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The Teme Catchment Abstraction Management Strategy

September 2005



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Vision for the Teme CAMS area

To manage water resources sustainably and protect this highly diverse and sensitive area.

1 Introduction

Catchment Abstraction Management Strategies (CAMS) are strategies for management of water resources at a local level. They will 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.

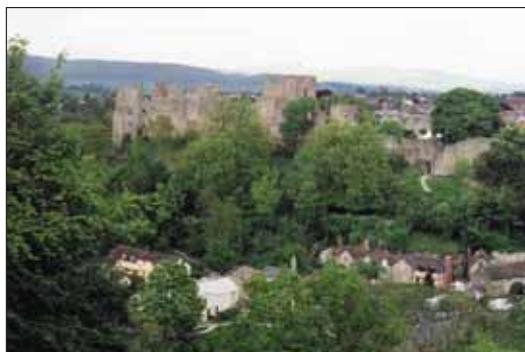
CAMS are also the mechanism for managing time-limited licences by determining whether they should be renewed and, if so, on what terms.

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 document should be read in conjunction with *Managing Water Abstraction*.

It was not feasible to deal with the whole Severn catchment in one exercise, but it is important to determine whether there were any over-riding flow requirements to be taken into account on the main river before looking in more detail at the catchments draining to the Severn Corridor.

Management of water resources in the River Severn itself was considered as part of the Severn Corridor CAMS (published June 2003). This set out the framework for managing water resources along the Severn Corridor focusing exclusively on the regulated reaches of the Rivers Severn and Vyrnwy from Afon Clywedog, (downstream of the reservoir) to the Severn Estuary (Sharpness), including the River Vyrnwy downstream of Lake Vyrnwy.

The River Teme rises in the Kerry Hills and is a good quality river of high conservation value throughout its 122 kilometres length. It flows eastwards to join the River Severn just south of Worcester.



Ludlow Castle

A Technical Document for the Teme 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 Teme CAMS

Consultation is an integral part of the CAMS process. 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
- meetings.

The leaflet was distributed in July 2003 with the aim of raising awareness of the development of the CAMS in the local area. It also invited anyone with an interest to send in written comments, provide information, views and suggestions for consideration during the early development of the CAMS.

A Stakeholder Group was set up for the Teme CAMS whose role was to represent the key interests in the catchment. They have helped to identify issues of local significance, provided views on proposals and considered the likely implications of different strategy options. The members of the Teme CAMS stakeholder group and the interests they represent are as follows:

Philip Engleheart	chair
John Harper	agriculture
John Bennett	angling/fisheries
Bob Powell	industry
David Heaver	ecology
Andy Graham	ecology
Denzil Onslow	local landowners
Steve Gallimore	public water supply
Karl Bungey	recreation

The stakeholder group and the Agency met five times between October 2003 and May 2005 to consider and discuss a variety of issues. This group helped to review and comment on the results of the Resource Assessment Management (RAM) framework and the Sustainability Appraisal process. (The RAM framework is a national process that allows us to determine water availability in a catchment in a consistent manner. Sustainability Appraisal looks at the costs and benefits of future licensing options).

There was also a formal consultation on the Teme CAMS through a consultation document, distributed in January 2005. The responses received were analysed and taken into account as the strategy was finalised. This document now sets out the final strategy that has been determined for the Teme CAMS area.

The Teme CAMS Consultation Document was sent out to about 60 organisations and individuals. During the three month consultation period 15 responses were made which raised a variety of views and comments. Most of the comments were concerned with preserving the environmental value of the Teme CAMS area. A Statement of Response was sent out to all those who commented in May 2005.

The Teme CAMS area

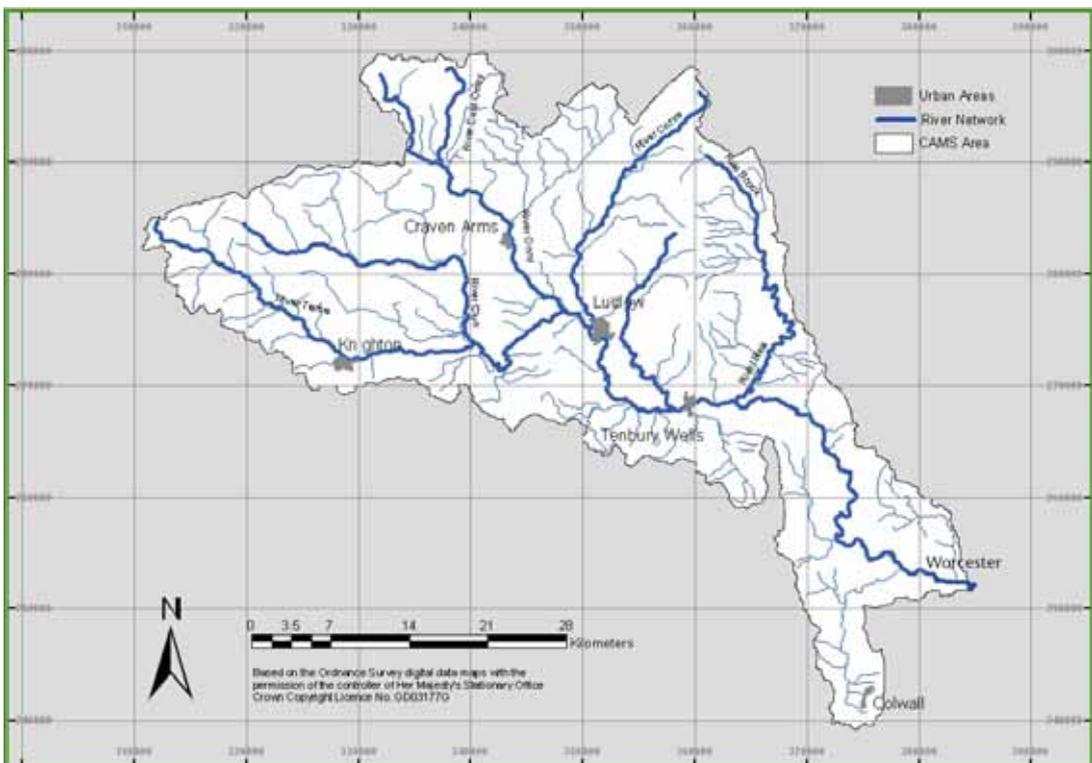
The Teme CAMS area covers the whole of the catchment of the River Teme which includes parts of the counties of Shropshire, Herefordshire, Worcestershire and Powys. The major settlements wholly within the area include Ludlow, Tenbury Wells and Knighton, however the highest concentration of population occurs in Worcester City, only part of which falls within the CAMS area.

The Teme is the second largest tributary of the River Severn. It rises in the Kerry Hills in Mid Wales from a small spring in Bryn Coch quarry on Cilfaesty Hill at 460 metres above sea level. It is a rural river passing through three market towns before joining the River Severn just south of Worcester after 122 kilometres. The north of the area is bordered by the Stiperstones, Long Mynd and Wenlock Edge and to the south east

by the Suckley Hills and the ridge of the Malvern Hills. The unspoilt countryside is widely regarded as some of the most attractive in Britain and large parts are designated as Areas of Outstanding Natural Beauty. The landscape is characterised by rolling hills and attractive valleys with sheep grazed Welsh border uplands in the west giving way eastwards to the softer, more fertile countryside of the English Midlands.

Major tributaries include the rivers Clun, Onny, Corve and Rea and larger brooks such as the Kyre, Leigh and Laughern. The rural nature of the area is reflected by high quality rivers supporting high-class fisheries and providing a variety of habitats for a wide range of flora and fauna. The whole of the River Teme is classed as a Site of Special Scientific Interest (SSSI) as it represents a biologically rich river.

Map 1 The Teme CAMS catchment overview



Population density is low with most market towns located mainly in the river valleys, although there are a number of villages and smaller settlements scattered throughout the area.

3.1. Ecology

The River Teme and its tributaries support a diverse range of flora and fauna that is mainly associated with good water quality. Being such a diverse river, the River Teme has a rich macro-invertebrate community including Stonefly, Mayfly and Caddis Fly larvae, which require good water quality.

