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Fal and St Austell Streams Catchment Abstraction Management Strategy

July 2005



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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.

Published by:

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Catchment Abstraction Management Strategy

1

Introduction

Vision for the CAMS area.
A shared strategy for the sustainable management of water resources within the Fal and St Austell Streams catchment

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

This Fal and St Austell Streams consultation document establishes how much water is available in the catchments under consideration. It outlines the Environment Agency's proposed options for defining the future local abstraction policy. The Fal and St Austell Streams CAMS is the third to be produced in the Cornwall area.

This document seeks your views on the future licensing strategy for this CAMS area.

A technical document (consultation version) for the Fal and St Austell Streams 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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Argal Reservoir

Consultation on the Fal and St Austell Streams 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 2004. 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.

A stakeholder group has been set up for the Fal and St Austell Streams 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 Fal and St Austell Streams CAMS stakeholder group and the interests they represent are as follows:

Name	Interest represented
Mark Williams	Chairman
Mandy Gore	Extractive Industries
Neil Whiter	Water Companies
Robert Foote	Recreation and Farming
Jeremy Best	Fruit Farming
Gerald Wright	Wildlife and Rod Fishing
Toby Russell	Agricultural Organisations
Kate Stokes	Water Wildlife
Beth Tonkin	English Nature
Simon Leather	Riparian Owners
Sam Groom	Tourism

The Agency would like to thank the stakeholder group for their involvement.

We consult with a diverse stakeholder group with different perspectives on how best to manage the rivers to help develop our future policy. They provide us with local information and issues that inform our assessment. However the outcome of that assessment and the status placed on individual management units is determined by the Agency. The stakeholder group is not asked to approve these conclusions and consequently we appreciate that the outcome may not be reflective of their views.

This document is the formal part of the Fal and St Austell Streams CAMS consultation process and provides the opportunity for all interested parties to comment on the strategy that is being proposed.

Responses should be sent, in writing to:
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The closing date for the responses is 30/09/05. Please ensure that you include, where appropriate the reference to the element of the proposed strategy that you are addressing.

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.

The CAMS area

The Fal and St Austell Streams CAMS area extends over a total area of approximately 860km². The area covers all of the Cornish peninsula draining to the English Channel, from Par in the East to the Lizard in the West. The coastline is indented with extensive estuaries and creeks. The A30 road marks the Northerly limit for much of the area from Innis Downs to just short of Redruth.

Three large urban areas are located within this CAMS area: St Austell, Truro and Falmouth/Penryn. There are many smaller settlements throughout the area.

There are major areas of china clay workings both historical and on going in the East of the unit around St Austell and widespread evidence of historical mining predominantly around the River Carnon catchment. Much of the unit, however, remains rural in character and agriculture makes an important contribution to the economy. Tourism is also very important with popular beaches along the coastline and major attractions such as The Eden Project, Heligan Gardens and the National Maritime Museum within the CAMS area.

Figure 1 illustrates an outline of the CAMS area.



