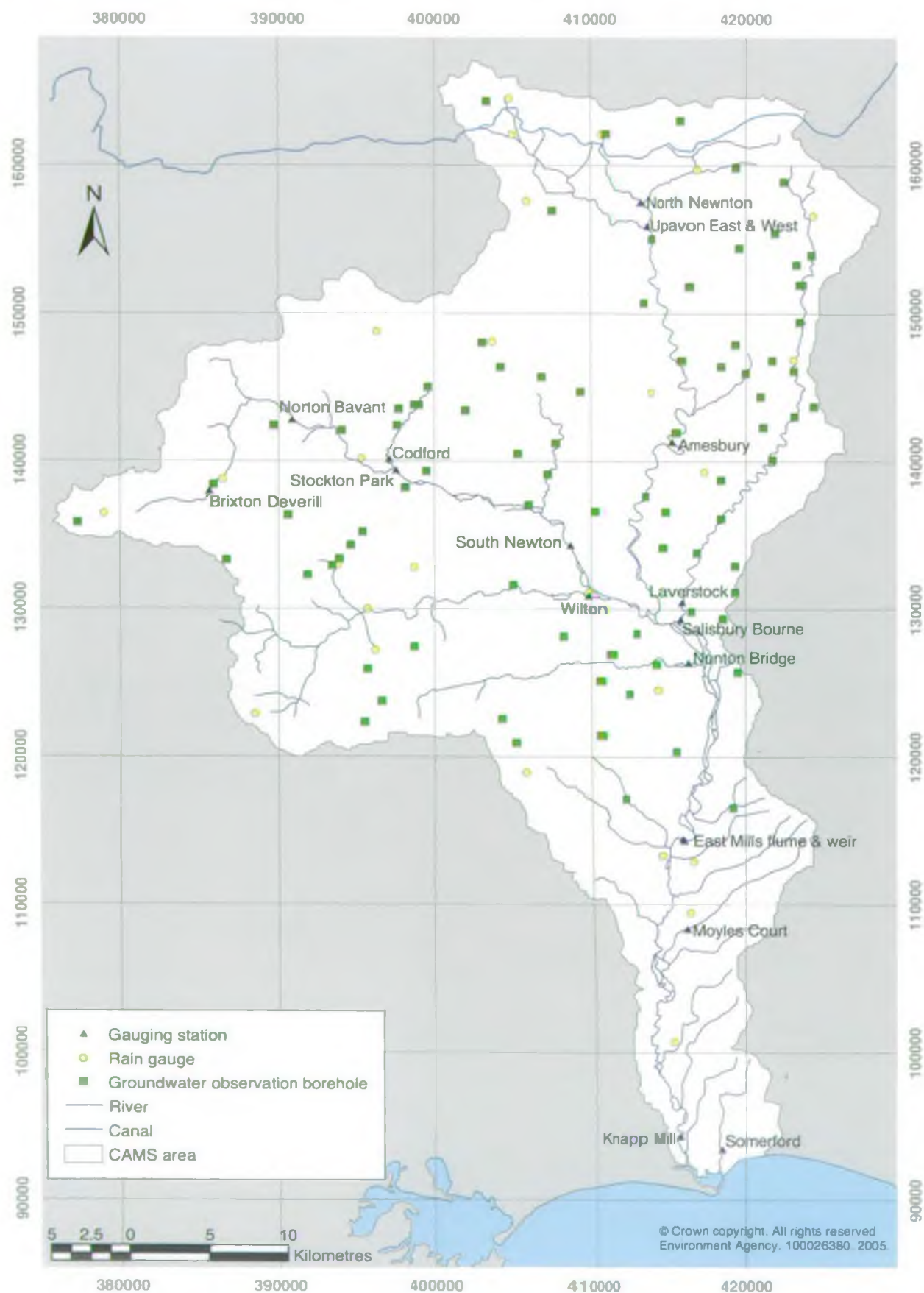
The Environment Agency monitors groundwater levels across the major aquifers in the catchment through a network of 93 observation boreholes, which in the main are located on the Chalk.

Table 1 Permanent gauging stations in the Hampshire Avon CAMS area

Gauging Station Name	River	Period of Record
North Newton	Woodborough Stream	Jan 1994 to date
Upavon East	Eastern Avon	Oct 1971 to date
Upavon West	Western Avon	Jan 1972 to date
Amesbury	Avon	Feb 1965 to date
Laverstock	Bourne	Oct 1965 to date
Brixton Deverill	Wylfe	Jan 1979 to date
Norton Bavant	Wylfe	July 1971 to date
Codford	Chitterne Brook	Jan 1994 to date
Stockton Park	Wylfe	Aug 1994 to date
South Newton	Wylfe	Jan 1967 to date
Wilton	Nadder	Jan 1966 to date
Nunton Bridge	Ebbles	Dec 1996 to date
East Mills Flume & Weir	Avon	Oct 1963 to date
Moyles Court	Dockens Water	Sept 2001 to date
Knapp Mill	Avon	Jan 1994 to date
Somerford	Mude	Feb 2003 to date

Map 3

Hydrometric network



4.4 Abstractions

There are currently 493 abstraction licences within the Hampshire Avon CAMS area, however a number of these abstraction licences may be used for more than one purpose (i.e. they may authorise 2 or more uses), consequently there are 714 licensed abstraction points.

Although abstractions are spread across the whole CAMS area, the large groundwater abstractions are concentrated on the Chalk aquifer. Approximately 86% of the number of abstraction licences in the CAMS area are from groundwater, however due to large surface water abstractions downstream of Salisbury they only represent approximately 20% of the total annual licensed volume.

The largest abstractor by volume is aquaculture for fish (fish farming) at 68%, and in combination with the other significant use for public water supply makes up over 90% of the total volume of water authorised. However, a different picture is seen when looking at the number of licences, over half of all licences are for agriculture but these account for only 0.5% of the total authorised volume (see **Chart 1**).



Sluices at the end of the Britford carrier

The impact of abstraction on the environment will vary with use. For example, water abstracted and used in a fish farm is generally assumed to be returned to the watercourse at some point downstream of the point of abstraction (0% consumptive) and so may have a limited net impact on the overall resources of the river, although there may be a localised impact such as a deprived reach between the points of abstraction and discharge. These localised impacts will not be considered within the CAMS process but are considered in the Habitats Regulations review of consents.

Whereas water abstracted for spray irrigation results in a total loss of that resource to the catchment (100% consumptive). Public water supply is considered to be 100% consumptive (unless mitigated by stream

augmentation) since, although water is returned through STWs, these may be some distance from the abstraction. This means that some purposes with lower licensed volumes may have a greater impact on the flow regime than those with higher authorised volumes. Consideration of the net use of water is very important within the CAMS process.

In the Hampshire Avon CAMS area, 96% of the groundwater abstractions are consumptive compared to 73% of surface water abstractions. Of the consumptive abstractions, the largest by volume are for public water supply (89% of the total volume) followed by currently exempt uses e.g. Crown abstractions (5% of the total volume) see Chart 2.

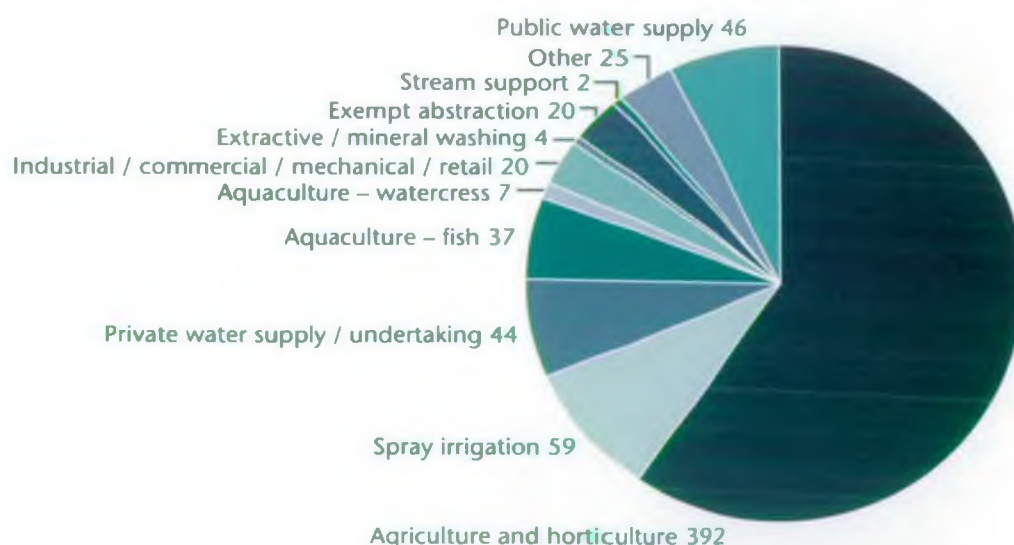


Chart 1 Summary of abstraction licence purposes by number of licensed points

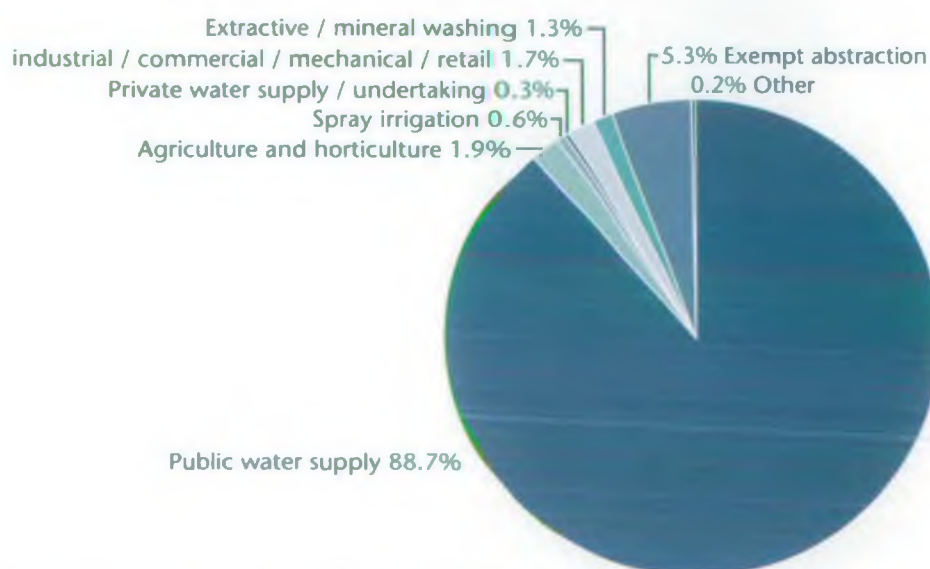
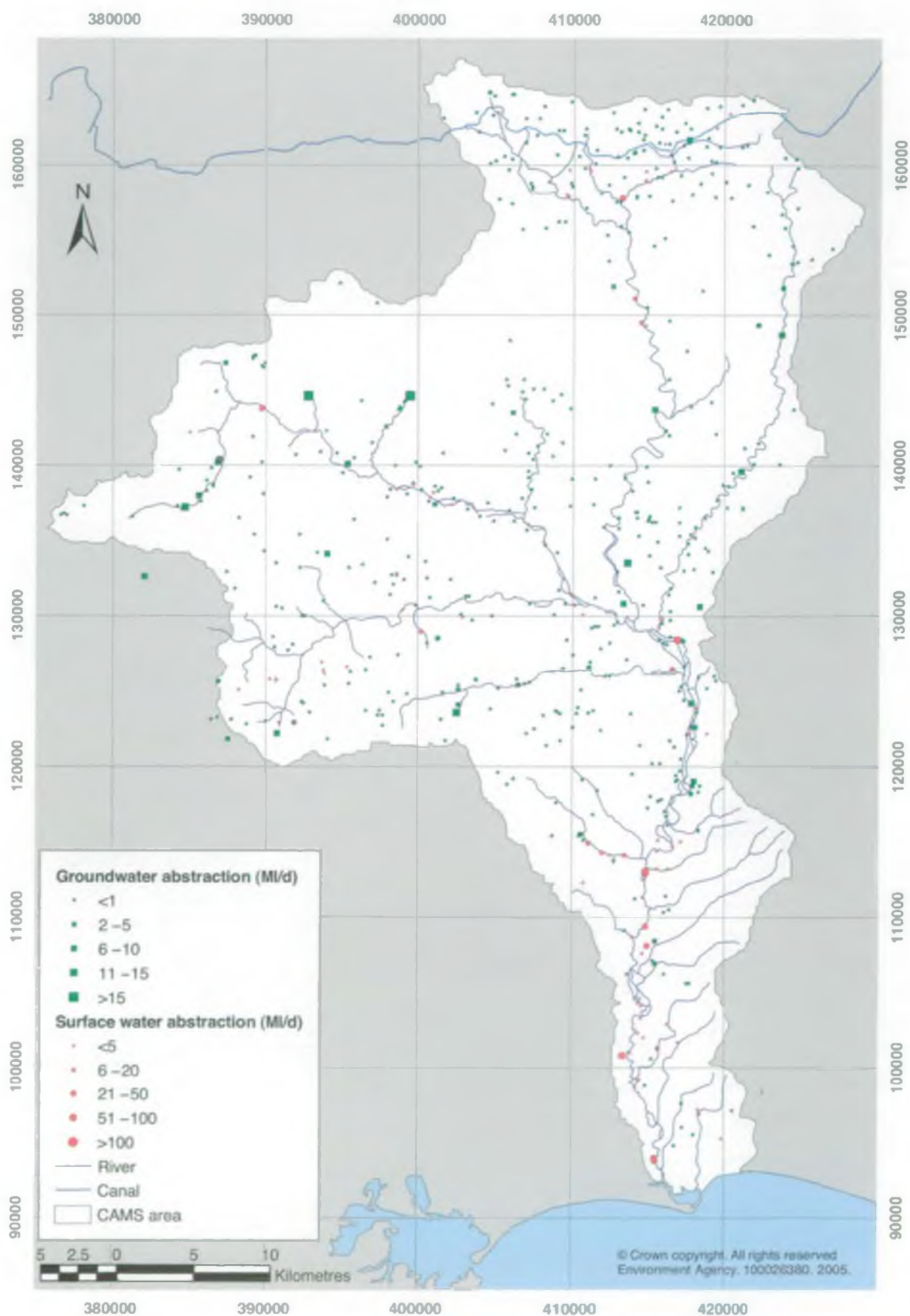


Chart 2 Summary of consumptive abstraction licence purposes by annual volume

Map 4

Licensed abstractions



4.5 Discharges

A total consented volume of approximately 54 MI/day of treated effluent is discharged directly into the rivers and streams or goes to soakaways within this CAMS area. Approximately 80% of all discharge volume arise from sewage treatment works operated by water companies, with the remaining 20% from private sewage treatment plant discharges and trade discharges. Of the sewage treatment works operated by Wessex Water, the largest are those at Salisbury and Ringwood reflecting the biggest population centres within the catchment.