There are diverse macrophytes (plants) within the Teme catchment with a large range of mosses and liverworts in the upper reaches and plants such as Water Crowfoot and marginal reeds in the lowland areas.

The otter has well established breeding populations on the Teme and are also found downriver to the confluence with the River Severn at Worcester. Young otters from the Teme are seeking new territories and are likely to be recolonising lower sections of the Severn catchment where the animals are still very rare.

The Teme supports a good population of White Clawed Crayfish which is a globally threatened species and is seriously declining in numbers. The extensive shingle shoals hold rare Riffle beetle communities with some seventeen different types of species being recorded.

A population of Freshwater Pearl Mussels are present along the River Clun. These are a rare and protected species.



Freshwater Pearl Mussels BAP species

3.2. Fisheries

The salmonid species Brown Trout and migratory Atlantic salmon dominate the majority of the Teme

catchment. The Teme and its tributaries provide extensive spawning grounds for both species. The Atlantic salmon in particular is vulnerable with concerns globally for its long-term survival. At present its distribution is limited in this catchment by the presence of obstacles on the River Teme and its tributaries which prevent movement. Both species are protected under Annex II of the EC Habitats and Species Directive. In addition the protected species Bullhead and Brook Lamprey are common. The migratory Sea Lamprey is also known to spawn within the catchment as is Twaite Shad. Grayling can be particularly affected by low flows but have recently staged an excellent recovery within the Teme catchment.



Fish pass at Powick Weir

From Ashford Carbonell to its confluence with the River Severn the River Teme is one of the best coarse fisheries in England and Wales. It is especially noted for its Barbel and Chub.

3.3. Conservation

The River Teme drains a hilly, predominately rural catchment. The river is actively eroding and fast-flowing, with many shingle bars, especially above Leintwardine. Downstream of Leintwardine, the river flows through a more gentle landscape through Ludlow and Tenbury Wells before joining the River Severn just below Worcester. At its lowest section, the Teme becomes more sluggish, typical of a mature lowland river. This varied landscape can be explained by the complicated geology and supports a wide range of habitats and species.

The Welsh section of the river lies within the Radnor Environmentally Sensitive Area (ESA). The English section of the river runs through the Clun ESA and Shropshire Hills Area of Outstanding Natural Beauty (AONB).

UK Biodiversity Action Plan

The UK Biodiversity Action Plan (BAP) is a national programme aimed at protecting particular species and types of habitat. The Agency, water companies and planning authorities must have regard for the BAP. The Agency's Midlands Biodiversity Action Plan has identified certain species in need of special protection. Examples include salmon, otters, Lamprey, Great Crested Newt and White Clawed (Atlantic Stream or Native) Crayfish. CAMS must take into account the presence of BAP species and habitats when considering future options for water resource management.

Designations

The whole of the River Teme itself (but none of the tributaries or the catchment area) has been designated a Site of Special Scientific Interest (SSSI). It is of special interest as a representative near natural and biologically rich river type associated with sandstone and mudstones. It is considered to be a nationally outstanding example of a large river with rich and varied plant, invertebrate, fish and otter

communities. The variations in geology, flow and substrate give rise to diverse river, plant and animal communities.

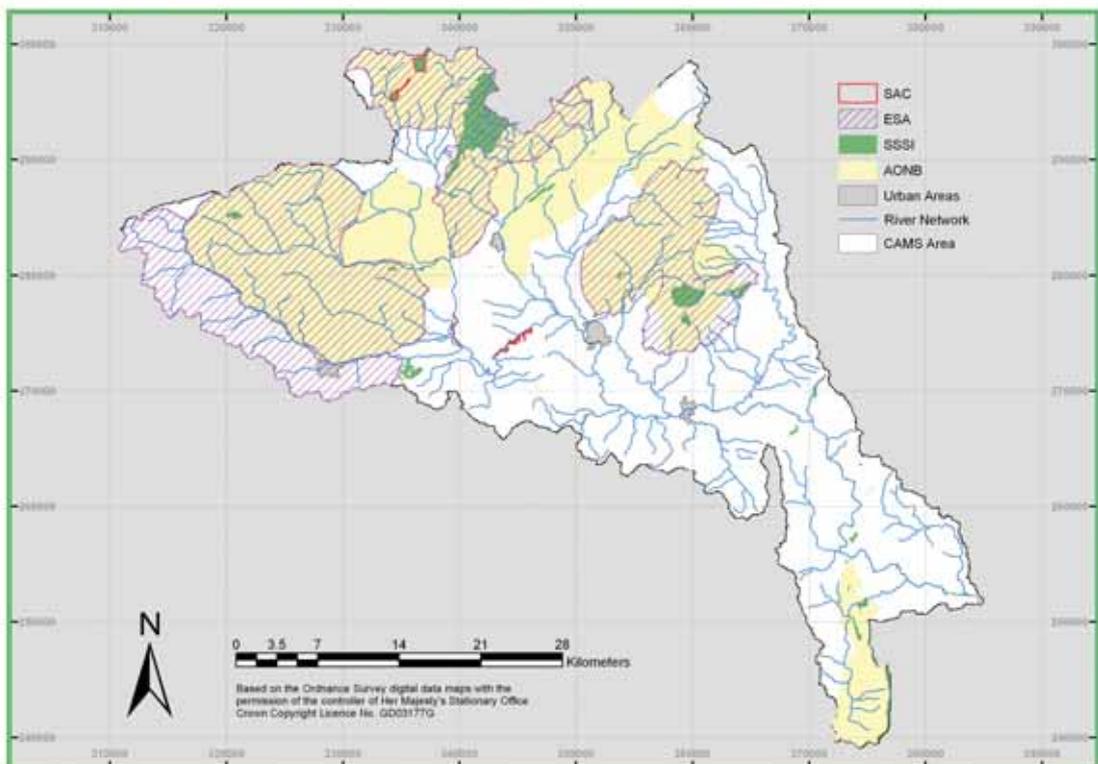
Parts of the River Clun, which is a tributary of the Teme, are classed as a SAC (Special Area of Conservation) due to the biodiversity of habitats and species in the river.

3.4. Water Quality

The Teme catchment has 374kms of river classified under the Surface Waters (River Ecosystem Classification – RE) Regulations 1994.

The classification system establishes a target water quality for different stretches of river using a five grade hierarchical system. Each grade has differing acceptable concentrations of chemicals, including ammonia, biochemical oxygen demand (BOD) and dissolved oxygen, which then determines a target grade (RE1 to RE5) to each designated river stretch. It is this grade that determines the water quality.

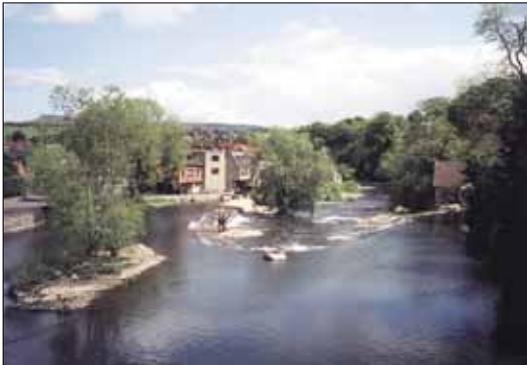
Map 2 Teme CAMS designation conservation sites



Of the total length of the classified stretches within the Teme catchment 15% (89.3km) has the highest water quality target of RE1 and almost 73% (264km) has the water quality target of RE2. The target of RE3 applies to 5% of the catchment (17.3km) with the remaining 7.5% (3km) at the lower RE4 target.

Many of the watercourses have stretches designated under the EC Directive on Freshwater Fish, which reflects on the quality of fresh waters needing protection or improvement in order to support fish life. (This was brought into UK law through Surface Waters (Fishlife) Regulations (No. 1331)). The stretches of water within the Teme catchment designated for salmonids (e.g. salmon, Brown Trout and Grayling) total 296km.

The Teme catchment provides a vital role in receiving the treated discharges from rural sewage treatment works and larger treatment centres at Tenbury Wells, Craven Arms, Church Stretton, Ludlow and Knighton. Improved sewage treatment is being implemented in the area to remove phosphates and protect and improve the water quality of the catchment.