Bissoe Gauging Station

3.1 Hydrology and Hydrogeology

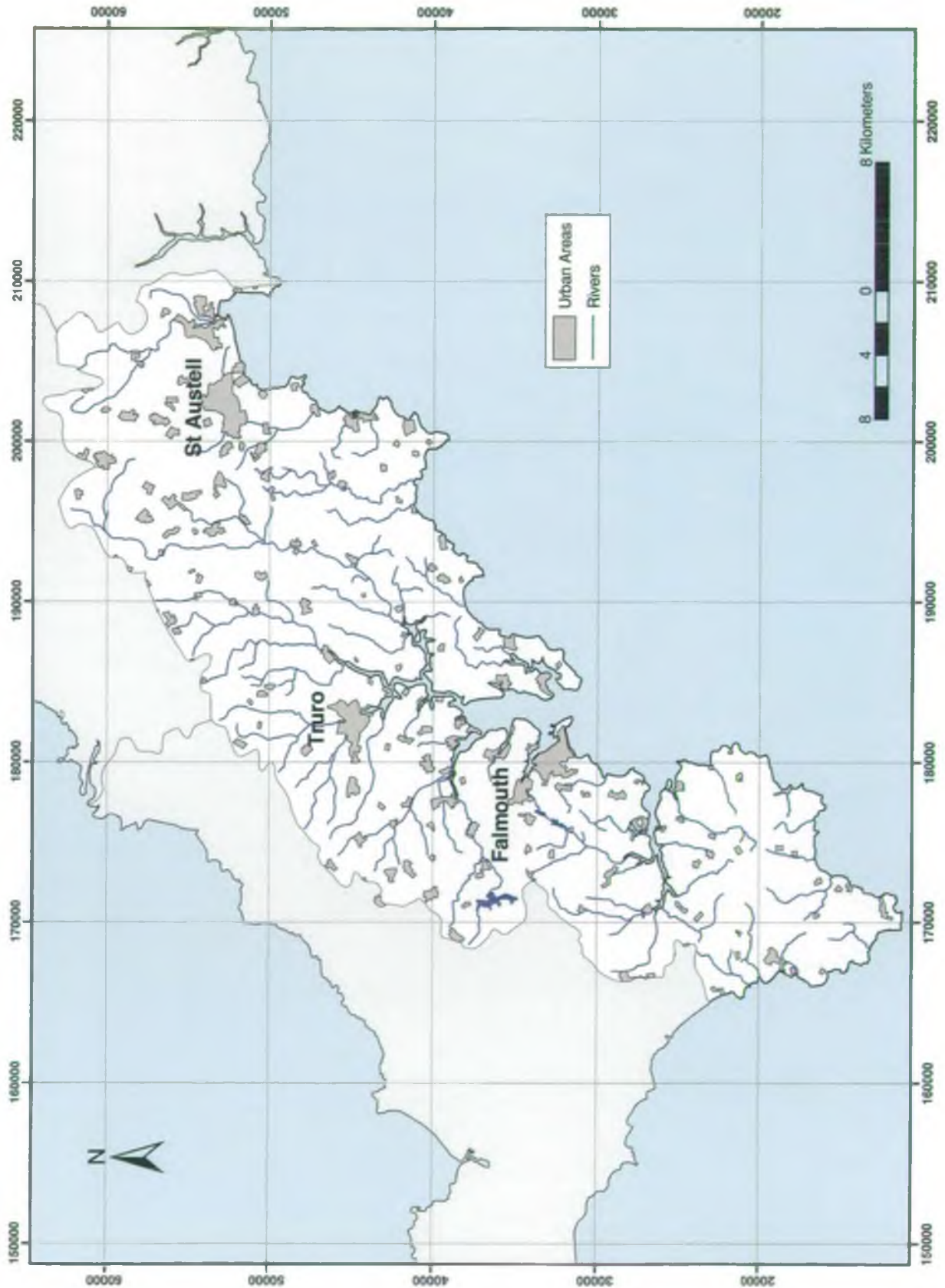
The Fal and St Austell Streams CAMS area forms part of the coastline of Britain that represents landfall for the dominant westerly maritime airflow. As the associated frontal systems cross the area they interact with the higher ground inland giving an orographic effect. This results in relatively high rainfall totals compared to the rest of the UK and a pronounced gradient in rainfall totals between the coast and hinterland. Much of the CAMS area consists of low or impermeable rocks with steep topography. Consequently the high rainfall and geology interact to give a “flashy” hydrological regime with a quick time to peak and a relatively sharp recession limb. A lack of significant groundwater reserves gives a low baseflow index and can result in naturally low flows during periods of low rainfall.

The major rivers of the Fal and St Austell Streams CAMS area are the River Fal, St Austell River, Par River, River Kenwyn, River Allen and Helford River. There are a number of other smaller tributaries and coastal streams; those assessed for CAMS were Caerhays Stream, Tresillian River, River Carnon, River Kennal, Argal Stream and Manaccan River.

In the east of the CAMS area river flows have been significantly impacted by the china clay industry in the River Fal, Par River and St Austell River catchments. Elsewhere the Carnon River catchment has a higher than expected groundwater component. This results from historical metalliferous mining and associated drainage adit systems. In the western part of the area flows below Stithians and College-Argal reservoirs in the River Kennal and Argal Stream catchments are impacted by these public water supply installations. River flow downstream of the sewage treatment works scattered throughout the area can also be modified. However, away from the named catchments above much of the area is rural, and exhibits largely natural, unmodified hydrology.