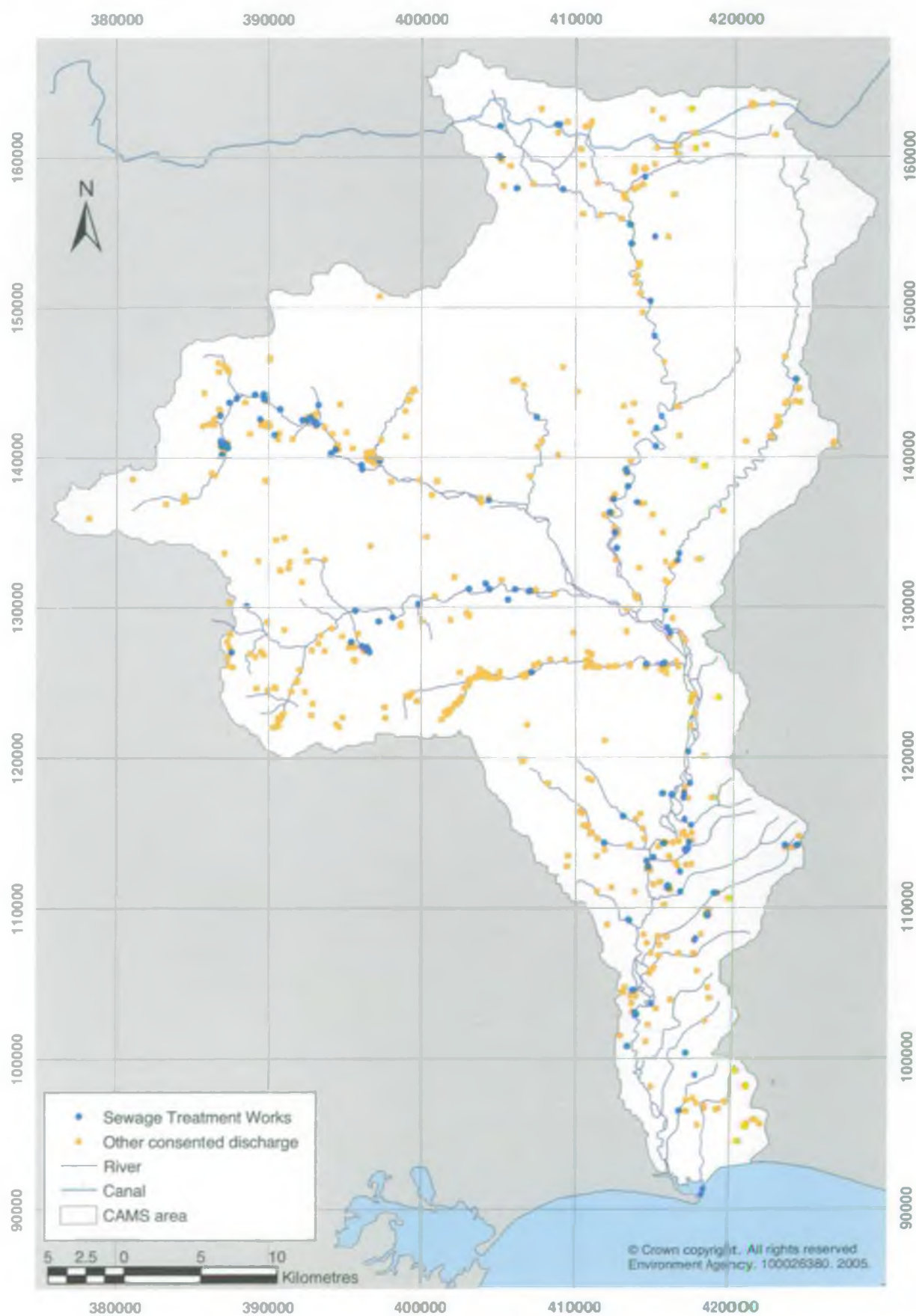
In addition to the above discharges, there are large discharges associated with fish farms and watercress beds corresponding directly to their abstractions. Wessex Water also provides stream support on the upper River Wylfe and Chitterne Brook to augment river flows during periods of low flow.



Salisbury Sewage Treatment Works

Map 5

Consented discharges



4.6 Landscape and landuse

Much of the area is characterised by rolling chalklands and the attractive sheltered valleys of Chalk rivers. Salisbury Plain occupies a considerable part of the upper Avon catchment and is a vast rolling landscape of arable fields and unimproved grassland punctuated by small hilltop woodlands. Apart from the intensive farming, the main influence on the landscape is military activity on and around Salisbury Plain. The water meadows at Harnham and Lower Woodford are already operational, but abandoned water meadows are characteristic of some the river valleys in the CAMS area, many of which are in the process of being restored to be managed as areas of floodplain grazing marsh through agri-environment schemes (see section 6.3.4).

South of Salisbury the Avon valley is flat-bottomed and contained by the landform rising up to the New Forest plateau to the east and the Dorset Heaths to the west. On the floodplain are low-lying pastures and groups of large water bodies where sand and gravels have been extracted, particularly in the Ringwood area.

In places these pastures have a rich floodplain species-rich flora and low scrub but on the drier stretches there are open arable fields with low hedges. The valley contrasts strongly with the free-draining, sandy, heather-covered hills, which are visible to the east.

Important commercial and residential areas are around Salisbury, Fordingbridge, Warminster, Amesbury, Ringwood and Christchurch. Salisbury with its commercial development and flourishing tourism is an important employment centre. The harbour town of Christchurch is an important tourist and recreational centre.

©Wiltshire Wildlife Trust



River Wylfe floodplain near Langford

4.7 Conservation and ecology

The River Avon is considered to be one of the most biodiverse Chalk rivers in Britain, supporting very rich flora, fish and invertebrate fauna communities that are considered rare or threatened on an international scale. This is reflected by the fact that a significant part of the CAMS area is in the North Wessex Downs Area of Outstanding Natural Beauty (AONB) and the Cranborne Chase and West Wiltshire Downs AONB.

4.7.1 Statutory designations

The ecological value of the river is recognised through the designation of a number of water dependent Sites of Special Scientific Interest (SSSI) which cover most of the river, its tributaries and associated wetlands. Furthermore, the international importance of the site has been recognised through the designation of most of the River Avon and its tributaries as a Special Area of Conservation (SAC) and much of the Avon valley as a Special Protection Area (SPA) and Ramsar.

River Avon SAC

The River Avon SAC includes the rivers Avon, Bourne, Nadder, Wylfe, Till and the Dockens Water. The SAC is underpinned by five component SSSIs: the River Avon system (rivers Avon, Nadder, Wylfe and Bourne), River Till, Jones Mill, Porton Meadows and Lower Woodford Water Meadows.

The River Avon SAC has been designated for its habitat for *Ranunculus* plant communities, Atlantic Salmon, Bullhead, Sea and Brook Lamprey and Desmoulin's whorl snail. Currently English Nature consider the SAC to be in unfavourable condition, abstraction is one factor affecting this condition.

Avon Valley SPA/Ramsar

The Avon Valley SPA stretches from Christchurch upstream as far as Bickton and comprises a broad floodplain bisected with numerous ditches and channels. The SPA also includes Blashford Lakes.

It has been designated for internationally important numbers of wintering Bewick's swan and gadwall as well as nationally important numbers of breeding birds associated with lowland open water.



Salisbury cathedral



Kingfisher

Currently English nature considers the SPA to be in unfavourable condition, abstraction is one factor affecting this condition.

Parts of the Avon Valley are also designated as a Ramsar site. The Avon Valley Ramsar site largely follows the boundaries of the Avon Valley (Bickton to Christchurch) SSSI and includes a greater range of habitats than any other Chalk river in Britain. It has one of the largest expanses of unimproved floodplain grassland in Britain, notable assemblages of wetland birds and diverse assemblages of wetland plant communities.

Salisbury Plain SSSI, SAC and SPA

Salisbury Plain SSSI supports the largest known expanse of unimproved Chalk downland in northwest Europe and contains 41% of Britain's remaining area of this rich wildlife habitat. Salisbury Plain is important to the River Avon as it forms much of the catchment of the upper Avon, Bourne, Wylde and Till. Salisbury Plain, Porton Down and Parsonage Down SSSIs are components of the Salisbury Plain SAC. Salisbury Plain SPA supports internationally important numbers of stone curlew and hen harriers and Porton Down SPA supports possibly the highest numbers of breeding stone curlew in Britain.

New Forest SAC / SPA / Ramsar

The New Forest SAC is one of the most important sites for wildlife in the UK and is recognised as being of exceptional importance for nature conservation across the European Union. The SAC supports a complex mosaic of habitats. Major components are the extensive wet and dry heaths, with rich valley mires and associated wet and dry grasslands, the ancient pasture and enclosed woodlands, rivers and streams and permanent and temporary ponds. The New Forest is drained by small streams including the Dockens Water, which is part of the River Avon SAC. The New Forest is also a SPA and Ramsar and has recently become a National Park.

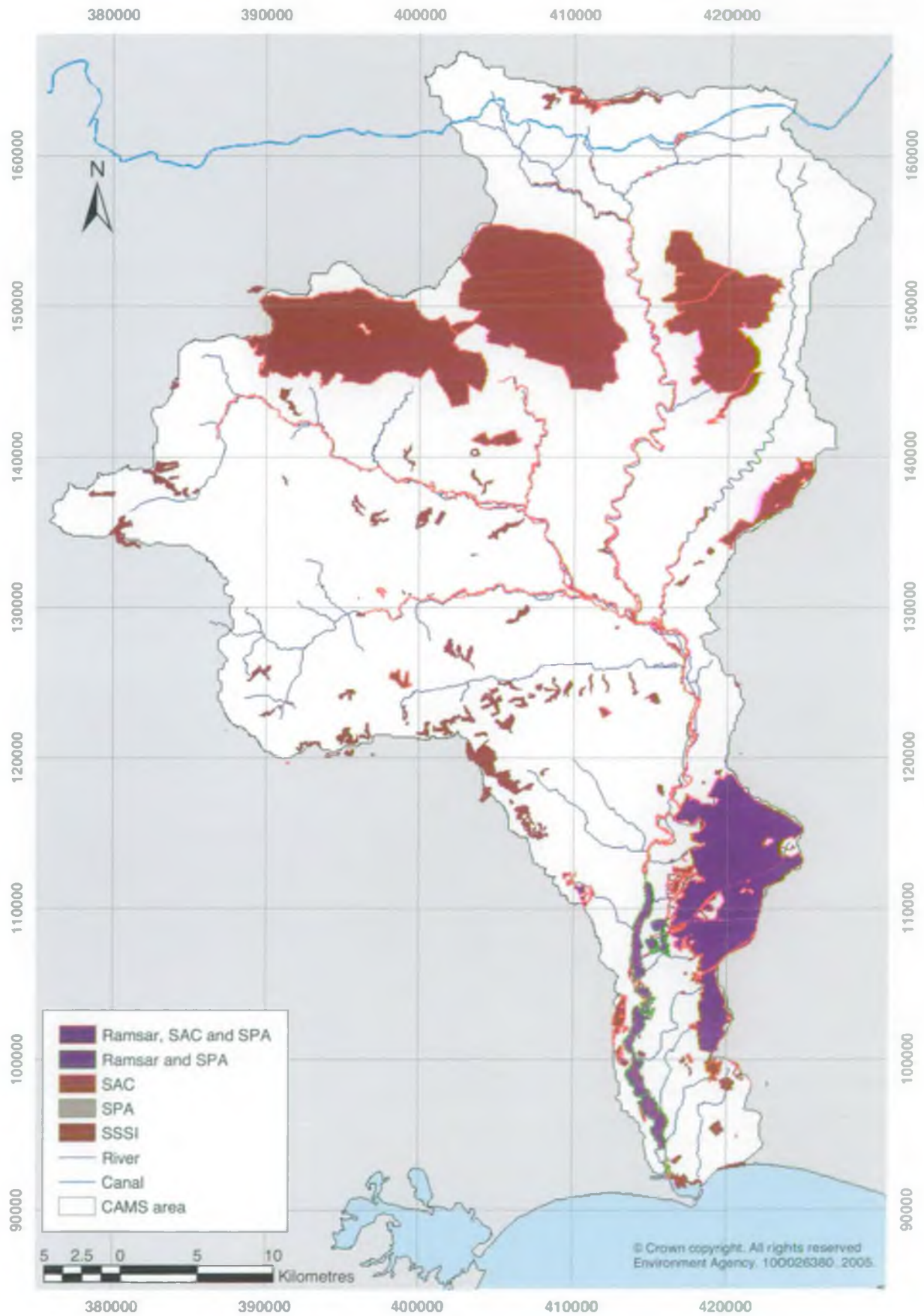
4.7.2 Non statutory designations and BAP species and habitats

There are numerous Sites of Nature Conservation Interest (SNCI's) in the catchment, including fens and floodplain grazing marsh. Biodiversity Action Plan (BAP) species within the CAMS area include fine-lined pea mussel, Desmoulin's whorl snail, water voles, otters and great crested newts. Key BAP habitats include Chalk Rivers and their associated winterbournes, floodplain grazing marsh, reedbed, wet woodland and fen habitats.