Ludlow Weir

Although the Teme Valley is designated as a SSSI, the lower reaches (stretches of water) of the catchment are affected by diffuse pollution, mainly consisting of nutrients and solids. These are generally thought to derive from agricultural sources and it is a problem that can have a significant detrimental effect on water quality.

3.5. Hydrometry

The Teme CAMS covers an area of 1,653km² and is made up of many tributaries such as the Clun, Onny and the Rea. The average annual rainfall across the whole catchment is 782mm (standard period 1961 to 1990) compared to the England and Wales average of 897mm. Rainfall is much higher to the

west of the catchment over the higher areas in Wales. Rainfall ranges from over 1,000mm per year in the hills above Knighton to 700mm per year at the confluence with the River Severn.

Water resources are monitored using an extensive network of hydrometric flow and rainfall measuring stations. This data is used on a routine basis for drought and flood monitoring, water resource investigations and has also been used to assess resource availability in this CAMS.



Knightsford Gauging Station

River flows are measured at two gauging stations in the catchment at Tenbury Wells and Knightsford. River levels are monitored for various projects across the catchment and field staff collect spot flow measurements at a variety of temporary sites.

Rainfall data in the Midlands Region is recorded by automatic tipping-bucket rain gauges. In addition there are many daily storage gauges in the region operated by voluntary observers with data returns made on a monthly basis.

3.6. Hydrogeology

The geology underlying the River Teme catchment area is complex and varied. The area is dominated by heavily faulted Devonian and Silurian age sedimentary rocks. There are no Major Aquifer Units within the area and only parts of two Minor Aquifer Units.

The River Teme rises in the west of the area and, together with its tributaries the Rivers Clun and Redlake, flows initially across Silurian sandstones, mudstones and siltstones and Devonian mudstones and sandstones. The River Onny tributary to the north rises on ancient Pre-Cambrian sandstones and siltstones that underlie the Long Mynd and Linley Hill. The River Corve, to the east, drains an area of

Devonian and Silurian limestones, siltstones and mudstones. The latter includes the Raglan mudstone, which underlies most of Corve Dale and the River Teme Valley.

The north east of the catchment area is underlain by Devonian mudstones and sandstones, which lie beneath the headwaters of the Ledwyche Brook and River Rea. Brown Clee Hill and Titterstone Clee Hill are the highest points in the area and the two hills are composed of Lower and Middle Coal Measure rocks, capped with igneous dolerite rock.

A small zone of Upper Carboniferous Coal Measures, Highley Beds, lies beneath the area around Mamble and Clows Top on the central eastern edge of the Teme catchment. Mercia Mudstone strata, comprising mudstones with thin sandstone bands, underlie the extreme eastern part of the River Teme catchment area, on the western side of Worcester.

Boreholes for Public Water Supply are protected by Source Protection Zones (SPZs), i.e. zones that protect the quality of the aquifer around the borehole. In the Teme CAMS area, SPZ's have been defined around the water supply boreholes at Clungunford, Diddlebury, Munslow, Bishops Castle and Leintwardine.

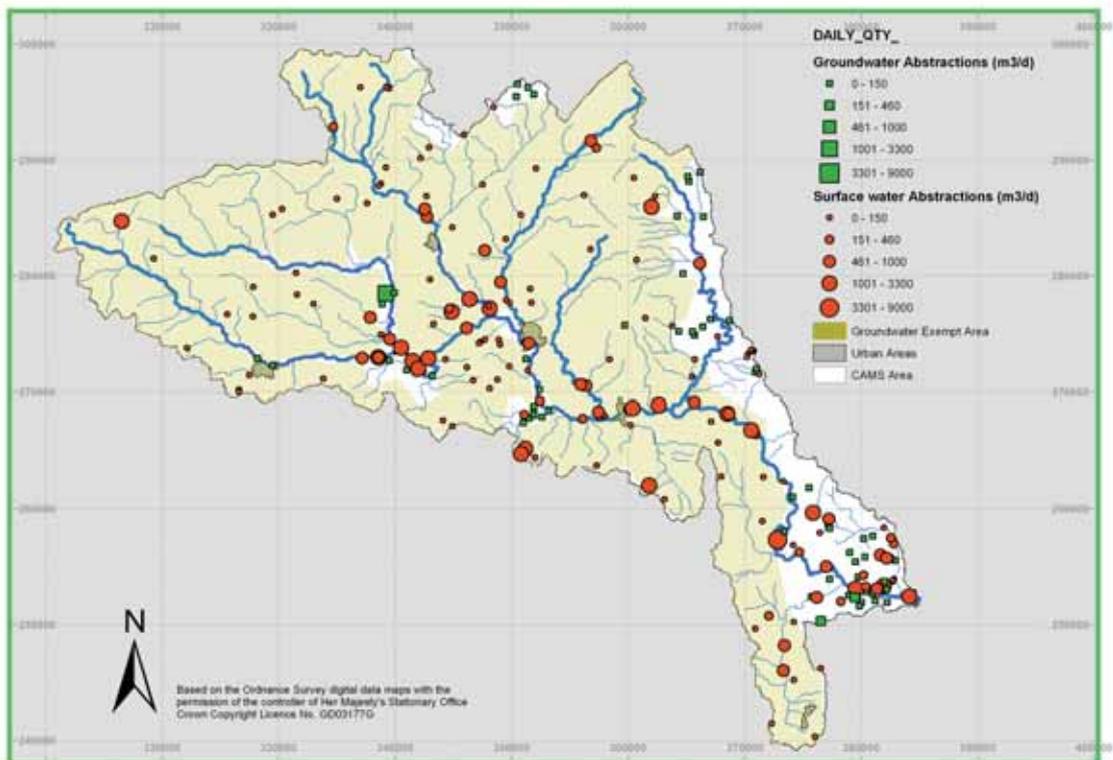
3.7. Abstractions and discharges

The total licensed volume of 8,303,071 cubic metres of water per year is distributed over 125 licensed abstractions in the River Teme catchment. Of these nine are groundwater licences, accounting for a total annual licensed abstraction of 1,301,020 cubic metres (16%). 113 licences are for surface water, which accounts for a total annual licensed abstraction of 6,994,751 cubic metres (84%).



Pump abstracting for spray irrigation at Broadwas on River Teme

Map 3 Teme CAMS licensed abstractions



Whilst there is an adequate supply of surface water resources in the Teme catchment during the winter period, in the summer the River Teme often experiences low flows. Unlike the River Severn, flows in the River Teme are not supported by releases from a reservoir. There is, therefore, a need to limit the volume of water abstracted during periods of low flows. This is achieved by imposing flow restriction conditions so that abstraction must reduce or cease during low flow periods. It is also Agency policy to time limit all new abstraction licences.

As has already been mentioned, groundwater resources are limited in the catchment as the geology of the area is such that there are no major aquifers (water bearing rocks). Consequently a large proportion of the catchment falls within the area classed as 'exempt', whereby abstraction from groundwater does not require a licence. At present the Agency has no control over such groundwater abstractions but this will change when certain parts of the 2003 Water Act are implemented. Nevertheless, where water-bearing rocks are present, small public water supplies and private supplies can be supported by means of boreholes or springs.

The main uses of water in the catchment are for public water supply and agriculture, with very little industrial use. The River Teme has become an important source of water for irrigation and there are numerous spray irrigation licenses in force. The change in land use from pasture to arable has increased potential for diffuse pollution. Diversification in the farming sector has also seen the development of fish farming and fishery enterprises, which are dependent on surface water sources. Cultivation of farmland for potatoes is increasing in the catchment with some farmers utilising trickle irrigation, which whilst presently exempt from the need for an abstraction licence will require one following the implementation of parts of the Water Act 2003.

In some parts of the catchment there can be significant water movement between water in the river channel and the adjoining gravel deposits. This is a natural process which, under very low flow conditions, leads to some short sections of the river channel running dry before the water re-emerges from the gravel deposits. One example of this natural phenomenon happens at Leintwardine.

From the 1 April 2005 changes in legislation as a result of the Water Act 2003 has meant that abstractions which do not exceed 20 cubic metres per day no longer require an abstraction licence. Over a hundred licences have been deregulated within the Teme catchment totalling 173,639 cubic metres of water in annual abstraction.