Figure 2 shows the solid geology of the CAMS area

Figure 1 | CAMS area overview



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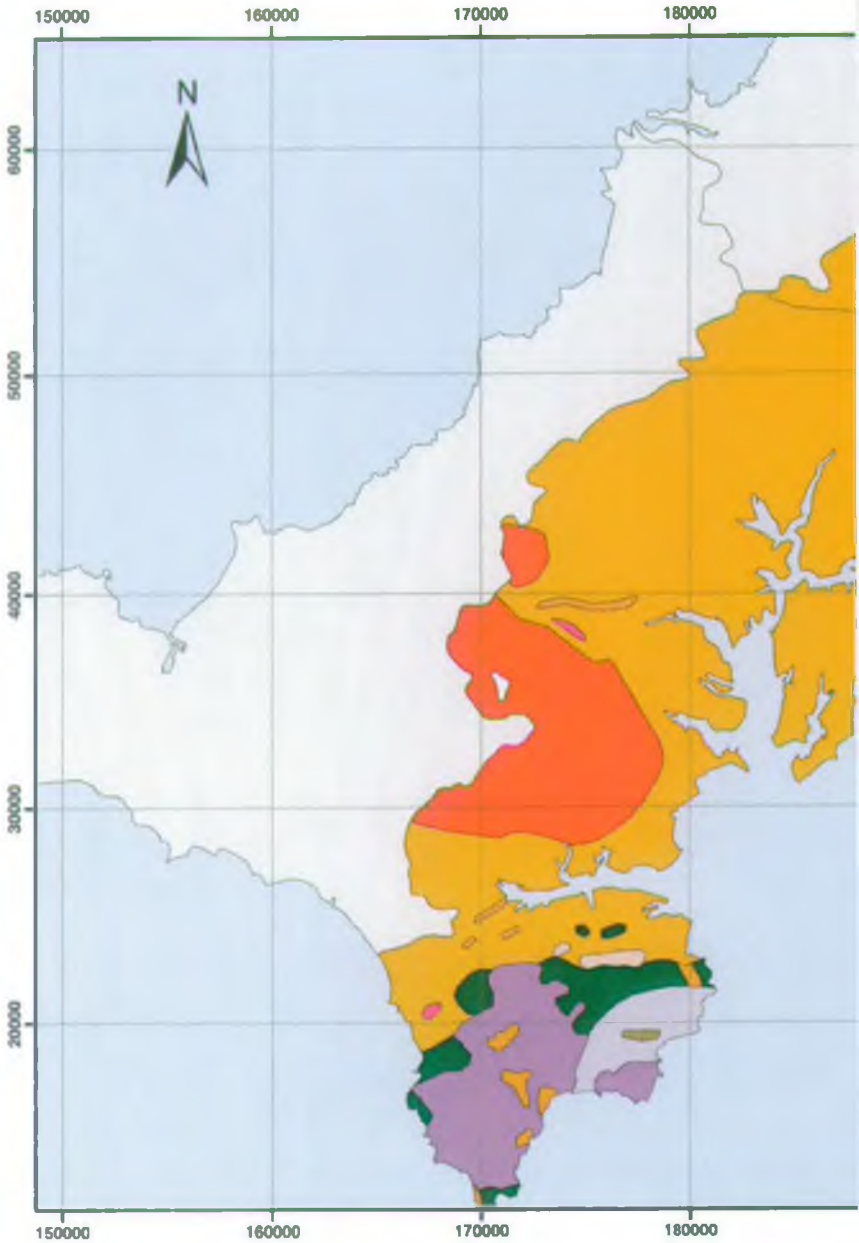
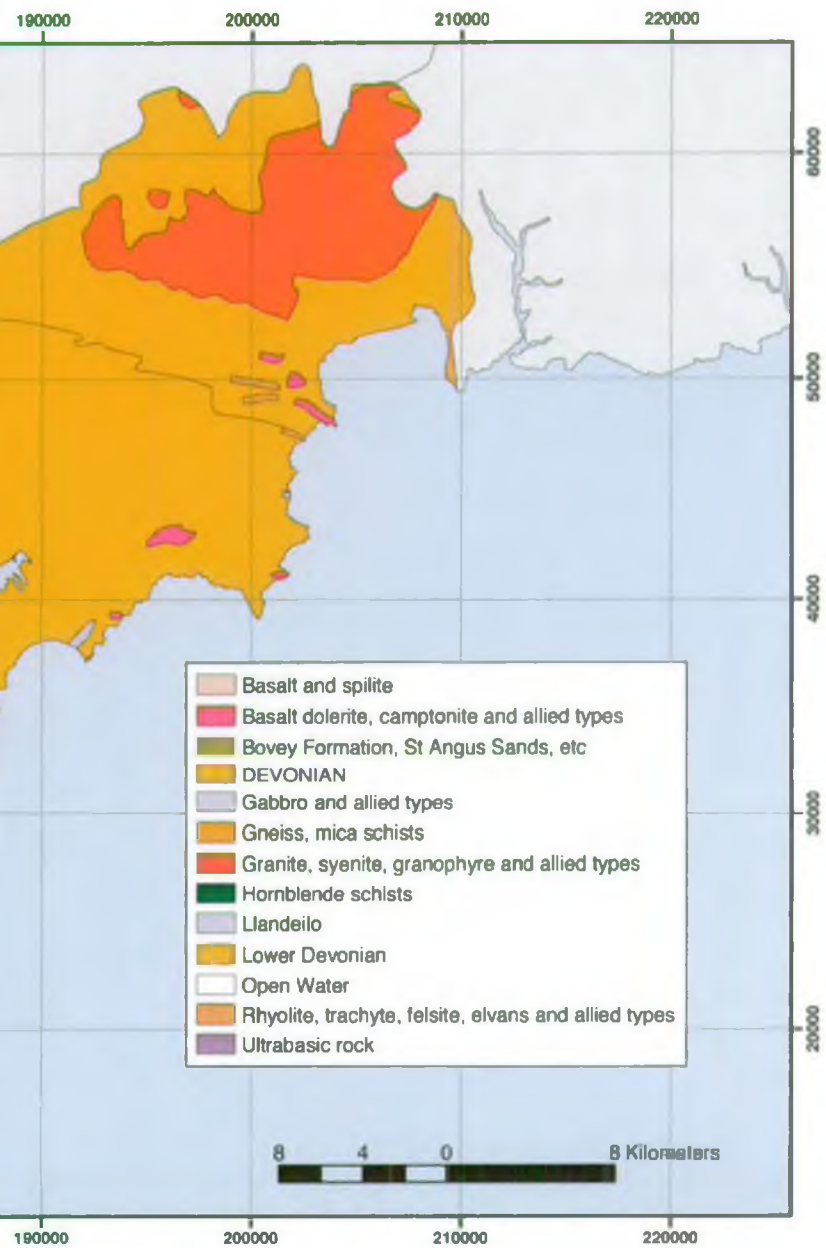