© Roger Key, English Nature



Desmoulin's whorl snail



4.8 Fisheries

For much of its length the Hampshire Avon and its tributaries support nationally important fisheries for salmon, brown trout, grayling and coarse fish. There is good access for angling for the fish species that reside in the Avon catchment, with plenty of opportunities for both resident and visiting anglers. The River Avon system has extremely diverse fish fauna and specific species are protected under the SAC designation (see section 4.7).

Salmon utilise the Avon catchment extensively and spawn in the Avon and at the beginning of the main tributaries and in the lower and middle reaches of the Rivers Wylde and Nadder. The salmon populations have declined significantly in the last decade and despite 100% catch and release of all salmon caught on the river and in Christchurch harbour they remain at critically low levels. Suspected causes of this decline include siltation of spawning gravels and reduced survival at sea. Low flows can also inhibit fish migration and regular management of all obstructions throughout the catchment is required to ensure they do not impede fish passage.

The upper reaches of the Nadder, Wylde and Avon above Salisbury hold good populations of brown trout and these are often supplemented with stocked fish for angling purposes. This is also the case on the River

Ebble. On the Avon below Salisbury and on the lower reaches of the Nadder and Wylde coarse fishing takes place in the winter. The lower Nadder is a coarse fishery.

Fish population surveys show that the River Bourne has a population of fish dominated by brown trout and grayling, which are present throughout the perennial reach. The Bourne is one of the most important lamprey habitats in the Avon catchment. Brown trout and grayling fishing represent the principal angling interests on the Bourne.

4.9 Recreation & amenity

There are several canoe clubs operating on the River Avon, including one in Salisbury and one in Ringwood. Some of the lakes within the Blashford Lakes complex are used for water-based recreation including sailing and water skiing and the Blashford Study Centre is also located by the lakes. Public rights of navigation exist in the tidal stretches of the River Avon at Christchurch.

There is an extensive public footpath network over much of the CAMS area and the Avon Valley footpath runs from Salisbury cathedral to Christchurch. The New Forest is a popular area for walking and cycling and bird watching and other informal leisure interests take place throughout the catchment. Additionally, the River Avon and Avon Valley Initiative (RAAVI) is currently investigating opportunities to develop access further.

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Bullhead

4.10 Water quality

The Environment Agency manages water quality through River Quality Objectives (RQOs) and General Quality Assessment (GQA). GQA classifies the state of water quality in rivers and canals and assesses the change in state over time. RQOs take into account the uses for which river stretches are intended and must be both achievable and sustainable; they are based on the River Ecosystem (RE) classification scheme that consists of five hierarchical classes. RQOs form the basis for planning river water quality improvements and can be used to drive water company investment. They also form the basis for setting consents for new discharges ensuring that future development will not hinder improvement to water quality. The Environment Agency also manages water quality by applying standards set in EC directives (such as the Freshwater Fish Directive) and other international commitments.

The Hampshire Avon and tributaries are high quality rivers with over 96% of the catchment demonstrating very good or good water quality (RE1 or 2). Compliance monitoring for 2001 to 2003 indicates that only 4.9% of the monitored river length significantly failed to comply with its RQO. Only one site in the catchment failed to comply with the mandatory standards of the Freshwater Fish Directive in 2003. This site was on the Huckles Brook, a small tributary of the Hampshire Avon in the New Forest, where dissolved oxygen levels are depleted in the summer during low flow conditions.

In terms of GQA standards for nutrients, elevated levels of phosphate (predominantly from point source sewage inputs) are found in the Avon, Nadder and Wylfe. Elevated nitrate levels (predominantly from agricultural diffuse sources) are found in the upper Avon, Wylfe and Ebble.

The effluent discharges from several STWs within the Hampshire Avon catchment (including the large works at Salisbury and Warminster) have, or are scheduled to receive, phosphate reduction as part of the AMP programme of water quality improvements. Phosphate reduction is required under the Habitats Regulations in order to meet favourable status of the Hampshire Avon SAC.

Excessive sedimentation is an issue in the Hampshire Avon CAMS area. It is generally believed to be due to poor land management practices, which causes soil to run off the land into watercourses and impact stream ecology. Sedimentation is thought to be one of the principal reasons for the decline in fisheries in these catchments as fine sediment covers spawning beds leading to fish eggs dying due to lack of oxygen. The Environment Agency led Landcare Partnership project

raises awareness of the principles of "best farming practice" with catchment land managers. Efforts have so far been targeted on the following high risk-sub-catchments: River Nadder, Upper Avon and Upper Wylfe. For further details see: www.environment-agency.gov.uk/regions/southwest.

The EC Nitrates Directive requires Nitrate Vulnerable Zones (NVZs) to be established in catchments where high or rising levels of nitrate have been identified and for Action Programme measures to be implemented in those zones to reduce nitrate pollution (in surface and/or groundwater). Approximately 50% of the Hampshire Avon CAMS area is designated as NVZ. For more information go to the 'farming quick links' on www.defra.gov.uk

The issue of groundwater protection is important because groundwater is used as a source of public water supply as well as providing natural baseflow or spring flow to watercourses. Groundwater quality is particularly important within this catchment given the high proportion of groundwater contributing to river flows in the summer and autumn. Groundwater in the Chalk is naturally of very high potable quality, however agricultural and industrial landuses over time have caused some localised pollution of the aquifer. In particular elevated levels of nitrates have been identified as a consequence of agricultural landuse.

To aid the protection of groundwater resources from pollution, the Environment Agency devised a framework, known as the "Policy and Practice for the Protection of Groundwater". This approach incorporates the classification of groundwater vulnerability and the definition of policies relating to landuse activities that constitute a threat to groundwater within the vulnerability zones. Within the Hampshire Avon catchment the policy has enabled the highest level of protection to be afforded to the source areas of Chalk catchment supplying important potable sources such as the public water supply boreholes. In addition, during the period 2005 to 2010, Wessex Water are building treatment works at three public water supply groundwater sources in the Avon catchment to reduce nitrate levels.

As part of the Environment Agency's duties, a groundwater quality monitoring programme has also been developed over the past 3 years. The purpose of this work has been to characterise groundwater quality across the catchment. The data will be reviewed over time to determine evidence of potential change in water quality.

4.11 Stakeholder feedback

The consultation process for the Hampshire Avon CAMS began with the distribution of an awareness raising leaflet distributed to licence holders and other interested parties in January 2005. Comments received in response to the awareness-raising leaflet were used in the development of this document.

A stakeholder group has been brought together consisting of individuals representing interest groups within the catchment. Each stakeholder is expected to consult with other people and organisations who have the same interests in order to enable them to reflect the opinions of the wider community. The group has been briefed upon, and contributes to the outcome of, all stages of the CAMS process and to date has met twice to discuss the development of this proposed strategy.

The group will meet again following the current period of formal consultation to help shape and define the final strategy.



River Avon near Downton

Resource assessment and resource availability status

5.1 Introduction

To manage water resources effectively, we need to understand how much water is available and where it is located. This is achieved by undertaking a resource assessment, covering both surface water and groundwater.

Water is used for a number of different purposes, the principal categories being general agriculture, spray irrigation, industrial use, power generation and water supply. For each different use, the amount of water that is returned to the water environment close to where the water was abstracted may vary considerably. Where this loss is high, the Environment Agency considers the abstraction to be consumptive. This may restrict the availability of water for these purposes, unless a significant proportion of the water abstracted is returned to the water source close to the point of abstraction.

To easily provide information on the availability of water resources within a catchment that may be used for consumptive purposes, a classification system has been developed. This "resource availability status" indicates the relative balance between committed and available resources, particularly at low flows. It indicates whether water is likely to be available for new abstractions and highlights areas where abstraction needs to be reduced. This does not replace the need for the licence determination process, which is applied to licence applications. More information on the determination process is given in Annexe Two of *Managing Water Abstraction*.

There are four categories of resource availability status, as shown in Table 2.

Table 2 | Resource availability status categories

Indicative resource availability status	Definition	Colour coding for illustration on maps
Water available	Water likely to be available at all flows including low flows. Restrictions may apply.	Blue
No water available	No water available for further licensing at low flows although water may be available at higher flows with appropriate restrictions.	Yellow
Over-licensed	Current actual abstraction is resulting in no water available at low flows. If existing licences were used to their full allocation they would have the potential to cause unacceptable environmental impact at low flows. Water may be available at high flows with appropriate restrictions.	Orange
Over-abstracted	Existing abstraction is causing unacceptable environmental impact at low flows. Water may still be available at high flows with appropriate restrictions.	Red

So that water resources are assessed consistently in similar situations, a framework for resource assessment and management, to be applied in all CAMS areas, has been developed.

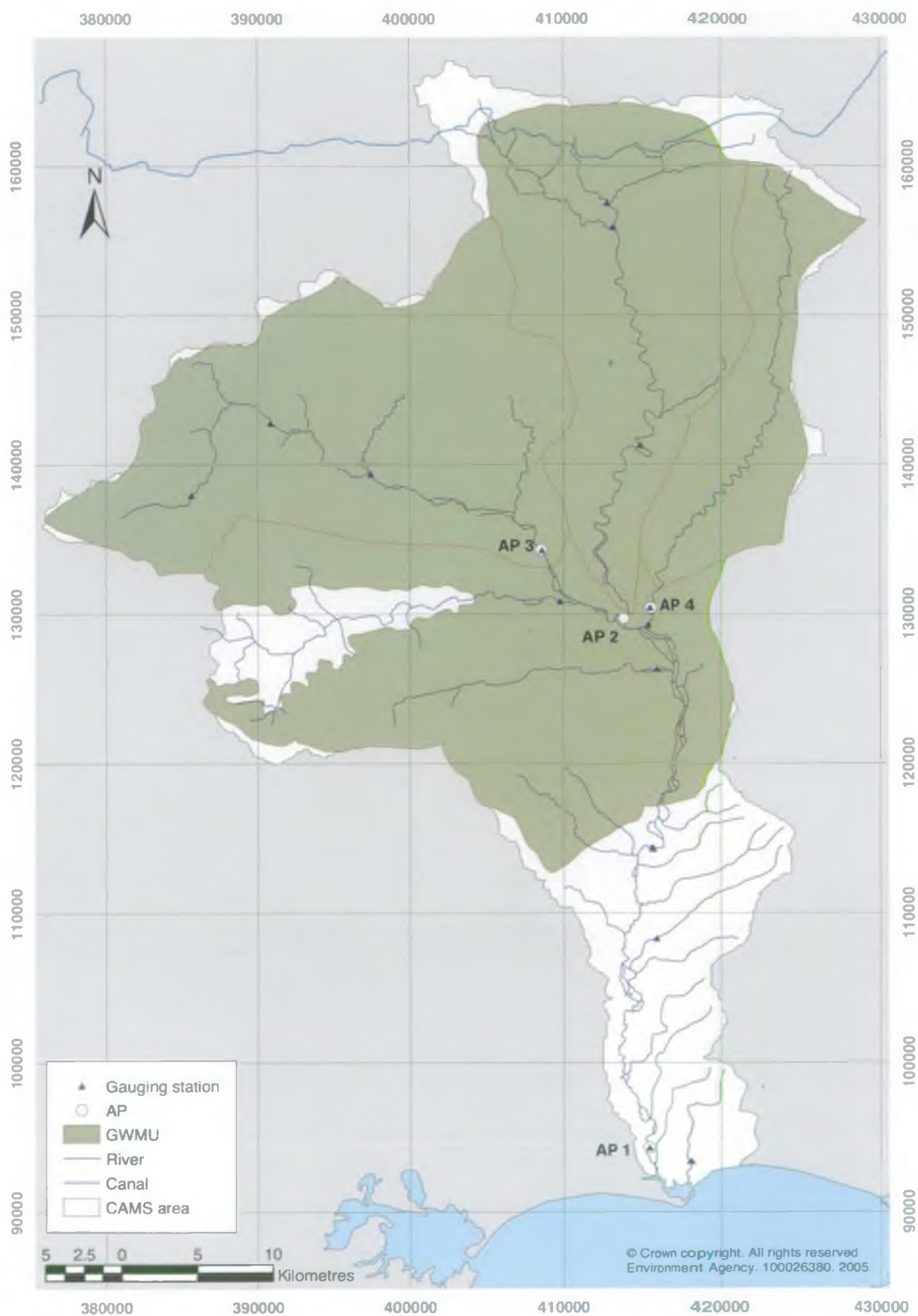
This framework involves the development of an understanding of the water resources of the CAMS area and assessment of the surface water and groundwater resource. These results are integrated to define the final resource availability status of different units within the CAMS area.