The majority of abstraction licences (95 out of 123) are for agricultural purposes and spray irrigation.

Although there are only a small number of licensed abstractions for public water supply, they account for over 50% of the total licensed quantity from the Teme catchment.

There are over 60 consented discharges to the catchment; the majority are for sewage effluent or sewerage system overflows. The largest discharge is from Ludlow Sewage Treatment Works.

3.8 Links with Other Plans

The development of CAMS has links with many other initiatives, both Agency schemes and those belonging to other organisations. These include:

- The Agency's Restoring Sustainable Abstraction (RSA) Programme.
- Water Company Water Resources Plans.
- Specific interest Agency plans (Salmon Action Plans, Catchment Flood Management Plans and Biodiversity Action Plans).
- Water Level Management Plans.
- National and Regional Water Resources Strategies.
- Water Framework Directive (WFD).

The Water Framework Directive will establish a common framework for the protection and management of surface water and groundwater from the headwaters to the coasts. It will co-ordinate activities across the European Union to provide an integrated and consistent approach.

Implementation will require Member States to develop "River Basin Management Plans" (RBMP) as a high level statutory planning process, subject to public consultation and review on a six year cycle. These plans will set out a programme of measures for achieving the environmental objectives of the Directive. As part of the Agency's function in achieving its implementation, CAMS will have a key role in contributing to completion of these plans. It is likely that each River Basin District will be made up of several CAMS areas.

CAMS will enable the management of water resources at a local river catchment level with further subdivision into smaller surface water and groundwater management units. As CAMS are based on river catchments, they will readily aggregate to River Basin Districts.

There is further information regarding the Water Framework Directive in *Managing Water Abstraction*. (See Annexe 2, page 37).

English Nature and the Agency have agreed that this CAMS will replace the Water Level Management Plan for the River Teme.

Resource Assessment and Resource Availability Status

4.1. 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 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, showing whether licences are likely to be available and highlighting 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 1.

Table 1 | 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 catchment.

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 4 shows the river APs that have been defined for the Teme CAMS. Further details on how these were defined are provided in the Technical Document for the Teme CAMS.

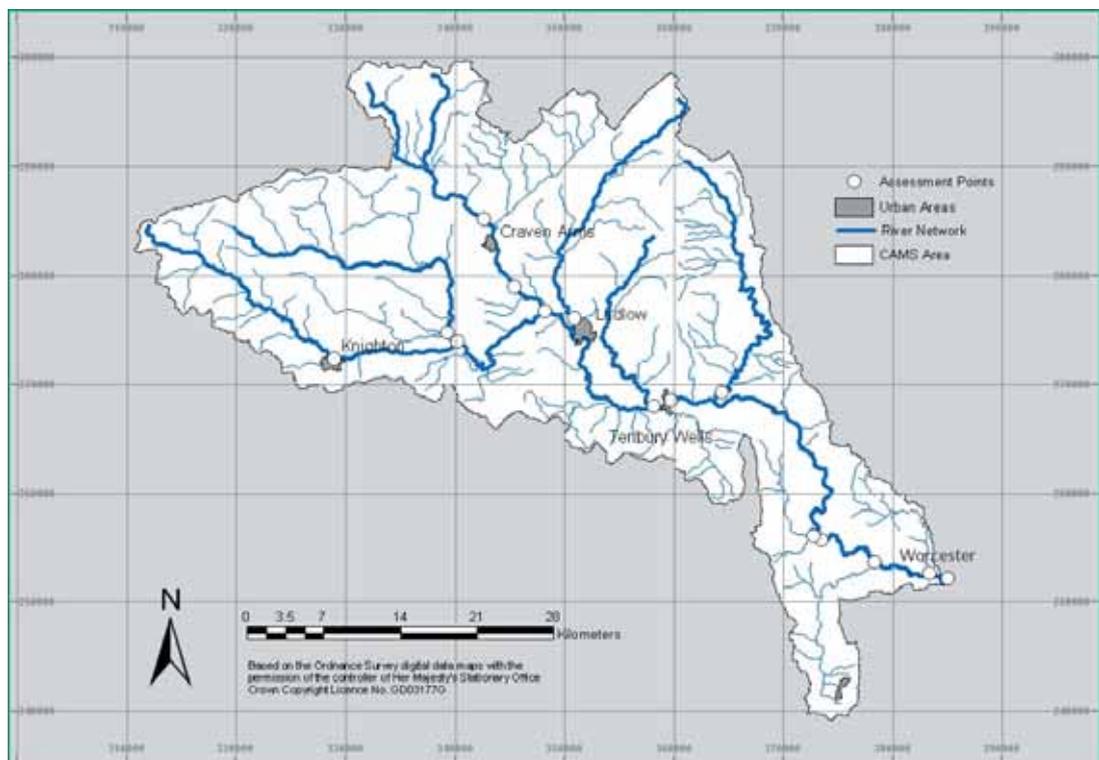
4.2. Resource assessment of groundwater management units

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, and the impact of abstraction on summer outflows from the unit.

4.3. Resource assessment of river Assessment Points (APs)

The surface water resource assessment requires the definition of '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.

Map 4 Teme CAMS assessment points and groundwater management unit



These 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 5 and Table 2 show the environmental weighting scores for each assessment point in the Teme CAMS area.

These river flow objectives are then compared with a scenario flow 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. 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. However, this applies only at times of low flow. During periods when flows are higher, there may be some water available for abstraction. The classification is therefore a classification of resource availability at low flow.

Abstraction licences are sometimes managed in order to ensure this flow variability is maintained by the use of 'Hands off Flow' (HoF) conditions. These are conditions on licences that require abstraction to stop (or reduce) when the flow in the river falls below a specified level. Therefore, when river flows are above the hands-off flow, abstraction can take place but when flows are below this level, no abstraction (or reduced abstraction only) can occur. Low flows will occur more frequently during the summer months.

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 HoF possible on a first-come-first-served basis. As more licences are granted, the HoF must be increased to maintain sustainable flows in the river.