Figure 2 Simplified Solid geology of the CAMS area



3.2 Hydrometry

Flow data from five permanent gauging stations and two temporary logger sites used in the Fal and St Austell Streams CAMS hydrological assessment. Tregony gauging station is situated near the bottom of the River Fal catchment and therefore recorded the collective impact of the china clay (and other) abstractions upstream. In a similar fashion the gauging stations at Bissoe and Devoran Bridge (now closed) located in the Carnon catchment were heavily impacted by abandoned mine drainage. The gauging station at Ponsanooth is situated below Stithians Reservoir and the associated Kennal Vale pumping station.

In addition to these continuous flow monitoring sites, we initiated a programme of spot flow gaugings at two sites. This data was used to quality control the hydrological modelling. At two of these sites, the closed Molingey Gauging Station and Manaccan River spot flow gaugings were undertaken. Continued monitoring at these two sites and at Trenowth flood warning station will see additional continuous flow data available for the next CAMS cycle.

There are currently nine daily and five tipping bucket rain gauges located throughout the Fal and St Austell Streams CAMS area.

Figure 3 indicates the location of hydrometric sites within the CAMS area.

3.3 Abstraction and Discharges

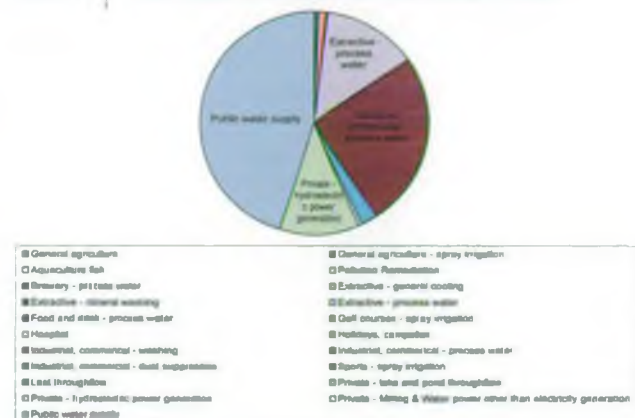
As a result of the Water Act 2003 abstractions of 20 m³d⁻¹ and below no longer require a licence from 31 March 2005. Only abstractions that in aggregate exceed 20 m³d⁻¹ need to be covered by an abstraction licence. Consequently only the licences over 20 m³d⁻¹ were considered in the CAMS hydrological assessment. There were 38 licensed surface water and 58 licensed groundwater abstractions over 20 m³d⁻¹ in the Fal and St Austell Streams CAMS area. Given that licences can cover abstraction from multiple sources or for multiple purposes a total of 98 purposes are covered.

Figure 4 shows the geographical location of abstraction licences over 20 m³d⁻¹.

Of the 98 abstraction purposes in the Fal and St Austell Streams CAMS area, only 61 have an impact on the assessment rivers. The other abstractions lie in hydrologically discrete catchments, and therefore the subsequent discussion is centred on the 61 that are relevant.