Within and between catchments there are variations in characteristics. In order to measure, manage and regulate effectively, we need to break catchments down into smaller areas, recognising similarities in characteristics. In the resource assessment for CAMS, in areas where groundwater resources are significant, groundwater management units (GWMUs) are defined. For surface water, "assessment points" (APs) are located on the river network. These river APs and GWMUs are the focus of resource assessment and abstraction licensing.

Map 7 shows the GWMUs and river APs that have been defined for the Hampshire Avon CAMS. Further details on how these were defined are provided in the technical document for the Hampshire Avon CAMS. The number and location of APs and GWMUs will be revisited in the next round of CAMS when information from the AMP 4 and Habitats Regulations review work are available.

Map 7

Location of GWMUs and APs



5.2 Resource assessment of groundwater management units

For the groundwater resource assessment, various tests are applied to each unit to determine the resource availability status. These tests include examining the balance between recharge to the unit and abstraction from it (i.e. the ability of the unit to support abstraction), and the impact of abstraction on summer outflows from the unit.

5.3 Resource assessment of river assessment points

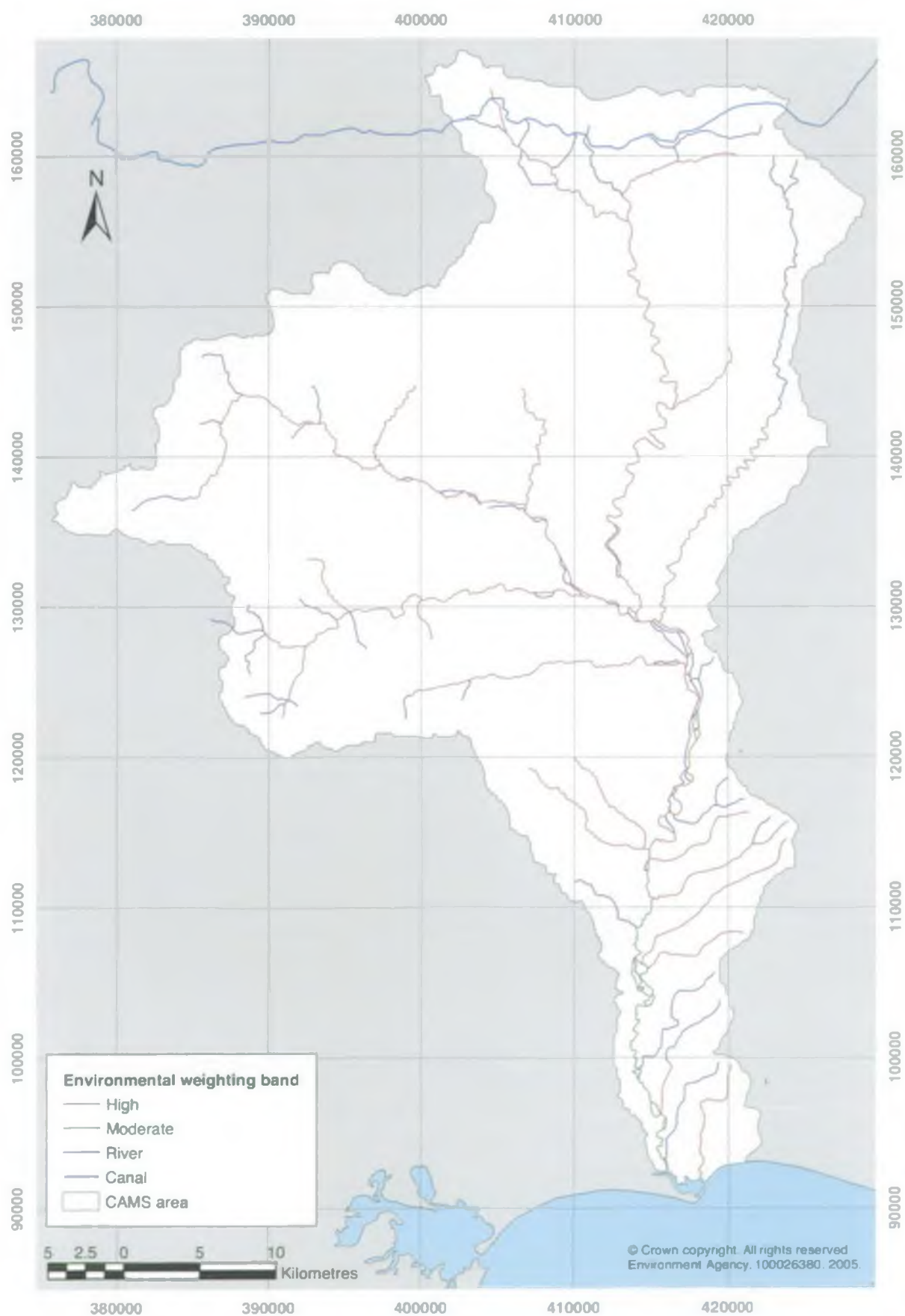
The surface water resource assessment requires the definition of "ecological river flow objectives". These are based on the sensitivity of the local ecology to flow variations (i.e. their vulnerability to abstraction impacts). It also takes account of other flow needs. These objectives represent the minimum flow that we are aiming to protect. This then affects the amount of water that is available for abstraction.

These ecological river flow objectives are developed by first giving "environmental weighting" scores to the reaches, which represent the sensitivity of the river reach to abstraction. Reaches are banded according to their sensitivity to abstraction, either Very High (VH), High (H), Medium (M), Low (L) or Very Low (VL).

Map 8 and **Table 3** show the environmental weighting bands for each assessment point and river reach in the Hampshire Avon CAMS area.

Table 3 | Environmental weighting bands for each assessment point

Assessment Point Number	Assessment Point Name	Environmental Weighting Band
1	Knapp Mill	Moderate
2	Salisbury	High
3	South Newton	High
4	Laverstock	High



Phase 2 of the ecological weighting process compares the status of the existing ecology of the river with the current flow regime in order to "ground truth" the resource availability status highlighting where the ecology is seen to be compromised or maintained with potential to be compromised by abstraction. The results of the phase 2 assessment for the Avon catchment generally verifies the resource availability status. The CAMS approach provides a high level assessment of the status of the ecology of the river. A more detailed assessment has been carried out as part of the Habitats Regulations review of consents process, which identified stretches of river where the ecology is particularly effected. The phase 2 assessment is discussed in more detail in the technical document.

The ecological river flow objectives are compared with a worst case scenario which assumes that all licences are being fully utilised (i.e. the full licensed quantity is being abstracted). This comparison reveals either a surplus, balance or deficit of water available for future licensing. The size of the surplus/deficit corresponds to a resource availability status for the unit.

The surface water resource availability classification gives an indication of whether new licences will be available from the river or whether some recovery of resources is required. However, there are significant variations in flow throughout the year. A classification of "over-licensed" or "over-abstracted" generally indicates that no new licences will be granted at times of lower flow. During periods when flows are higher, there may be some water available for abstraction. The classification is therefore really a classification of resource availability at lower flows.

Abstraction licences are sometimes managed in order to ensure that this flow variability is maintained by the use of "hands-off flow" conditions. These are conditions on licences that require abstraction to cease (or reduce) when the flow in the river falls below a specified level. Therefore, when river flows are above this hands-off flow, abstraction can take place but when flows are below this, no abstraction (or reduced abstraction) can occur.

In order to maximise abstraction while maintaining the variability of flow (required for many aquatic species), a tiered system of hands-off flows is applied. Licences are generally granted with the lowest hands-off flow possible on a first-come-first-served basis. As more licences are granted, the hands-off flow must be increased to maintain sustainable flows in the river.

For potential applicants for new abstraction licences, it is therefore important to know not only the likelihood of obtaining a licence, but also the reliability of a licence if granted with a hands-off flow condition.

Within the CAMS resource assessment, reliability is expressed as a percentage. This percentage indicates the minimum amount of time over the long term that the scenario flow exceeds the river flow objective, therefore allowing abstraction to take place.

The resource assessments for both surface water and groundwater use a scenario, which assumes that all licences are being fully utilised; that is, the full authorised volume is being abstracted. However, many licences are not used fully and therefore in reality the resource availability can be different. If the result of a resource assessment is "over-licensed", data of actual abstraction is then used to establish whether the status is "over-abstracted" (actual flows are lower than river flow objectives). A status of "over-abstracted" represents abstraction that is already unsustainable whereas "over-licensed" represents the potential for damage should the full licensed amount be abstracted.

5.4 Integration of the surface water and groundwater resource assessments

The Resource Availability Status of a river AP can only be finally assigned after consideration of any downstream AP's and their level of environmental stress. Thus if a downstream unit is more critical, this will override more favourable units upstream. The rationale for this is that although it may appear that water is available in the headwaters, in fact they are required to meet demands further downstream.

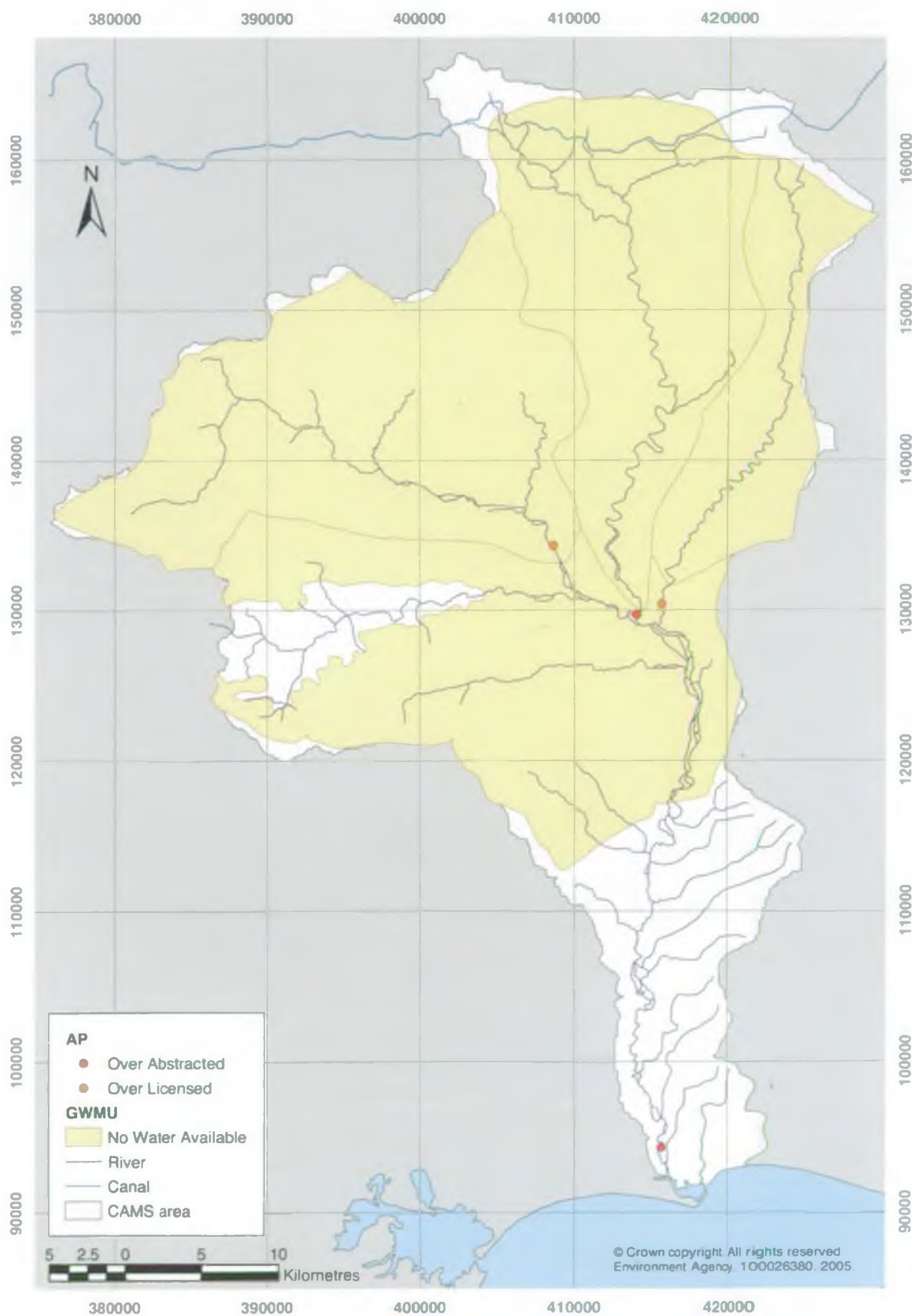
Where the groundwater status and the surface water status differ (as for much of the Avon CAMS area) the surface water status overrides the groundwater status and will be the status carried forward for the sustainability appraisal. This ensures the surface and groundwater is protected.