Map 5 Teme CAMS environmental weighting scores

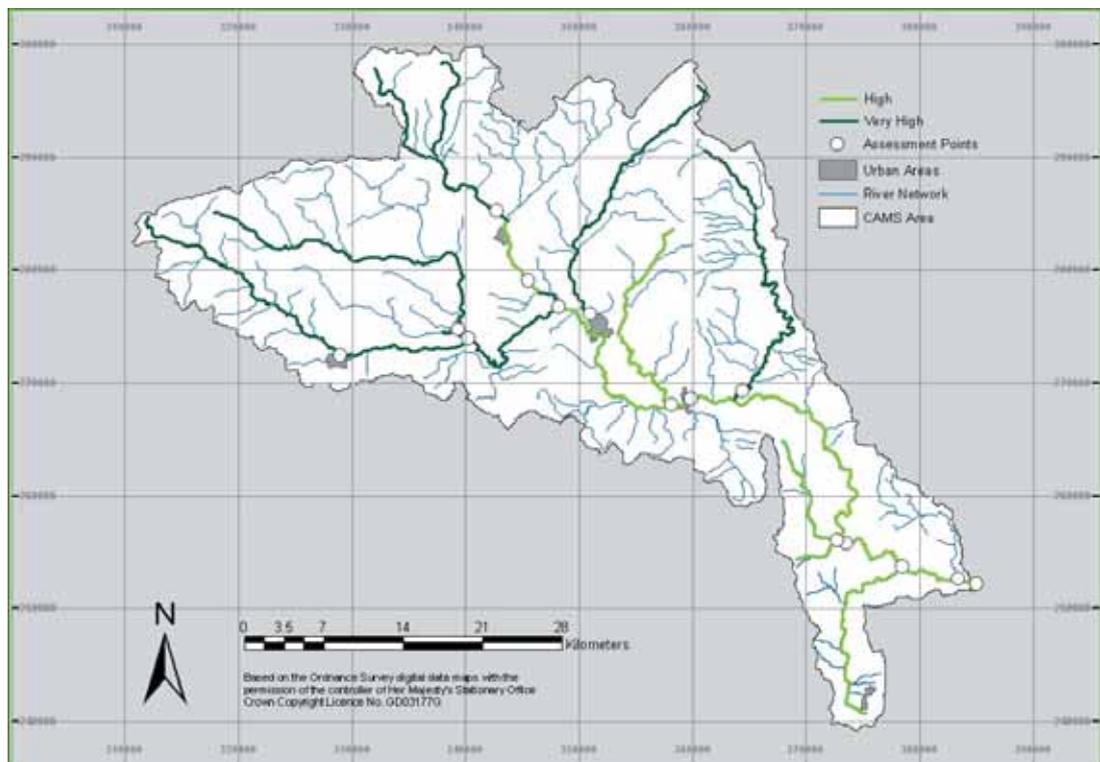


Table 2 | Environmental weighting scores for each AP

Assessment Point	Name	EW Band
1	Knighton	VH
2	Bromfield	VH
3	Tenbury	H
4	Knightsford	H
5	Worcester	H
6	Redlake	VH
7	Clun	VH
8	Quinney Bridge	VH
9	Onibury	H
10	Corve	VH
11	Ledwyche	H
12	Rea	VH
13	Sapey Brook	H
14	Leigh Brook	H
15	Laughern Brook	H

Potential applicants for new abstraction licences must 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', then data showing how much water is actually being abstracted is studied. If the rate of actual abstraction creates flows higher than the River Flow Objective, then the unit is classed as 'over licensed'. However, if the actual rate of abstraction is causing lower flows than the River Flow Objective then the unit is classed as 'over abstracted'. This status represents an unsustainable use of water resources, which could lead to damage within the environment.

4.4. Integration of the surface water and groundwater resource assessments

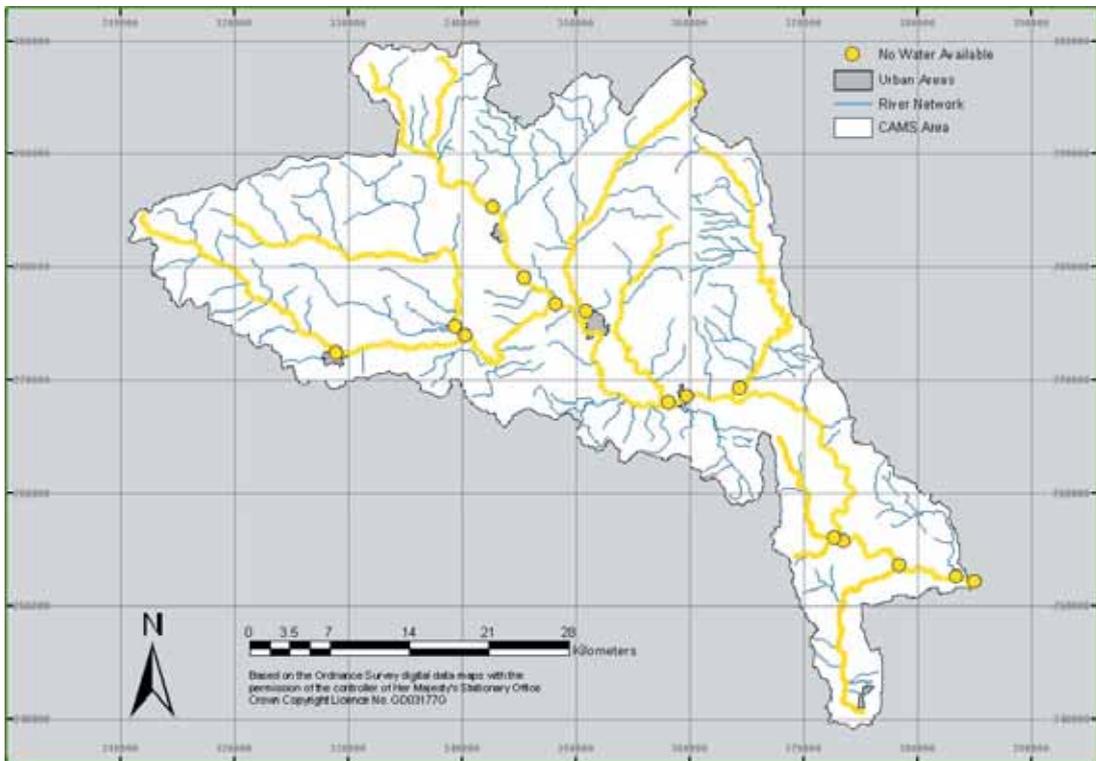
The resource availability results for river reach and groundwater management unit assessments are integrated and iterations made.

Map 6 shows the resource availability status of groundwater management units and river reaches in the Teme 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 Teme CAMS Technical Document.

4.5. Water Resource Management Units (WRMUs) in the Teme CAMS

On completion of the resource assessment, the assessment points (APs) were combined to a single WRMU. The options for future water resource management were considered for the unit, through the Sustainability Appraisal process. In carrying out the Sustainability Appraisal, all designated and non-designated conservation sites were considered, including County Wildlife Sites, which are not documented in the description of each Unit. Also considered were archaeological and heritage sites. As previously the Severn corridor CAMS was completed in June 2003. This had a resource availability status of 'No Water Available'. Due to the requirement to protect the River Severn the Teme is classed as 'No Water Available'. See table 1. The WRMU boundary and the resource availability are illustrated in Map 6.

Map 6 Resource availability status



4.5.1. Water resource management unit – Teme catchment

This Unit comprises the entire Teme catchment to the confluence with the River Severn at Worcester and covers an area of 1,653km². There are 40 SSSI's within the WRMU, of which 25 are water dependent. There is also one SAC on the Clun and four designated sites. There are 29 water dependent Scheduled Ancient Monuments (SAMs) and some of the WRMU is of great geological interest. There is a further requirement on the Agency to protect the designated and non-designated sites. There are 123 licensed abstractions, including abstractions for public water supply, spray irrigation and general agricultural uses. This is a predominantly rural area, however it is expected that there will be a rising demand for public water supply. The resource assessment for the Unit is 'Water Available'. However since the Teme flows into the River Severn, which is covered by the Severn Corridor CAMS and is classed as 'No Water Available', the Teme must also be classed as 'No Water Available'.

Licensing strategy

5.1 Sustainability appraisal

A sustainability appraisal process has been developed to enable the Agency to take account of the 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, pro forma 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*.

5.2. Licensing strategy

5.2.1. National and regional strategies

In March 2001, the Agency published a National Water Resources strategy for England and Wales. This document outlines how the Agency plans to manage water resources over the next ten to 25 years. The water resources strategy in the Midlands Region (*Water Resources for the Future, March 2001*) focuses on the state of water resources on a regional scale and explores options for their long-term sustainable development. The Strategy also recommends combining some further water resource developments with sensible management of our demands, through water efficiency measures.

5.2.2. Licensing strategy in the Teme CAMS area

Licensing in the CAMS area follows the principles and procedures of the Agency's licensing system as set

out in Annex 2 of *Managing Water Abstraction*. Beyond the statutory requirements of the Water Resources Act (1991), there are well-established guidelines and licensing conditions to ensure the sustainable management of the water resources.

Groundwater Licensing Policy

Groundwater resources are limited in the catchment. The geology of the area is such that there are no major aquifers. As a consequence a large proportion of the area falls within the Exempt Area. A licence is, however, required for groundwater abstraction from river gravels. The gravels are in direct continuity with the surface water and as a result abstraction from the river gravels could potentially affect river levels and flow.

It should be noted that the Agency no longer has any control over any abstraction if the quantities are less than 20 cubic metres per day (4,400 gallons) irrespective of the Exempt Area.

Groundwater resources are also present in minor aquifers in the catchment. Any applications for an abstraction licence in these groundwater units would meet no objection in principle provided that yields are sustainable and there are no local derogation issues.

Surface water licensing policy

The Severn Corridor CAMS (published June 2003) established that the resource assessment for the whole of the River Severn corridor was 'No Water Available'. As a result, there is a requirement to protect the flows from the Teme catchment into the River Severn. This means that the resource assessment of this catchment has been overridden to 'No Water Available.' In accordance with RAM the first level of 'hands-off' flow restriction was set at 159 MI/d, at Tenbury, but there is no longer any water available at this level so we are now licensing to the second hands-off flow level of 190 MI/d.