Chart 1 shows that three abstractions for public water supply at Stithians Reservoir, College and Argal Reservoirs and Kennal Vale intake are the most significant by volume, representing 44.6% of the licensed total. Stithians Reservoir can be used in tandem with the Cornwall Spine Main to supply the Falmouth, Truro, Redruth and Lizard areas. The associated pumping

Chart 1 Percentage of licensed abstractions by volume



station at Kennal Vale can be used to assist winter refill of the Stithians Reservoir if required. The Cornwall Spine Main distributes water abstracted from the River Fowey at Restormel, in the Seaton, Looe and Fowey CAMS area. Local demand from the Falmouth area can be met from the College and Argal Reservoir abstraction. Public water supply abstractions are completely consumptive to the catchment area immediately below the abstraction. However, some water may be returned at some other point in the catchment via sewage treatment works (STWs).

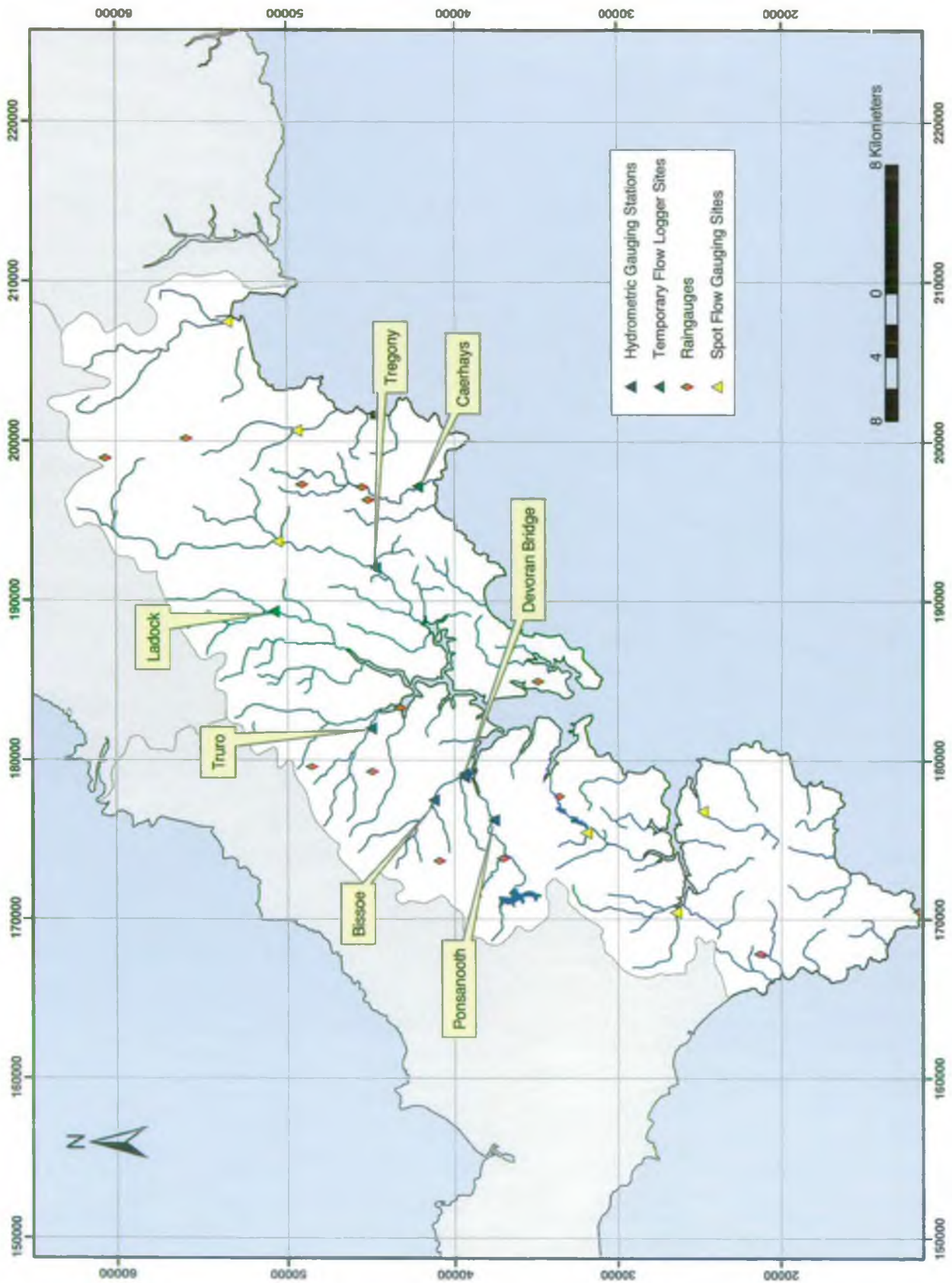
Next most significant are three abstractions associated with industrial and commercial processing at 25.1% of total licensed volume. Twelve abstractions associated with extractive industry processing, cooling and mineral washing make up a further 13.1%. The exact consumptivity of these abstractions is variable, depending upon the specific application and in the case of the china clay abstractions, whether water is transferred cross-catchment. There are a number of other consumptive licences such as those for agriculture and spray irrigation purposes that represent a small proportion of total licensed volume. In all, consumptive abstractions including public water supply make up 85% of total licensed volume.