The critical AP's and the final status of groundwater and surface water are integrated to create water resource management units (WRMUs), which are then taken forward for assessment in the sustainability appraisal.

Map 9 shows the resource availability status of groundwater management units and river reaches in the Hampshire Avon CAMS area. This is the classification following integration of the groundwater and surface water assessment results and subsequent iterations. The results of the separate surface water and groundwater assessments are available in the Hampshire Avon CAMS Technical Document.

Map 9

Resource availability status of GWMUs and APs

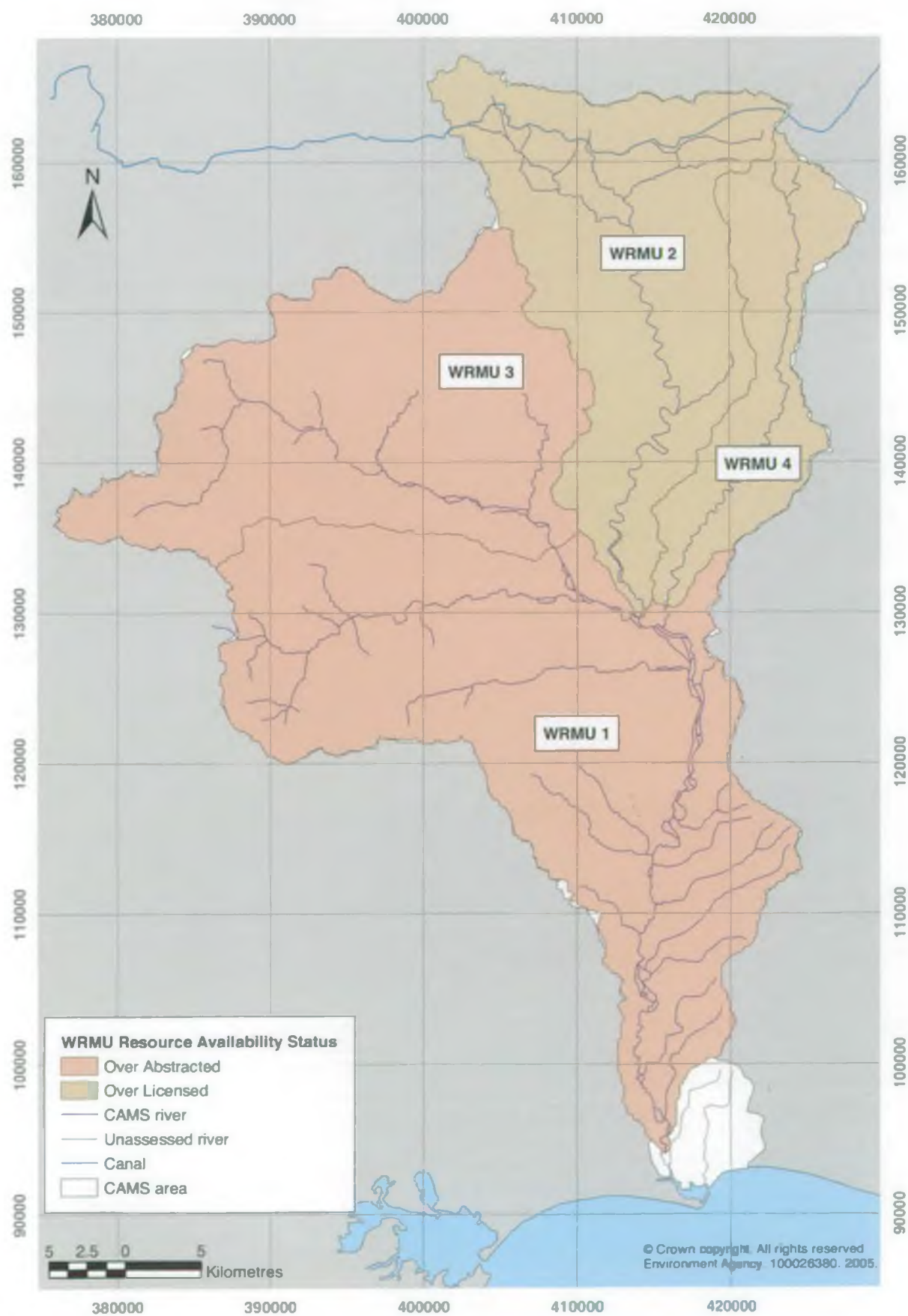


5.5 Water Resource Management Units (WRMUs)

The WRMUs for the Hampshire Avon CAMS were defined by looking at the size of the upstream catchment, availability of hydrometric data, distribution of abstractions and discharges, position of major tributaries and distribution of ecological characteristics.

The resource assessment for each of the assessment points within the WRMUs has included all the abstractions and discharges in the rivers which drain to that point. This method was also used to assess the groundwater units.

The four surface water APs and four GWMUs were integrated to create four WRMUs in the Hampshire Avon CAMS area. The units are shown in Map 10. WRMUs were not designated for minor aquifers or small coastal streams where there are very few abstractions or little hydrometric data.



5.5.1 Water resource management unit 1: Lower Avon (surface water and groundwater)

WRMU 1 is the largest WRMU in the Hampshire Avon CAMS catchment, covering the entire River Avon and its tributaries below Salisbury. The tributaries include the lower section of the River Wylde, the River Nadder, River Ebble, Sweatfords Water, Ashford Water and the New Forest Streams. The surface water catchment area of this unit is approximately 700km² and the unit contains 222 abstraction licences (324 licensed abstraction points). WRMU 1 is the most downstream unit in the CAMS area with the other three WRMUs draining through the unit into Christchurch Harbour.

The surface water assessment point (AP 1) for this WRMU is at the tidal limit of the River Avon.

A naturalised flow sequence was derived using data from Knapp Mill gauging station along with local information. The AP has been assessed as being "over-abstracted".

The majority of the upper part of the unit overlies the Chalk aquifer, which has been assessed using the Resource Assessment and Management (RAM) framework as GWMU 1. The groundwater catchment area of GWMU 1 is approximately 440km². The status of the groundwater unit has been assessed as "water available", but has been overridden to "no water available" because the surface water is "over-abstracted". The aim of overriding the status of the groundwater unit is to prevent new abstractions in this unit adding to the water resource stress in the associated surface water unit.



River Ebble at Nunton

The surface water and groundwater units have been integrated for the sustainability appraisal and the licensing strategy.

Approximately 91% of the total licensed volume in the unit is from surface water and 9% from groundwater. Most of the licensed volume is accounted for by fish farm licences, which are non-consumptive. Consumptive abstraction in the unit accounts for only 22% of the total authorised volume. The most significant consumptive licences by volume are for public water supply, abstracted water from this unit also supplies parts of the Bournemouth conurbation. There are a number of discharges into the catchment, the largest of which are from sewage treatment works, most notably Salisbury and Ringwood.

The classification of this unit shows that after licensed abstractions and discharges are considered, for a significant part of the year, there is currently a deficit of flow below that required by the river environment. If every licence holder were to use their full authorised volume the deficit would last for a greater portion of the year.

WRMU 1 Lower Avon has been assessed as “over-abstracted”.

5.5.2 Water resource management unit 2: Upper Avon (surface water and groundwater)

WRMU 2 covers the Eastern Avon, Western Avon, Upper River Avon down to Salisbury and its tributary the Nine Mile River. The surface water catchment area of this unit is approximately 400km² and the unit contains 140 abstraction licences (202 licensed abstraction points). The surface water assessment point (AP 2) for this WRMU is at Salisbury on the main River Avon, which has been assessed as being “over-licensed”.

There is no permanent gauging station at Salisbury, so a naturalised flow sequence was derived using Low Flows 2000 software and calibrated using spot gaugings.

The Kennet and Avon canal runs through the top of WRMU 2, to the north of the Vale of Pewsey. The canal is thought to import water to the unit through leakage from the sides and base of the canal primarily due to bank erosion, water vole activity and tree roots. There are also two surface water overflow weirs on the canal, one of which is in WRMU 2 (the other is to the west of the Hampshire Avon CAMS area). The canal also exports water where it is topped up from streams and rivers, although this happens outside of the Hampshire Avon CAMS area.



River Avon through Salisbury

The majority of the unit overlies the Chalk aquifer, which has been assessed using the Resource Assessment and Management (RAM) framework as GWMU 2. The groundwater catchment area of GWMU 2 is approximately 355km². The status of the groundwater is "no water available". The surface water and groundwater units have been integrated for the sustainability appraisal and the licensing strategy.

Approximately 46% of the total licensed volume in the unit is from surface water and 54% from groundwater. Most of the licensed volume is accounted for by fish farm licences, which are non-consumptive. Consumptive abstraction in the units accounts for 46% of the total authorised volume. The most significant consumptive licences by volume are for public water supply and Crown abstractions. There are a number of discharges into the catchment, the largest of which are from sewage treatment works

The classification of this unit shows that based on full authorised abstractions and discharges, i.e. if each licence holder were to use their full authorised volume, there would not be enough water to meet the needs of the river environment for a significant portion of the year.

WRMU 2 Upper Avon has been assessed as "over-licensed".

5.5.3 Water resource management unit 3: Wylfe (surface water and groundwater)

WRMU 3 covers the majority of the River Wylfe and its tributaries. The tributaries include the River Till and the Chitterne Brook. The surface water catchment area of this unit is approximately 450km² and the unit contains 93 abstraction licences (132 licensed abstraction points). The surface water assessment point (AP 3) for this WRMU is at South Newton on the River Wylfe, which was assessed as being "over-abtracted".

AP 3 is located at South Newton gauging station, so a naturalised flow sequence was derived using data from the gauging station and the Wylfe model output. The model was validated using existing geological information, groundwater and river flow monitoring data, rainfall records and land use data.

The majority of the unit overlies the Chalk aquifer, which has been assessed using the Resource Assessment and Management (RAM) framework as GWMU 3. The groundwater catchment area of GWMU 3 is approximately 460km². The status of the groundwater is "water available", but has been overridden to "no water available" because the associated surface water unit is "over-abtracted". The surface water and groundwater units have been integrated for the sustainability appraisal and the licensing strategy.



River Wylfe at Langford

Approximately 24% of the total licensed volume in the unit is from surface water and 76% from groundwater. Most of the licensed volume is accounted for by public water supply, 80% of which is exported out of the catchment. The second largest volume of water is for fish farm licences which are non-consumptive.

Consumptive abstraction in the units accounts for 50% of the total authorised volume. The most significant consumptive licences by volume are for public water supply. There are a number of discharges into the catchment, the largest of which are from sewage treatment works. In addition stream augmentation occurs at Kingston Deverill and Brixton Deverill to support flow in the upper Wylfe, together with another stream augmentation scheme on the Chitterne Brook.

The classification of this unit, according to the CAMS methodology, shows that after licensed abstractions and discharges are considered, for a significant part of the year, there is currently a deficit of flow below that required by the river environment. If every licence holder were to use their full authorised volume the deficit would last for a greater portion of the year.

WRMU 3 Wylfe has been assessed as "over-abstracted".

5.5.4 Water resource management unit 4: Bourne (surface water and groundwater)

WRMU 4 covers the maximum extent of the River Bourne. The surface water catchment area of this unit is approximately 165km² and the unit contains 38 abstraction licences (56 licensed abstraction points). The River Bourne typically dries from its perennial head at Idmiston to its headwaters on an annual basis. The surface water assessment point (AP 4) for this WRMU is at Laverstock near the confluence with the River Avon, which has been assessed as being "over-licensed".

AP 4 is located at Laverstock gauging station, so a naturalised flow sequence was derived using data from the gauging station and the Bourne and Nine Mile model output. The model was validated using existing geological information, groundwater and river flow monitoring data, rainfall records and land use data.



River Bourne in flood

The majority of the unit overlies the Chalk aquifer, which has been assessed using the Resource Assessment and Management (RAM) framework as GWMU 4. The groundwater catchment area of GWMU 4 is approximately 155km². The complex geology means however, that the groundwater boundary varies thus the maximum groundwater extent is represented by GWMU 4. The status of the groundwater is "water available". The complexity of the geological structure and its interaction with the river makes this status an over simplification. Given that the associated surface water unit is "over-licensed" and detailed investigation has shown that the ecology of the river has been affected by the current level of abstraction, GWMU 4 has been overridden to "no water available". The surface water and groundwater units have been integrated for the sustainability appraisal and the licensing strategy.

Approximately 0.1% of the licensed volume in the unit is from surface water and 99.9% from groundwater. Most of the licensed volume is accounted for by public water supply and Crown abstractions. All abstractions in this unit are consumptive. There are a number of discharges into the catchment, the largest of which are from sewage treatment works. Part of the conurbation of Salisbury is located in this unit; the other notable urban area in the unit is Tidworth.

The Bourne investigation has considered the unit in detail at both a catchment and local scale, and has shown that the ecology has been stressed by recent levels of abstraction, notably the winterbourne reaches. Further work will be carried out in the AMP 4 period to determine a sustainable abstraction regime for the river by reducing the level of abstraction within the catchment. This will ensure that the requirements of the Habitats Regulations are met.