Following consultation on the proposed surface water policy for the Teme, our licensing strategy for the Teme CAMS is in accordance with our resource assessment. Table 3 overleaf summarises restrictions which will apply to the Teme CAMS area.

Table 3 | Summary of 'hands-off' flows in the Teme CAM

River		Policy and reason
River Teme catchment from source to u/s River Onny confluence	River Teme and larger tributaries including the River Clun	Subject to 'hands-off' flow of 240 MI/d on River Teme @ Tenbury
River Teme catchment from u/s River Onny to Tenbury gauging station, including the River Corve	River Teme, River Onny and lower reaches of major and tributaries excluding the River Corve	Subject to 'hands-off' flow of 190 MI/d on River Teme @ Tenbury
River Teme catchment d/s of Tenbury	River Teme and major tributaries	Subject to 'hands-off' flow of 230 MI/d on River Teme @ Knightsford

Due to the sensitivity of the river upstream from its confluence with the River Onny licences for any watercourse upstream of this point will be subject to a tighter 'hands-off' flow restriction of 240 megalitres per day. The need for tighter restrictions in the upstream reaches will be examined over the next six years.

Where abstractions are requested on minor tributaries, a 'hands-off' flow tied to a local measuring structure is usually necessary. This is because flows measured at the Tenbury or Knightsford gauge may not be representative in the upper reaches of minor tributaries. The need to continue with additional restrictions for the upper reaches of the Teme CAMS will be investigated over the coming six years of this CAMS cycle.

Conditions are placed on licences to maintain environmental stability and ensure that abstraction must not result in the river flow being depleted below a preset level or hands-off flow. Under conditions of extreme water resources shortages through lack of rainfall, abstraction for spray irrigation may be banned completely.

All new abstraction licence applications within the Teme CAMS area are screened and assessed for their impact on conservation sites designated under the Birds and Habitat Directive.

For any spray irrigation proposal in the Teme CAMS area, the construction of a winter storage reservoir will continue to be encouraged to provide a reliable source of irrigation water during the summer months.

The separate winter restriction has been removed as it is not needed to maintain the environmental integrity of the river. The licences which currently have a winter restriction will be recalled and varied during the early years of this CAMS.

Table 4 below shows the number of days a licence granted under the various 'hands-off' flow conditions would be restricted in both a dry and average year.

Because the Teme catchment directly contributes to the Severn Corridor new and varied consumptive licences will be restricted when regulation at Bewdley is greater than or equal to 500 MI/d from any source (as documented in the Severn Corridor CAMS).

5.2.3. Licence determination

In addition to the strategy, any application for a new or increased abstraction licence has to be determined by the Agency in accordance with a nationally agreed procedure. This may require the applicant to support their application with information above what is required in the applications forms. This can be by way

Table 4 | Enforced restrictions under existing licensing policy

Tenbury			Knightsford
Year	190 MI/d restriction	159 MI/d restriction	230 MI/d restriction
Dry 1995	133	115	125
Average 1997	39	6	50

of an Environmental Report (ER) or an Environmental Impact Assessment (EIA). The publication *'Managing Water Abstraction'* sets out how the Agency will determine a licence application. For more information on this process please refer to *'Managing Water Abstraction'*.

5.2.4. Exempt purposes

There are instances, relating to both purpose and quantity, in which a licence is not required. Further information can be found in the Agency's publication *'Managing Water Abstraction'* (annexe 2, paragraph 4) for specific information on these exemptions.

5.2.5. Approach to time limiting

In line with our national time limiting policy (as stated in MWA) all new licences (within this catchment) will be time limited until 2013 to fit in with the next CAMS cycle.

This CAMS area will have a common end date for licences of the 31 March 2013 (the normal renewal cycle beyond this will be 12 years). However, longer time limits may be issued subject to the satisfaction of certain criteria (for example a licence that will significantly reduce or replace the reliance on direct summer abstraction). Where there is significant uncertainty about the sustainability or need for the licence a shorter time limit may be applied. Further information on this can be obtained from Chapter 5 of *'Managing Water Abstraction'*.

5.2.6. Renewals and management of existing licences

The Agency's policy (as detailed in *'Managing Water Abstraction'*) states that all time limited licences are likely to be renewed if the proposal meets the following three tests, although licence conditions may be reviewed.

- The licence holder can demonstrate that they need the water
- The licence holder can demonstrate efficient use of water
- The licence is deemed (by the Agency) to be environmentally sustainable.

The renewal would also be subject to the application going through the required legal procedures and any representation received.

Licence holders will be notified eighteen months before their licence expires and will be expected to re-apply for their licence. The Agency will endeavour to give six years notice if a licence is not to be renewed or renewed on more restrictive terms, which could impact significantly on the use of that licence. Further details on time limits are available in *'Managing Water Abstraction'*.

5.2.7. Efficient water use

The Agency encourages the efficient use of water by abstractors and their customers. This is particularly important during drought periods when water resources are limited and when the water environment may be under stress. The Agency will continue to promote water saving methods to abstractors and look for opportunities to work in partnership with outside organisations to promote efficiency (for example *'Waterwise on the Farm'* leaflet).

5.3. Water resource management unit – 1 (Teme catchment) ('Water Available' and 'No Water Available')

5.3.1. Resource availability status and results of the sustainability appraisal

12 of the 15 Assessment Points in the Teme catchment are assessed as having *'Water Available'*. The resource status changes to *'No Water Available'* for the Clun, the Corve and the Laughern Brook.

However, as has already been mentioned, the *Severn Corridor CAMS* (published June 2003), which determined our strategy for the River Severn, established that water below the confluence with the River Worfe, (upstream of the River Teme confluence with the River Severn) may only be available at higher flows (without 'hands-off' Flow restrictions). As a result the resource status of the whole of the River Teme catchment has been overridden to 'No Water Available' due to the downstream requirements on the River Severn.

This means that there is a need to override the status of the contributing catchments. There is a further requirement on the Agency to protect the designated and non-designated conservation sites.

5.3.2. Guidance on the assessment of new applications

In addition to the licensing strategy for this catchment, any application for a new or increased abstraction licence has to be determined by the Agency in accordance with a nationally agreed procedure. Details of this procedure can be found in the publication '*Managing Water Abstraction*'.

5.4. Opportunities for licence trading in the Teme 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 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).

5.5. The Water Act 2003

Following the first major review of the abstraction licensing system since its inception in 1963, the Government, in 1999, set out a new framework for managing water resources. The CAMS process and 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 Agency's web-site www.environment-agency.gov.uk. The Agency web site will be updated to provide information as the Water Act is implemented.

Future Developments in the CAMS Area

Water level management plans

English Nature and the Agency have agreed that the CAMS for the Teme will replace the Water Level Management Plan for the Teme SSSI. Discussions are underway to ensure that any issues raised by the Water Level Management Plan will be addressed either within the CAMS or other relevant documents.

Post-CAMS appraisal

The Agency will start reviewing the Teme CAMS in three years time and a further document will be produced in 2010. The success of the implementation of this CAMS will be assessed using the following indicators:

- The resource availability status of the Teme CAMS area will not have been compromised by the implementation of the licensing strategy given in the CAMS.
- We have treated all licence applications in a fair, open and consistent manner and encouraged sustainability.
- There is no recorded damage to any designated or non-designated sites of conservation interest as a result of abstraction.
- We have promoted the efficient use of water.
- We continue to protect salmonid habitats.
- We will examine the requirement for local restrictions on licences in the upper reaches and also those issued upstream of the River Onny confluence on the Teme itself.
- Existing licence holders with winter restrictions will be varied over the next CAMS cycle.