The remaining 15% of licensed volume is made up of purposes that can be described as non-consumptive. This includes the 13 licences for aquaculture, hydroelectric and leat and pond throughflow. Such licences are described as non-consumptive as water is discharged to the watercourse in close vicinity to the abstraction point. There is no water resources impact at the Water Resources Management Unit (WRMU) scale.

There are a number of discharge consents held by the water company. These are permits to discharge water associated with sewage treatment works. In addition there are several consented discharges associated with the china clay and mineral industries together with other discharges from hotels, fisheries and other trade premises. As might be expected in such a rural area there are a number of other smaller discharges from private dwellings and buildings.

Figure 5 shows the consented discharges over 20 m³d⁻¹ in the Fal and St Austell Streams CAMS area.

Figure 3 | Location of hydrometric sites within the CAMS area.



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Figure 4 Geographical location of abstraction licences over 20 m³d⁻¹.

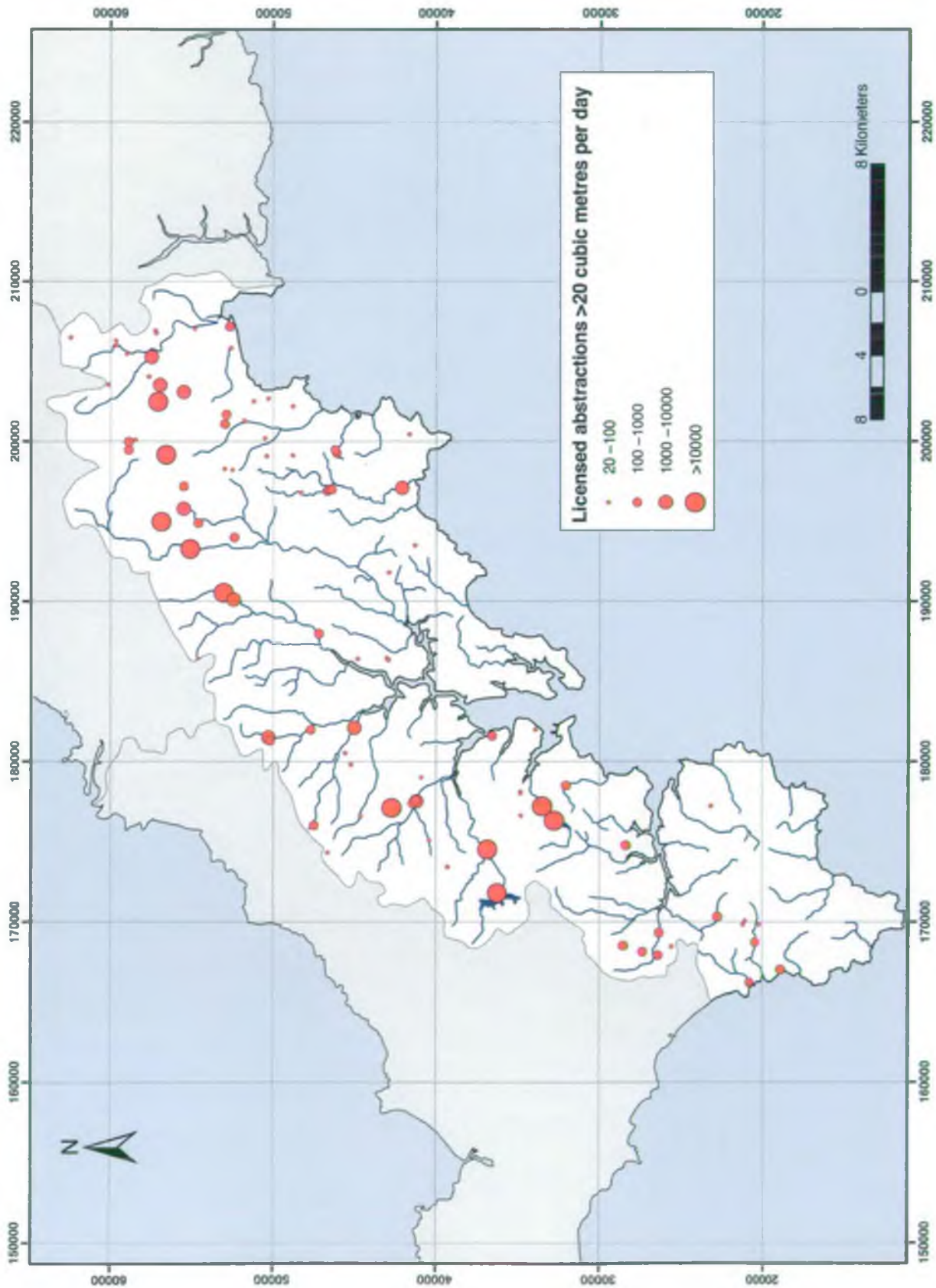
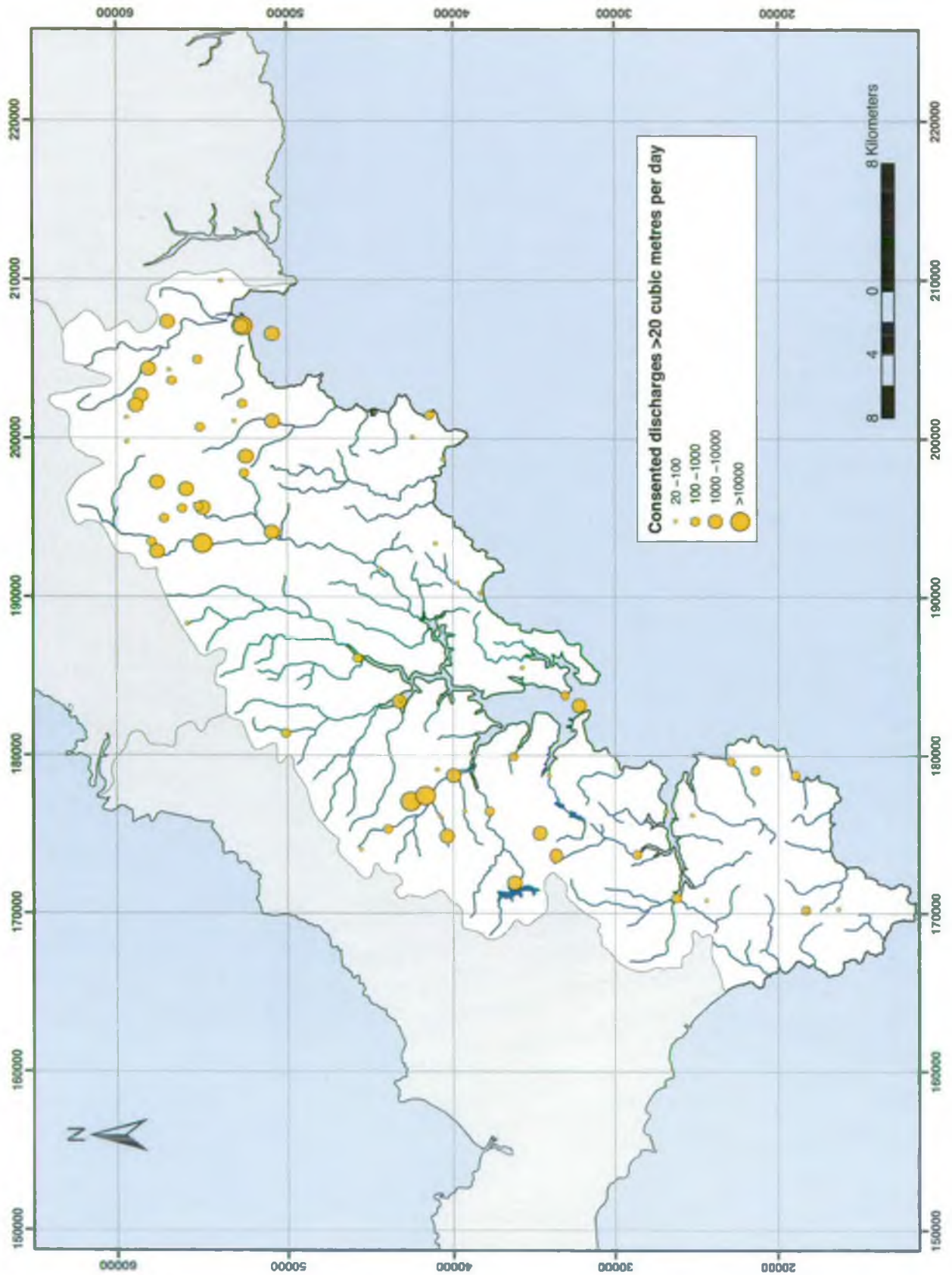


Figure 5 | Consented discharges



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3.4 Water Dependent Designated Sites

Water has been fundamental in shaping the landscape and determining natural vegetation patterns. Human activities including farming and industry have resulted in changes to the natural drainage systems.