The classification of this unit shows that based on full authorised abstractions and discharges, i.e. if each licence holder were to use their full authorised volume, there would not be enough water to meet the needs of the river environment for a significant portion of the year.

WRMU 4 Bourne has been assessed as "over-licensed".

5.5.5 Areas within the CAMS but outside of WRMUs 1 to 4

The nature of the CAMS process is designed to consider the status of the catchment from the tidal limit upstream. This means that often groundwater units do not fit neatly into this structure and frequently cross CAMS catchment boundaries. In addition, coastal situations usually fall outside the extent of the CAMS

process. Where coastal streams exist, it is often not practical to assess them all independently as this would be too time consuming and the background data for these small streams is not always available (for example the River Mude which has a catchment area that is too small for the CAMS assessment). Therefore in these situations it would be assumed that licence applications would be determined according to the present system. This would lead to each of these applications been assessed on a site-specific basis.

Proposed licensing strategy

6.1 Sustainability appraisal

6.1.1 Introduction

A sustainability appraisal process has been developed to enable the Environment Agency to take account of costs and benefits in the production of CAMS. The process considers the government's four objectives of sustainable development, relating to environment, economics, society and resource use. It uses a largely qualitative, proforma-based approach to consider what the resource availability status for each water resource management unit should or could be after each six-year cycle (Tier 1). This is undertaken for all units in all CAMS areas. It also allows the appraisal of options for recovering water resources, by taking into account the implications of different options on all aspects of sustainability (Tier 2). This is undertaken to determine the most sustainable options for the future management of the catchment including, where necessary options for recovery of resources. More information on the sustainability appraisal process is provided in *Managing Water Abstraction: The Catchment Abstraction Management Strategy Process*.

6.2 Existing licensing strategy

6.2.1 National and regional strategies

In March 2001 the Environment Agency published a national water resources strategy for England and Wales¹ and a water resources strategy for the South West Region² which looks 25 years ahead. They consider the needs for water, both for the environment and for society and examine the uncertainties about future water demand and its availability. The regional strategy recommends thirty actions for the Environment Agency, abstractors and other groups in the South West. Some of these actions, although not enforceable under current legislation, are incorporated into our licensing policy and are promoted by licensing staff and by CAMS.

¹ Water Resources for the Future: A strategy for England and Wales. Environment Agency, March 2001.

² Water Resources for the Future: A strategy for South West Region. Environment Agency, March 2001.

6.3 Catchment overview of proposed licensing strategy

6.3.1 New licence applications

The strategy provides potential applicants for new abstraction licences with the likelihood of obtaining a licence and also the reliability of a licence if granted with a hands-off flow condition. Anyone is entitled to apply for a licence, even if the strategy suggests that there may not be water available. However, all new licence applications will still be subject to a rigorous assessment to ensure that the issue of a new licence will not have a detrimental impact on the local environment or existing protected rights and complies with the requirements of the Habitats Regulations.

The proposed strategy really applies to those abstractions that have a net impact on the environment. There are likely to be applications for licences that are non-consumptive in nature or abstractions that may have beneficial effects for the environment, and in these cases applications will be considered on their relative merits taking into account local impacts. Applications for new impoundments will also be dealt with on a case by case basis taking into account local impacts.

In all cases though, the CAMS overview of resource availability is simply the first stage of the licence determination process. It provides an indication of the availability of water but all licence applications will still be considered under the requirements of the 1991 Water Resources Act and 2003 Water Act. Local issues of derogation and environmental impact will always be assessed and may override the status of a unit as defined in this CAMS.

In certain locations in the catchment where water dependant European designated sites are located, the Habitats Regulations procedures will apply for all applications where abstraction could impact any part of these sites. Such applications will require an appropriate assessment looking in detail at the potential impacts on the designated site, as part of the licence application.

Managing Water Abstraction sets out what activities require an abstraction licence and how the Environment Agency determines both abstraction and impoundment applications

6.3.2 Exemptions from the requirement for an abstraction licence

There are instances, relating to both purpose and quantity, in which a licence is not currently required. The exemptions under the Water Resources Act 1991 are detailed in Managing Water Abstraction (Annexe 2, paragraph 4) available on request from the address in section 1.

The Water Act 2003 is changing some of these exemptions. A leaflet titled *The Water Act 2003 – Modernising the Regulation of Water Resources* details the new exemptions, and is available on request from the address in section 1.

A number of abstractions located within the Hampshire Avon CAMS are not currently licensed due to exemptions under the Water Resources Act 1991. These include trickle irrigation, dewatering from mining and quarrying operations, operations linked to land drainage activity, Crown abstractions and small abstractions for domestic use (not exceeding 20m³ per day). However, as of April 2005, the Water Act 2003 will remove the exemptions for trickle irrigation, dewatering from mining and quarrying operations and water transfers for canals or into internal drainage districts (including water meadows and agri-environment schemes). In addition, the Water Act 2003 will make all abstractions less than 20m³ per day exempt from the requirement of a licence (see section 6.9).

In order to present the most accurate picture possible of the resource situation in the catchment this CAMS assessment has included all current abstraction licences, including those for volumes of less than 20m³ per day, together with other currently exempt abstractions (Crown) where they are known.

6.3.3 Approach to time limiting

For applications for new or varied licences received after the 1 October 2001, there is a presumption that all licences will be issued with a time limit.

For the Hampshire Avon CAMS area new licences will normally be time limited to expire with a common end date of 31 March 2013, with a normal renewal period of 12 years. Where there may be an impact on a Natura 2000 site, licences may be time limited to coincide with the Habitats Regulations review date of 31 March 2008. If there is local uncertainty or the need for further investigation a shorter time period may be appropriate. There is an assumption at present

that licences will be renewed subject to three tests being met:

- There is a need for the water.
- The abstractor is making efficient use of the water.
- There is no environmental damage being caused by the abstraction.

In cases where an abstraction is found to be impacting on a site designated under the Habitats Regulations there is no presumption of renewal.

Licence holders will be notified that their licences are going to expire as the licences approach the expiry date. The licence holder will then have to reapply for the licence. The Environment Agency will endeavour to give six years notice if a licence is not going to be renewed or renewed on more restrictive terms that significantly affect the use of the licence. Further information on time limits is available in Managing Water Abstraction.

There may be some circumstances where we are prevented from being able to give six years notice, for instance where the abstraction is located within a site designated under the Habitats Regulations and is deemed to be unsustainable. In such situations, we will make every effort to give as much notice as possible.

Further information on time limiting is available in *Managing Water Abstraction*.

6.3.4 Water meadows and floodplain grazing marsh

The restoration of traditional water meadows and the re-wetting up of flood plains, are becoming increasingly favoured options designed to utilise excess river flows in the winter months and as an aid to reduce flooding. There are significant biodiversity benefits to be gained through the wetting-up of flood plains, as this re-creates habitat lost from floodplains (through over-drainage), for breeding and over-wintering birds and the ditches themselves contribute to the overall diversity of the floodplain. Grants are available from Defra under the new Environmental Stewardship Scheme for restoration of sluices and control structures, ditch clearance and scrub management. All of these elements will help to restore and improve habitat for wetland birds.

The restoration of traditional water meadows can be used to deliver the biodiversity benefits above by utilising the ditch network and control structures to retain water in the soil through to early summer. If these meadows are used as they would have been traditionally, their benefits are more focused on a reliable supply of water to promote grass growth early in the year.

If either technique is not used correctly, water can be applied at inappropriate times of the year and is then lost through evaporation. In addition, spring or summer abstraction can be very damaging to the river ecosystem by removing large volumes of water from a river that may already be exposed to low flows.

The Water Act 2003 will change the requirement for abstraction licences for these systems in the future, in that a licence will be required where controllable structures are used to abstract water into the meadow systems from the river.

The Environment Agency has recently consulted on its proposals for the future licensing of abstractions into water meadow systems/agri environment schemes. The outcome of this consultation will be considered in the production of our final CAMS document for the Hampshire Avon.

We recommend that any applicants wishing to install any new structures, or start operating any disused meadow system in the near future consult us at an early stage for advice on the likely authorisations required to proceed.

6.3.5 Water Efficiency

The Environment Agency encourages all abstractors to employ water efficient methods to reduce their demand for water. This is largely a matter of common sense, involving thinking about how water is used and then targeting methods designed to reduce consumption.

The Environment Agency has recently introduced a policy of incorporating additional information into new licences that requires abstractors to demonstrate efficient use of water for the purpose of renewal of time limited licences.

Advice on water efficiency can be found on the Internet at www.environment-agency.gov.uk/savewater and www.envirowise.gov.uk.

6.3.6 Management of licences

The Environment Agency carries out a rigorous inspection and enforcement policy to ensure that licence holders are meeting the conditions set out in their licence. This is important in all catchments but especially those that have limited or no additional resource, as it ensures that no more water than that which is licensed is abstracted.



Harnham water meadow

6.3.7 Restrictive flow conditions

In order to enable abstraction while maintaining the variability of flow (required for many aquatic species), a tiered system of hands-off flows is applied. This comprises a series of Takes (proportions of water), which can be abstracted. Licences are generally granted with the lowest hands-off flow possible i.e. within Take 1, on a first come, first served basis. As more licences are granted, the hands-off flow (HOF) must be increased i.e. within Takes 2, 3 and 4 to maintain sustainable flows in the river. Current licences with time limits or Hands Off Flow conditions will be incorporated into the new management strategy.

6.3.8 Groundwater licences

Most current groundwater abstractions do not have conditions attached that restrict their use during dry periods. This is mainly because they were issued many years ago but also due to the difficulty in assessing the relationship between the abstraction and the nearest stretch of river. The CAMS assessment shows that the main Chalk aquifers in the catchment are "no water available". It is likely that if a new groundwater licence could be issued it would have a hands off flow condition attached to protect the surface water, which is already heavily committed.

There is no policy for new applications in the tertiary deposits or the underlying confined Chalk outside of the WRMUs. In these cases local investigations will be required to determine potential environmental impacts or impacts on other abstractors. The Environment Agency would only be able to grant a licence if it could be demonstrated that it would have no detrimental impact on the environment or protected rights. In the case of the confined Chalk it is not currently a resource used for public or private water supply. This has historically been due to the ease of abstraction within the unconfined Chalk as opposed to the difficulty in obtaining a supply from an artesian confined aquifer at depth with uncertain quality and available resource.

6.3.9 Surface water licences

Water resource availability assessments for rivers in the catchment show that either they are either "over-licensed" or "over-abstracted". In order to protect the environment and protected rights, the Environment Agency is unlikely to grant a licence for a consumptive abstraction in any unit without a hands off flow condition.

6.4 Proposed licensing strategy for water resource management units 1 and 3: Lower Avon and Wylfe

6.4.1 Resource availability status and results of the sustainability appraisal

From the resource assessment, it was determined that WRMUs 1 and 3 currently have a resource availability status of "over-abstracted". The requirements of the Habitats Regulations drive the management options for both the Tier 1 and Tier 2 sustainability appraisals for these units. Based on the Tier 1 sustainability appraisal the units must move from "over-abstracted" to a level where there is no adverse effect on the integrity of the SAC from abstraction licences. In order to achieve this target there will need to be some recovery of resources in each unit.

6.4.2 Guidance on the assessment of new applications

There would be a presumption against issuing new consumptive licences from surface water within these units without a restrictive flow condition. The assessment shows that these units are "over-abstracted" for a significant part of the year and water is scarce at both low and medium flows. There may be water available for licensing at higher flows subject to restrictive flow conditions, which will protect the river environment.

Abstraction for consumptive purposes will not be possible for the majority of the year and licences will be very unreliable. It is highly unlikely that any new consumptive licence could be used in summer. For guidance, if a consumptive surface water licence were to be issued in either unit, it would only be granted in Take 4 (the most restrictive band).

WRMU 1

Based on the full licensed scenario (i.e. everyone using their full licensed volume), a licence issued with a HOF 4 flow constraint would impose a restriction at a flow of Qn55. New licence holders would be able to abstract water for approximately 43% (157 days) of the year in an average year. This would fall in a dry year such as 1992 to 19% (69 days) but rise to 68% (247 days) in a wet year such as 1993.

WRMU 3

Based on the full licensed scenario (i.e. everyone using their full licensed volume), a licence issued with a HOF 4 flow constraint would impose a restriction at a flow of Qn44. New licence holders would be able to

abstract water for approximately 36% (132 days) of the year in an average year. This would fall in a dry year such as 1992 to 17% (61 days) but rise to 58% (211 days) in a wet year such as 1993.

The groundwater and surface water in the catchments were integrated for the resource assessments. The groundwater is largely restricted to the Chalk, which is closely connected to the rivers and therefore applications for new groundwater licences would be subject to detailed local investigations to ensure that pumping does not have a significant negative impact on the environment and other water users in each unit. Any groundwater licence that is able to be issued would have appropriate constraints in line with those for surface water abstractions and there is a presumption against issuing new unconstrained consumptive licences.

Licences for non-consumptive abstractions or with a net benefit to the environment may be granted but will still be subject to the usual local licence determination process.