Clun castle

Glossary

Abstracted Flow

Hydrograph representation of flow removed from river or the ground by abstraction

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. Most individual abstraction records are reported to the Environment Agency each year

Abstraction Charges

The charges payable on an annual basis to the Environment Agency under the terms of an abstraction licence

Abstraction Impact

The effect of abstractions taken directly from a body of water

Abstraction Licence

The authorisation granted by the Environment Agency to allow the removal of water

Aquifer

A geological formation that can store and transmit groundwater in significant quantities

Artificial Impacts

Combined impacts of abstraction and discharge on flows at the assessment point

Artificial Influences

Catchment activities such as surface water abstractions, effluent returns and groundwater abstractions which, individually or 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 a catchment at which an assessment of available resources is made. APs are located at the extremities of identified reaches and Water Resource Management Units

Augmentation (River)

To increase flow

Authorisation Policy Statements

The Environment Agency's standard operating procedures that create a consistent national approach to the implementation of legislation and Agency policies

Baseflow

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

Candidate Special Area of Conservation (cSAC)

A candidate Special Area of Conservation classified under the EC Habitats Directive and agreed with the EU to contribute to biodiversity by maintaining and restoring habitats and species. It will eventually become a SAC

Catchment

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

Cessation Condition

A condition on a licence that requires the licence-holder to immediately stop abstracting when a pre-determined flow or water level is reached, in order to prevent environmental damage

Compensation Flow

Water released from reservoirs in order to maintain a certain flow or level further downstream of the 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 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/Consumptiveness

Use of water where a significant proportion is not returned, either directly or indirectly, to the source of supply after use, e.g. water evaporated, used by nature or transferred elsewhere

Cubic Metre (m³)

Equivalent to 219.969 gallons or 1,000 litres

Demand

The amount of water required for use

Demand Management

The implementation of policies or measures which are used to control or influence the consumption or waste of water

Designated Water Dependent Sites

Nationally or internationally important (habitat) sites that have been legally recognised, which could be affected by water management or water quality issues

Direct Discharge (Groundwater)

The direct release into groundwater, via a sealed pipe or other direct means, of any List I or List II substance (as listed in the Groundwater Directive)

Direct Discharge (Surface Water)

The direct release into any surface waters, via a sealed pipe or other direct means, of any substance (trade effluents, sewage effluents, etc) other than uncontaminated rainwater run-off

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 effluent into controlled waters

Drift Deposit

A loose deposit of sand, gravel, clay, etc on top of solid rock

Drought

A general term covering prolonged periods of below average rainfall resulting in low river flows and/or low recharge to groundwater, imposing significant strain on water resources and potentially the environment

Drought Order

Water Companies and/or the Environment Agency apply to the Secretary of State for the imposition of restrictions in the uses of water

Dry Weather Flow (DWF)

This can be thought of as the average flow in the driest week in the average summer

EC Directive

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

Ecological River Flow Objectives/Level Requirements

The minimum river flows (or water levels) required to protect ecological objectives

Effective Rainfall

Rainfall which is used for recharge of aquifers or to support river flows after 'losses' due to evaporation and take-up by plants

Effluent

Liquid waste from industrial, agricultural or sewage plants

Effluent Return

See discharge

Environmental Allocation

The amount of water that is required to support the ecology of a river

Environmental Impact

The total effect of any operation on the environment

Environmental Weighting

An assessment of a river's sensitivity to abstraction based on physical characteristics, fisheries, plant life and invertebrates. It is specifically used in the CAMS RAM

Environmentally Sensitive Area (ESA)

An area where the landscape, wildlife and historic interest are of national importance

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)

EU Wild Birds Directive (1979)

Implemented through the Habitats Directive. A network of sites has been established to protect important and threatened species

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

Fauna

Animal population of a particular area or epoch

Flood plain

Land adjacent to a watercourse that is subject to flooding

Flora

Plant population of a particular area or epoch

Flow Duration Curve

A graph showing the plot of flow versus exceedance value. Thus Q95 (the natural river flow that is exceeded 95% of the time) will be a low rate of flow, and Q5 (the natural river flow which is only exceeded 5% of the time) will be a high rate of flow

Gauged Flow Records

Records of flow in a river as conventionally measured. They reflect natural runoff from the catchment and artificial influences (abstraction, discharge, etc) that occur upstream of the measurement point

Gauging Station

A site where the flow of a river is measured

General Quality Assessment (GOA)

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

The contribution that groundwater makes to the flow of rivers. It maintains the flow of rivers during extended periods of dry weather

Groundwater Catchment

The area from which groundwater will collect and flow to a specific river or over a specific 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

Habitat

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

Habitats Directive

A European directive on Conservation of Natural Habitats and of Wild Flora and Fauna. The Directive is implemented in the UK by the Conservation (Natural Habitats & c.) Regulations 1994 – commonly known as the ‘Habitats Regulations’. The Directive created of a network of protected areas across the European Union known as ‘Natura 2000’ sites

Hands-Off Flow (HOF)

A condition attached to an abstraction licence which states that if flow (in the river) falls below the level specified on the licence, the abstractor will be required to reduce or stop the abstraction

Hands-Off Level

A river flow level below which an abstractor is required to reduce or stop abstraction

Hydrogeology

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

Hydrograph

A graph showing the plot of flow or level versus time

Hydrology

The study of the earth's water, in particular of water under and on the ground before it reaches the ocean or before it evaporates

Hydrometric Network

Networks of sites monitoring rainfall, river flow and other water levels. The data collected is used for water resources management and planning, water quality, ecological protection and improvement, flood defence design and flood warning

Hydrometry

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

Hydropower

The production of electricity by the force of fast moving water, usually by using turbines, water wheels, etc

Impounding Reservoir

A reservoir created by damming a natural watercourse

Impoundment

An artificial body of water or wastewater such as a pond or dam for collection or storage of water for future use

Integrated River Basin Management

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

Internal Drainage Board (IDB)

A local land drainage authority with powers to raise finance and do works

Irrigation

The artificial distribution and application of water through man made systems in order to stimulate crop growth

Land Drainage

Actions taken to reduce waterlogging of land and to minimise flood risk

Leakage

Water lost from a supply network between the point of supply and point of demand

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 an 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 Environment Agency on what terms to grant or refuse a licence application, by reference to regulatory powers and duties

Licence of Right

A license that was introduced by the 1963 Water Resources Act in order to regulate abstractions. It is restricted mainly by the quantity of water authorised by abstraction. This type of license is no longer issued

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

Licensing Methodology

Procedure to aid licence determination

Local Environment Agency Plan (LEAP)

Previously known as Catchment Management Plan. This was the process by which the Agency responded to environmental issues in a catchment. They have now been replaced by the Focus newsletter, which concentrates on the local environment to highlight work carried out within the area

Low Flow

It is usually determined at a given value of 'Q95', which means that flow falls below this level 5% of the time

Low Flows 2000

A software package which originated from CEH, which can be used to generate low flow statistics for a catchment

Main River

The watercourse shown on the statutory 'Main River Maps' held by the Agency and DEFRA. The Agency has permissive powers to carry out works of maintenance and improvements on these rivers

Maintained Flow

The flow on a regulated river that is maintained by groundwater pumping, reservoir releases or inter-basin transfer

Managing Water Abstraction

Document produced in May 2001 about the CAMS process. It was updated in July 2002

Mean Flow

A long term average of the daily flow

Minimum Acceptable Flow

The minimum acceptable flow of an inland watercourse as defined in Section 21 of the Water Resources Act 1991

Minimum Maintained Flow

Statutory flow rate which must be maintained in regulated rivers

Minimum Residual Flow

The flow set at a river gauging station to protect downstream uses. When flow falls below this level controlled abstractions are required to cease

Natura 2000

The Habitats Directive established and protects a network of designated sites of the most important areas for wildlife across Europe. It consists of SPAs to protect bird species and SACs for the protection of habitats

Natural Flow Regime

The river flow pattern with no abstraction from or discharge in to the catchment

Natural Flows

The flows which would exist in the absence of any artificial impacts

Naturalisation

Process of converting gauged flows into natural flows by removing consumptive abstraction and discharge impacts. (This is detailed in 'Good Practice for Flow Naturalisation by Decomposition')

Non-Consumptive

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

NRA

National Rivers Authority (now incorporated within the UK Environment Agency)

OFWAT

Office of Water Services

Peak Flow

The maximum flow recorded during a high flow event

Permeability

The capacity of soil or porous rock to transmit water

Pool

A distinct natural feature of deeper water. In dry-weather conditions, there is no perceptible downstream flow