6.5 Proposed licensing strategy for water resource management units 2 and 4: Upper Avon and Bourne

6.5.1 Resource availability status and results of the sustainability appraisal

From the resource assessment, it was determined that WRMUs 2 and 4 have a resource availability status of "over-licensed". The requirements of the Habitats Regulations drive the management options for both the Tier 1 and Tier 2 sustainability appraisals for these units. Based on the Tier 1 sustainability appraisal the units must move from "over-licensed" to a level where there is no adverse effect on the integrity of the SAC from abstraction licences. In order to achieve this target there would need to be some recovery of resources in each unit.

6.5.2 Guidance on the assessment of new applications

There would be a presumption against issuing new consumptive licences from surface water within these units without a restrictive flow condition. The assessment shows that these units are "over-licensed" for a significant part of the year and water is scarce at both low and medium flows. There may be water available for licensing at higher flows subject to restrictive flow conditions, which will protect the river environment.

Abstraction for consumptive purposes will not be possible for the majority of the year and licences will be very unreliable. It is highly unlikely that any new consumptive licence could be used in summer. For guidance, if a consumptive surface water licence were to be issued in either unit, it would only be granted in Take 4 (the most restrictive band).

WRMU 2

Based on the full licensed scenario (i.e. everyone using their full licensed volume), a licence issued with a HOF 4 flow constraint would impose a restriction at a flow of Qn51. New licence holders would be able to abstract water for approximately 50% (181 days) of the year in an average year. This would fall in a dry year such as 1992 to 10% (37 days) but rise to 73% (265 days) in a wet year such as 1993.

WRMU 4

Based on the full licensed scenario (i.e. everyone using their full licensed volume), a licence issued with a HOF 4 flow constraint would impose a restriction at a flow of Qn53. New licence holders would be able to abstract water for approximately 39% (142 days) of the year in an average year. This would fall in a dry year such as 1992 to 7% (27 days) but rise to 67% (245 days) in a wet year such as 1993.

The groundwater and surface water in the catchments were integrated for the resource assessments. The groundwater is largely restricted to the Chalk, which is closely connected to the rivers and therefore applications for new groundwater licences would be subject to detailed local investigations to ensure that pumping does not have a significant negative impact on the environment and other water users in each unit. Any groundwater licence that is able to be issued would have appropriate constraints in line with those for surface water abstractions and there is a presumption against issuing new unconstrained consumptive licences.

Licences for non-consumptive abstractions or with a net benefit to the environment may be granted but will still be subject to the usual local licence determination process.

6.6 Renewals and management of existing licences

In all WRMUs there is a presumption of renewal of time limited licences and time limited variations, subject to other renewal criteria, for example impacts on any Habitats Regulations designated sites, or local

considerations. See section 6.3.3. However, licence conditions may be subject to minor changes including the addition of conditions to ensure water efficient methods are employed where appropriate.

At the time of renewal the resource availability status and requirements of the Habitats Regulations will be discussed with licence holders. The possibility of introducing voluntary measures could then be investigated to help ensure that the ecological river flow objective is met for as much of the year as possible.

Most of the existing licences within the Avon CAMS area are not currently subject to a time limit.

6.7 Resource recovery strategy and other changes to existing licences

Sustainability appraisal of resource recovery options

The target for all units is to move from "over-licensed" or "over-abstracted" to a level where there is no adverse effect on the integrity of the SAC from abstraction licences. Through the Tier 2 sustainability appraisal four options were considered:

1. Solely reduce abstraction to the Habitats ecological river flow objective in order to comply with requirements of Habitats Regulations.
2. Other works (for example habitat restoration) alone with no reduction in abstraction.
3. Reduce abstraction and identify / assess if there are other works / actions to enable compliance with Habitats Regulations (e.g. habitat restoration and voluntary revocation of unused licences) which could mean that fewer reductions in abstraction licences are required to comply with the Habitats Regulations.
4. Water efficiency audits.

Based on the sustainability appraisal assessment, done using current knowledge, option 3 is the preferred option. The options will, however be reassessed during stage 4 of the Habitats Regulations review of consents in light of new information coming out of this review and AMP 4 investigations.

The Habitats Regulations review of consents investigations, to be completed in 2008, will identify the individual licences having a detrimental impact on the Natura 2000 sites. The Environment Agency will affirm, amend or revoke licences in order to fulfil the requirements of the Habitats Regulations.

Revocation or amendments to licences will be proposed under the statutory powers in section 52 of the Water Resources Act 1991. As part of exercising these powers there is a liability on the Environment Agency to pay compensation.

Legal advice from Defra and published Ministerial Guidance during the planning for the AMP4 water company investment programme has directed the Environment Agency to use these statutory powers, where necessary, to make and fund changes to abstraction licences to resolve issues of unsustainable abstraction.

The principle of assessing compensation is that of 'equivalence' – that compensation should render the affected party no worse off financially after the licence change causing the loss than was the case before. The Government has asked the Environment Agency to use the National Water Abstraction Charges Scheme to raise the necessary funds.

If the Environment Agency proposes to modify or revoke an abstraction licence to meet the requirements of the Habitats and Birds Directives and there are no alternatives available the concept of overriding public interest (OPI) may apply if there are imperative reasons why the licence should remain unchanged. The circumstances where OPI may apply include where there is a serious risk to human health and public safety, in the interest of national security and defence, or a vital contribution to strategic economic development or recovery. The high cost of alternatives will not necessarily be an argument for not pursuing the alternatives.

Where OPI is supported there will need to be 'compensatory measures' provided, e.g. designating an equivalent area to that lost.

In addition to the work outlined in section 3, the Environment Agency will work with water companies and others to ensure that current arrangements for protecting the environment continue, including:

- Compliance with the licence conditions.
- Existing river augmentation schemes.
- Action to minimise the use of the Chitterne source, in line with the statement of intent agreed between the Environment Agency, English Nature, Ofwat and Wessex Water. This agreement runs until December 2006.

Until the outcome of the Habitats Regulations review of consents is known, the proposed licensing strategy set out above will ensure that new consumptive licences are not issued at low to medium flows. This will ensure the condition of the SAC does not

deteriorate further due to new abstraction licences in the first CAMS cycle (to 2012).

The Environment Agency will also endeavour to secure voluntary measures to reduce the impact of abstraction on the river and its ecology. For example the plan to use Newton Toney and Durrington sources, within current licensed volumes, in a way which minimises the impact on the River Bourne.

6.8 Opportunities for licence trading in the Hampshire Avon CAMS area

One of the objectives of the CAMS process is to facilitate water rights trading. The term water rights trading refers to the transferring of licensable water rights from one party to another, for benefit. It involves a voluntarily movement of a right to abstract water between abstractors, using the abstraction licensing process. More detailed information is available in *Managing Water Abstraction*.

A guidance leaflet (Water Rights Trading) was published and sent to Licence Holders towards the end of 2002 explaining the scope for water rights trading within current legislation. Consultation on more detailed proposals followed in 2003. After considering the responses to this consultation exercise, further information will be made available to update Licence Holders on the Environment Agency's conclusions for a detailed framework within which water rights trading will take place. This information and guidance will be timed to coincide with the expected implementation of the sections of the Water Act 2003 that are most relevant to trading. Further information on Water Rights Trading is available on the Environment Agency web site (www.environment-agency.gov.uk/subjects/waterres).

6.9 The Water Act 2003

Following the first major review of the abstraction licensing system since its inception in 1963, the Government set out, in 1999, a new framework for managing water resources. The CAMS process and the move to time limited licences are key elements of the new framework, which is completed by revisions to the statutory framework introduced by the Water Act 2003. The Act updates the Water Resources Act 1991 in several key areas:

- Deregulation of small abstractions
- New controls on previously exempt abstractions for mine and quarry dewatering, trickle and other forms of irrigation, transfers into canals and internal drainage districts
- Stronger powers for water resources planning and management
- Changes to the legal status of abstraction licences
- More flexibility to the licensing regulations to improve its efficiency and to encourage trading
- Stronger powers on water conservation

For more details on the Act and its implementation, see the Environment Agency's web-site, www.environment-agency.gov.uk.

The Environment Agency web site will be updated to provide information as the Water Act is implemented.

Future developments in the CAMS area

7.1 New development

The Environment Agency is a statutory consultee within the planning process in England and Wales. This responsibility involves commenting on both individual planning applications as well as planning policy at a national, regional, county and local level.

Planning Applications

The Environment Agency are consulted on all significant planning applications within the CAMS area. This includes new housing, employment and infrastructure development. The Environment Agency provides comments which strive to ensure that all new building developments achieve the highest level of water and energy efficiency. An example of this would include promoting Building Research Establishment Environment Assessment Methodology (BREEAM) Eco Homes rating for all new housing.

Local Plan Policy

The Environment Agency is also consulted on all levels of planning policy which includes the local development plans for each council in the CAMS area. The government set development numbers which are distributed at a regional level and subsequently form the land use allocations within local plans. The Environment Agency comments on site specific land use allocations within local plans to ensure that water efficiency is always promoted. The Environment Agency also comments on all aspects of planning policy which relate to water resources in order to ensure that the needs of the water environment are considered.

7.2 Water company water resource plans

The Environment Agency is the statutory body with a duty to secure the proper use of water resources in England and Wales. We expect water companies to develop long term plans showing how they will manage supplies for the future. We scrutinise these

plans very carefully to make sure that companies are not taking unnecessary risks with essential water supplies or the environment. All the water companies submitted a "Water Resources Plan" to us and to Ofwat early in 2004. The plans included current and forecast data on the water supply-demand balance (surplus/deficit) up to 2030. The report *Maintaining Water Supplies*, July 2004 contains the Environment Agency's views on the adequacy of these plans.

During the first cycle of the Avon CAMS, effective until 2012, the water companies will be implementing the following plans affecting the Hampshire Avon catchment:

Wessex Water, in connection with the River Bourne and Nine Mile investigation, will be redistributing some of its abstraction from the Bourne catchment to the Avon, all within existing authorised quantities. Thereby reducing abstraction pressures on the River Bourne. This will be an Interim solution trialled from 1 April 2005 and reviewed when the remaining Hampshire Avon Habitats Regulations investigations are complete in 2008.

Bournemouth and West Hampshire Water will be commissioning the second new lake at Longham for bankside storage. This enhanced storage capacity will increase the amount of water available to meet peak demands in the summer. This change will not result in an increase in authorised levels of abstraction.

Neither Thames Water, Cholderton and District Water Company nor Bournemouth and West Hampshire Water have plans to develop resources within the Hampshire Avon CAMS area within the first CAMS cycle.

Key issues for consultation

The development of the Hampshire Avon CAMS is designed to be an open and transparent process which results in a shared strategy for managing water resources. This means that we welcome your comments on any part of the proposed licensing strategy set out in section 6, however it must be remembered that the requirements of the Habitats Regulations must be met in the Hampshire Avon catchment and therefore it is this legislation that directs the options and actions that are being considered in this CAMS. Some key issues on which we are looking for a response are given below.

1. Do you agree that we should not grant any new unconstrained consumptive licences and only consider new licences where and when there are higher river flows? If not, why?
2. Do you agree with the new licensing strategy for the Hampshire Avon catchment? If not, why?
3. Do you have any specific concerns over any part of the proposed strategy?
4. Is this licensing policy clear?
5. Do you believe that the proposed licensing strategy will help to achieve sustainable water resources for the future?
6. Should we actively seek voluntary revocations of unused licences or reductions in partially unused licences throughout the CAMS area?
7. Would you be prepared to fit water saving devices into your property in order to reduce the impact of abstraction on the environment?
8. We would like your views on whether this document is clear and understandable.

Appendix 1

Glossary

Abstraction

Removal of water from a source of supply (surface or groundwater).

Abstraction – Actual

The volume of water actually abstracted as opposed to the volume of water that may be abstracted under the terms of an abstraction licence. Individual abstraction records are reported to the Environment Agency each year.

Abstraction impact

River Abstractions directly from the river. For SWABS behind impoundments, need to take storage into account. Similarly for GWABS, need to translate abstraction into stream flow depletion both spatially (identifying the river reaches impacted) and temporally (indicating the monthly profile of stream flow depletion).

Abstraction licence

The authorisation granted by the Environment Agency to allow the removal of water from a source.

Aquifer

A geological formation, group of formations or part of a formation that can store and transmit water in significant quantities.

Artificial influences

Catchment activities such as surface water abstractions, effluent returns and groundwater abstractions which individually and collectively have an influence on natural flows or levels.

Artificial recharge

Water which is deliberately discharged to groundwater for the purposes of groundwater management.

Assessment Point

Critical point in catchment at which an assessment of available resources should be made. APs are located at the extremities of identified reaches and water resource management units.

Augmentation (river)

To artificially support flows in a river.

Baseflow

That part of the river flow that is derived from groundwater sources rather than surface run-off.

Biodiversity

The living component of the natural world. It embraces all plant and animal species and communities associated with terrestrial, aquatic and marine habitats. It also includes genetic variation within species.

Borehole

Well sunk into a water bearing rock from which water will be pumped.

Canal

An artificial watercourse used for navigation.

Catchment

The area from which precipitation and groundwater will collect and contribute to the flow of a specific river.

Confluence

The point where two or more streams or rivers meet.

Consent conditions

Terms under which a discharge consent is issued, typically covering limits on flow rate and quality of water discharged, in order to protect the needs of the receiving water and of key end users.

Conservation Regulations 1994

Regulations that implement the Habitats Directive in UK law (also known as the Habitats Regulations).