Prescribed Flow

A generic term for any flow set down as a rule or guide to be followed 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 company

Pumped Storage Reservoir

This is a reservoir that stores surface water from a nearby river using a pumping plant as the main source of water supply

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, which was ratified by the UK Government in 1976

Reach

A length of river

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

Regime (Flow)

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

Regulated River

A river where the flow is augmented through the addition of water from another source

Residual Flow

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

Restoring Sustainable Abstraction Programme (RSAP)

The programme for resolving environmental problems caused by unsustainable abstraction in certain catchments

Return Period

The chance of the river level being higher than a stated value in any one year e.g. 1% probability in any year = 1:100 year flood (once in one hundred number of years)

Revocation

The cancellation of a licence and all associated rights and benefits

Rio Earth Summit, 1992

The United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro. It was the largest ever gathering of world leaders (over 150 Heads of Government). At this conference 153 countries signed the Convention on Biological Diversity

River

An open channel of fresh water flowing along a definite course, usually towards the sea, which is fed by tributaries

River Corridor

The continuous area of river, riverbanks and immediately adjacent land alongside a river and its tributaries

River Flow Objectives (RFOs)

The minimum river outflows required to protect ecological objectives within the area. It also considers effluent dilution requirements, navigation and other in-river needs

River Quality Objective (RQOs)

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

Family of fish (salmonidae) which includes many commercially farmed species such as the Salmon, Trout and Char

Saturated Zone

The zone in which the voids in a rock or soil are filled with water at a pressure greater than atmospheric

Scenario Abstraction and Discharge Impacts

The amount by which all the abstractions in the area reduce natural outflows, 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 flow at a given assessment point based on a defined abstraction and discharge rate

Site of Special Scientific Interest (SSSI)

An area given a statutory designation by English Nature or the Countryside Council for Wales because of its nature conservation value

Source of Supply

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

Special Area of Conservation (SAC)

An area classified under the EC Habitats Directive and agreed with the EU to contribute to biodiversity by maintaining and restoring habitats and species

Special Protection Area (SPA)

An area classified under the EC Birds Directive to provide protection to birds, their nests, eggs and habitats

Specified or Illustrative Year

The year chosen to depict flows, flow objectives and licensable resources

Spray Irrigation

Abstracted water sprayed onto grassland, fruit, vegetables, etc. During the summer period it has a high impact on water resources

Springs

These occur where the water table intersects the ground's surface

Surface Water

This is a general term used to describe all 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

Sustainable Management

The interpretation of the principles of sustainable development at a local or regional level within the boundaries of national and international political, economic and environmental decision making

Telemetry

A means of collecting information by unmanned monitoring stations (often river flows or rainfall) using a computer that is connected to the public telephone system

Threshold

A Hands Off Flow (HOF) value within a sequence of HOFs, each individual MI/d higher than the previous

Time Limited Licence

Licence with specified end date

Total Licensable Resource

This is equivalent to 'acceptable abstraction impacts' i.e. The abstraction impacts which are considered acceptable given the target outflows. It is likely to vary with reference to the assessment point and time frame (e.g. season)

Total Rainfall

Precipitation as measured by a raingauge

Treatment Works (also Waste Water Treatment Works)

Sewage Treatment Works or Water Treatment Works

Trickle Irrigation

The irrigation of crops by taking water direct to the plant roots, 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 in order to incorporate and integrate a range of activities. The 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 Management Unit

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

Water Resource(s)

The supply of groundwater and surface water in a given area

Water Resources Strategies (The)

Strategy for Water Resource planning in England and Wales over the next 25 years which will 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

Water Table

Level below which the ground is saturated with water. May vary with rainfall and pumping of boreholes

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

Year Drought/Flood 1:10

A drought or flood event with a statistical probability of occurring once in a ten year period (other periods may be specified in a similar way). See Return Period

List of Abbreviations

ADF

Average Daily Flow.

AMP

Asset Management Plan produced by the Water Companies for OFWAT. It sets out the investment programme by the water industry.

AOD (also mAOD)

Above Ordnance Datum: Land levels are measured relative to the average sea level at Newlyn in Cornwall. This average level is referred to as "Ordnance Datum". Contours on Ordnance Survey maps of the UK show heights above AOD in metres, hence mAOD.

AONB

Area of Outstanding Natural Beauty.

AP

Assessment Point.

BAP

Biodiversity Action Plan.

BW

British Waterways.

CAMS

Catchment Abstraction Management Strategy.

CBD

Convention on Biological Diversity.

CCW

Countryside Council for Wales.

CEH

Centre for Ecology & Hydrology and incorporates the former Institute of Hydrology (IoH).

cSAC

Candidate Special Area of Conservation.

cSPA

Candidate Special Protection Area.

DEFRA

Department of the Environment, Food and Rural Affairs (succeeds former DETR and MAFF).

EIA

Environmental Impact Assessment.

EU

European Union.

FDC

Flow Duration Curve.

GIS

Geographical Information Systems.

GQA

General Quality Assessment.

GWABS

Groundwater Abstraction.

GWDIS

Groundwater Discharges.

HOF

Hands off Flow.

Km

Kilometres.

Km²

Square kilometres.

LEAP

Local Environment Agency Plan.

m³/s

Cubic metres per second.

MAF

Minimum Acceptable Flow.

mAOD

Metres above Ordnance Datum (mean sea level at Newlyn Cornwall 1915 – 1921).

MI, MI/d, MI/day

MI = megalitres = 1,000,000 litres = 1,000 cubic metres = 1,000m³ = 220,000 gallons.

MI/d = MI/day = MI per day, = thousand cubic metres per day (tcmd).

MI/a

MI/a = Megalitres per year.

mm

Millimetres.

MMF

Minimum Maintained Flow.

MRF

Minimum Residual Flow.

NGWCLC

National Groundwater and Contaminated Land Centre.

NRA

National Rivers Authority (now incorporated within the UK Environment Agency).

OFWAT

Office of Water Services.

PF

Prescribed Flow.

PWS

Public Water Supply.

Q50

Flow exceeded 50% of the time period considered.

Q95

Flow exceeded 95% of the time period considered.

R&D

Research and development.

RFO

River Flow Objectives.

RQO

River Quality Objective.

s

Aquifer storage.

SAC

Special Area of Conservation.

SPA

Special Protection Area.

SSSI

Site of Special Scientific Interest.

SW

Surface water.

SWABS

Surface Water Abstraction.

SWALP

Surface Water Abstraction Licensing Procedure.

SWDIS

Surface Water Discharges.

UWWTD

Urban Waste Water Treatment Directive.

WRC

Water Research Centre.

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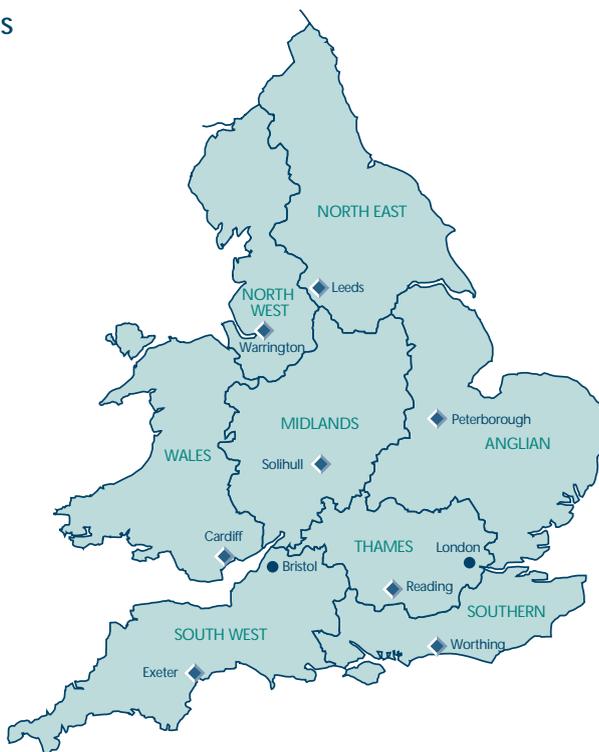
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