Constrained abstraction impact

The influence of an abstraction source which operates within pre defined flow/level or water quality constraints.

Consumptive use

Use of water where a significant proportion of the water is not returned either directly or indirectly to the source of supply after use.

Consumptiveness

Proportion of the water not returned either directly or indirectly to the source of supply after use e.g. water evaporated, transpired or transferred elsewhere.

Demand

The requirements for water for human use.

Demand management

The implementation of policies or measures which serve to control or influence the consumption or waste of water.

De-naturalisation

Process of converting a natural flow to an estimated existing or scenario flow by adding consumptive abstraction and discharge impacts.

Designated water dependent sites

Legally defined nationally and internationally important sites potentially affected by water management or water quality issues.

Discharge

The release of substances (i.e. Water, sewage etc.) into surface waters.

Discharge Consent

A statutory document issued by the Environment Agency, which defines the legal limits and conditions on the discharge of an effluent into controlled waters.

Dry weather flow (DWF)

The average of the annual series of the minimum weekly (7 consecutive days) flows, which can be thought of as the driest week in the average summer. It equates to between Q90 and Q95 in most natural rivers.

EC Directive

Issued by the European Commission to member states with the objective of producing common standards in the European Community – member states are then obliged to introduce appropriate legislation to comply with the Directive.

EU Water Framework Directive

First major review of European water policy. Seeks to improve water quality in rivers and groundwater in an integrated way (see Integrated River Basin Management). This will be transposed into UK law in 2003.

Ecological River Flow Objectives

The minimum river flows required to protect ecological objectives.

Environmental Weighting

An assessment of a river's sensitivity to abstraction based on physical characteristics, fisheries, macrophyte and macro-invertebrates for a catchment/sub-catchment.

Existing abstraction and discharge impacts

The amount by which all abstractions reduced natural flows in the scenario year, taking into account the consumptiveness of the use, the location of any effluent return and any lags or smoothing effects between abstraction and outflow impact. Based on estimated abstraction returns from the scenario year.

Flow duration curve

Plot of flow vs percentage of time a flow is exceeded. Thus QN95 (the natural flow that is exceeded 95% of the time) will be a low rate of flow, and QN5 (natural flow exceeded 5% of the time) will be a high rate of flow.

Flow regime

The statistical pattern of a river's constantly varying (mean daily) flow rates.

Gauged flow records

Records of flow in river as conventionally measured. They reflect not only natural runoff from the catchment, but also artificial influences (abstraction, discharge etc) that occur upstream of the measurement point.

Gauging station

A site where the flow of a river is measured.

GQA

Method for assessing the general quality of inland and coastal waters.

Groundwater

Water occurring below ground in natural formations (typically rocks, gravels and sands).

Groundwater baseflow

That part of the river flow that is derived from groundwater sources rather than surface run-off e.g. soil water, reservoir releases, effluents etc.

Groundwater catchment

The area from which recharge to the aquifer would naturally discharge to a defined point of a river, or over a defined discharge boundary.

Groundwater Management Units

Administrative sub-divisions of aquifers, defined on geological and hydrogeological criteria, which form the basis for groundwater resource management and licensing policy decisions.

Groundwater Protection Policy

Environment Agency policy relating to groundwater recharge areas to control activities having the potential to pollute underground water.

Habitat

Place in which a species or community of species live, with characteristic plants and animals.

Hands-Off Flow

A condition attached to the abstraction licence so that if the flow in the river falls below the flow specified on the licence then the abstractor may be required to stop or reduce the abstraction.

Hands-Off Level

Level below which an abstractor may be required to stop or reduce abstraction (i.e. groundwater level or river stage, to be specified on a licence, as a condition of that licence).

Hydrogeology

Branch of geology concerned with water within the Earth's crust.

Hydrograph

Plot of flow versus time.

Hydrology

The study of water on and below the earth's surface.

Hydrometric network

Networks of sites monitoring rainfall; river flow; river, lake, tidal and groundwater levels and some climate parameters. The data is used extensively for water resources management and planning, water quality and ecological protection and improvement, flood defence design, flood forecasting and flood warning.

Hydrometry

The measurement of water on or below the earth's surface.

Impoundment

A dam, weir or other work constructed in an inland water, whereby water may be impounded and any works for diverting flows in an inland water associated with the construction of a dam, weir or other work.

Integrated River Basin Management

The method by which the EU Water Framework Directive will be implemented to ensure that all requirements of and pressures on the environment are taken into account. CAMS is a component of this.

Licence

Formal permit allowing the holder to engage in an activity (in the context of this report, usually abstraction), subject to conditions specified in the licence itself and the legislation under which it was issued.

Licence application

Formal request by individual or organisation to the competent authority for a licence. For abstraction licences, the competent authority is the Environment Agency.

Licence determination

A decision by the competent authority on whether and on what terms to grant or refuse a licence application, by reference to the authority's regulatory powers and duties.

Licensed abstraction and discharge Impacts

The impacts of abstractions and discharges calculated for current abstraction licences and discharges based on full uptake of licensed abstraction rates and consumptiveness assumptions.

Low flow

The flow that is exceeded for a given percentage of the time. For example Q95 is the flow that is exceeded 95% of the time, this means that flow will only fall this low 5% of the time.

Managing water abstraction

Document produced in May 2001 on the CAMS Process and updated in July 2002 and May 2005.

Minimum residual flow

The flow set at a river gauging station to protect downstream uses and below which controlled abstractions are required to cease.

Mitigation

Refers to the environmental impact of scheme development or operation, and the actions, which may be taken to reduce or ameliorate such impacts.

Natura 2000

The habitats Directive will establish and protect a network across Europe of the most important areas for Wildlife, to be known as Natura 2000. This will include all SPAs and SACs on sites which are already SSSIs.

Natural flow regime

The river flow pattern experienced prior to the influence of man, with no abstraction from or discharge to the catchment.

Naturalisation

Process of converting gauged flows to natural flows by removing consumptive abstraction and discharge impacts (as detailed in 'Good Practice for Flow Naturalisation by Decomposition'). Note: there are other techniques of estimating natural flows.

Net Use

Proportion of abstracted water that is not returned to the river system nearby. For example, abstractions for irrigation have 100% net use because none is returned to the river.

Non-consumptive

This is where all abstracted water is returned to source a relatively short distance downstream of the abstraction point.

Ofwat

Office of Water Services.

Perennial flow

River flow present through the entire year.

Prescribed flow

A generic term for any flow 'prescribed' under statute or regulation.

Protected right

Protected rights include all existing licensed abstractions, and certain exempt abstractions for domestic and agricultural purposes (excluding spray irrigation) not exceeding 20m³/d.

Public water supply

Term used to describe the supply of water provided by a water undertaker.

Q50

The flow of a river which is exceeded on average for 50% of the time.

Q95

The flow of a river which is exceeded on average for 95% of the time.

RAM framework

Resource Assessment and Management Framework – a technical framework for resource assessment (for the definition and reporting of CAMS) and subsequent resource management (including abstraction licensing).

Ramsar site

A site of international conservation importance classified at the 'Convention on Wetlands of International Importance' 1971, ratified by the UK Government in 1976.

Recent actual abstraction and discharge impacts

The impacts of abstractions and discharges calculated for current abstraction licences and discharges based on recent abstraction returns or estimated from uptake and consumptiveness assumptions.

Recharge

Water which percolates downward from the surface into groundwater.

Residual flow

The flow remaining in a river following the abstraction of water from it.

Restoring Sustainable Abstraction Programme (RSAP)

The Environment Agency's programme for investigating and resolving issues caused by excessive (licensed) abstraction in certain catchments.

Revocation

Cancellation of licence and associated rights and benefits.

River

An open channel in which inland, surface water can flow.

River quality objective (RQOs)

A River Quality Objective is an agreed strategic target, expressed in terms of River Ecosystem standards, which is used as the planning base for all activities affecting the water quality of a stretch of watercourse.

River reach

Unit of a river between two assessment points, delineated for the purposes of abstraction licensing and resource management.

Salmonids

Members of the family salmonidae, includes Salmon, Trout and Char.

Scenario abstraction and discharge impacts

The amount by which all the abstractions in the area reduce natural outflows from it, taking into account the consumptiveness of the use, the location of any effluent return and any lags or smoothing between abstraction and outflow impact. Based on an assumed abstraction and discharge scenario (e.g. full Licensed rate, 'Existing', 'Recent Actual' etc).

Scenario flows

The flows, which would leave the assessment point in the specified year, based on the assumed scenario abstractions and discharges.

Source of supply

Either an inland water (river, stream, canal, lake, etc.) or underground strata. See Section 221 WRA91.

Special area of conservation (SAC)

A Special Area of Conservation is one classified under the EC Habitats Directive and agreed with the EC to contribute to biodiversity by maintaining and restoring habitats and species.

Special Protection Area (SPA)

A Special Protection Area is one classified as such under the EC Birds Directive to provide protection to birds, their nests, eggs and habitats.

Site of Special Scientific Interest

A Site of Special Scientific Interest is an area given a statutory designation by English Nature or the Countryside Council for Wales because of its nature conservation value.

Surface water

This is a general term used to describe all the water features such as rivers, streams, springs, ponds and lakes.

Surface water catchment

The area from which runoff would naturally discharge to a defined point of a river, or over a defined boundary.

Surplus or deficit

How much more or how much less abstraction impact is acceptable:

= Scenario flows – RFOs.

Sustainable development

Development that meets the needs of the present without compromising the ability of future generations to meet their own needs. This involves meeting four objectives simultaneously:

- social progress which recognises the needs of everyone;
- effective protection of the environment;
- prudent use of natural resources;
- maintenance of high and stable levels of economic growth and employment.

Sustainable management

The interpretation of the principles of sustainable development at a local/regional level within the boundaries of national and international political, economic and environmental decisions.

Tidal limit

The most upstream point within an estuary or river where water levels are subject to tidal variation.

Time limited licence

Licence with specified end date.

Trickle irrigation

The irrigation of crops by taking water direct to roots of plants, but without spraying or ejecting into the air.

Unconstrained abstraction impact

Abstraction impacts not related to hydrological or water quality constraints. Also see abstraction impacts.

Unlicensed abstraction

An abstraction that is carried out unlawfully or that is exempt from licensing.

Water Level Management Plans (WLMPs)

These provide a framework by which the water level requirements of a particular site can be discussed to incorporate and integrate a range of activities. The Environment Agency has a responsibility to be involved in the production of these plans in consultation with other interested bodies such as English Nature, Internal Drainage Boards, conservation groups and landowners.

Water resource

The naturally replenished flow or recharge of water in rivers or aquifers.

Water Resource Management Unit

An area that has similar groundwater and or surface water characteristics and is managed in a similar way.

Water resources strategies (The)

Strategy for Water Resource planning in England and Wales over the next 25 years to ensure sustainable use and sufficient water for all human uses with an improved water environment. The strategies predict demand using different social and economic scenarios.

Water Rights Trading

The transfer of licensable water rights from one party to another for benefit.

Watercourse

A stream, river canal or channel along which water flows.

Wetland

An area of low lying land where the water table is at or near the surface for most of the time, leading to characteristic habitats.

Winterbourne

A watercourse that is dry during the summer. During winter, groundwater levels saturate upper, more permeable horizons and 'overflow' discharge from the aquifer to the drainage network extends over longer 'winterbourne' stream reaches. In summer, flow in the winterbournes retreats to permanent spring heads further downstream leaving the upper reaches dry.

Appendix 2

List of abbreviations

AMP	The acronym for the Asset Management Plan produced by the Water Companies for OFWAT. It sets out the water industry investment programme. These plans are drawn up through consultation with the Environment Agency and other bodies to cover a five year period. AMP's have to be agreed by the Defra and OFWAT.	m³/s	Cubic metres per second.
AONB	Area of Outstanding Natural Beauty.	MI, MI/d, MI/day	MI = megalitres = 1,000,000 litres = 1,000 cubic metres = 1,000m ³ = 220,000 gallons MI/d = MI/day = MI per day, = tcmd, thousand cubic metres per day.
AP	Assessment Point.	mm	Millimetres.
BAP	Biodiversity Action Plan.	Ofwat	Office of Water Services.
CAMS	Catchment Abstraction Management Strategy.	PWS	Public Water Supply.
Defra	Department of the Environment, Food and Rural Affairs (succeeds former DETR – Department of the Environment, Transport and the Regions).	Qn50, Qn95	Naturalised flow exceeded during 50% or 95% of period over which flow data are being considered.
ERFO	Ecological River Flow Objectives.	Q50, Q95	Flow exceeded during 50% or 95% of period over which flow data are being considered.
EU	European Union.	RQO	River Quality Objective.
GIS	Geographical Information System.	SAC	Special Area of Conservation.
GQA	General Quality Assessment.	SPA	Special Protection Area.
HOF	Hands off flow.	SSSI	A Site of Special Scientific Interest i.e. an area given a UK statutory designation because of its conservation value.
km	Kilometres.		
km²	Square kilometres.		
Low Flows 2000	A software package which originated from CEH, that can be used to generate low flow statistics for a catchment.		
m AOD	Metres above Ordnance Datum (mean sea level at Newlyn Cornwall 1915–1921).		

Notes

Notes

www.environment-agency.gov.uk/cams

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