These changes in land use have been superimposed on the original natural patterns. The resulting combination of natural, semi natural and managed land combines to create a landscape of variety and quality, many areas of which are covered by landscape and conservation designations. The remaining undesignated areas within this CAMS are still predominantly rural and have high landscape quality.

There are three types of designated sites showing varying extents of water dependency within this CAMS area. They are:

Special Areas of Conservation (SACs)

- areas classified under the European Directive on the Conservation of Natural Habitats and of Wild Flora and Fauna (known as the Habitats Directive) covering a wide range of habitats and species.

Sites of Special Scientific Interest (SSSIs)

- sites of national conservation importance. Those meeting the criteria as set out in the Habitats Directive may also be designated SACs. SSSIs are designated because of their ecological, physiogeographical or geological characteristics and are protected by the Wildlife and Countryside Act 1981 and Countryside and Rights of Way (CROW) Act 2000.

County Wildlife Sites (CWS)

- local designations for sites of high ecological importance.

Designated Sites within the Fal and St Austell Streams CAMS area with significant areas of freshwater dependency are described below. Other designated sites including the Fal and Helford SAC have not been assessed as the CAMS process looks only at the effect of abstraction on habitats above the tidal limit.

Breney Common and Goss and Tregoss Moors SAC

(Also designated separately as Goss and Tregoss Moors SSSI and Breney Common SSSI).

The Goss and Tregoss Moors sites exhibit a mosaic of dry and wet heathland, acid grassland, bog, swamp, fen and inundation communities, open water and

dense willow. Areas with poor drainage support wet heath vegetation and Purple Moor Grass *Molinia caerulea*, Cross-leaved Heath *Erica tetralix*, Early Marsh Orchid *Dactylorhiza incarnata* and Lesser Butterfly Orchid *Plantanthera bifolia*. Wet heath merges into bog moss Sphagnum species-dominated bog vegetation. Of note is the presence of Yellow Centaury *Cicendia filiformis*, Marsh Club-moss *Lycopodiella inumdatum* and Pillwort *Pilularia globulifera* all nationally scarce species. There are numerous ponds that support the nationally scarce Cornish Moneywort *Sibthorpia europaea* and Wavy-leaved St. John's-Wort *Hypericum undulatum*. Areas of extensive willow carr support the uncommon lichen *Usnea articulata*. These sites also support 16 breeding species of Odonata including large populations of the Small Red Damselfly *Ceriagrion tenellum* and the variable damselfly *Coenagrion pulchellum* both nationally scarce species. Over 100 species of lepidoptera have been recorded, and other rare invertebrates include beetles and the Bog Bush-cricket *Metrioptera brachyptera*. Fifty-eight bird species are known to nest in this area.

Former tin streaming activity at the Breney Common site has resulted in a diverse wetland including extensive willow carr and a series of ponds. There is also a large area of wet heath with acid bog communities. Numerous streams drain across the site. Of note among the fern species are large stands of Royal Fern *Osmunda regalis* and Narrow Buckler Fern *Dryopteris carthusiana*, which are scarce in Southern Britain. More open areas support typical bog species together with notable local rarities such as Bottle Sedge *Carex rostrata* and Marsh Cinquefoil *Potentilla palustris* and the nationally rare Ivy-leaved Bellflower *Wahlenbergia Lederacea*. The wet heath contains Cross-leaved Heath *Erica tetralix*, the bog mosses *Sphagnum spp*, Bog Asphodel *Narthecium ossifragum* and large populations of Heath Spotted-orchid *Dactylorhiza maculata*.

The ponds show a range of successional stages from open water to bogs formed by siltation. Of note in the acid bog pools are the nationally rare Pillwort *Pilularia globulifera* and Western Bladderwort *Utricularia minor*. Thirteen species of Odonata occur here including Four-spotted Libellula *Libellula quadrimaculata*, Emperor Dragonfly *Anax imperator*, Black Sympetrum *Sympetrum danae* and the nationally rare Small Red Damselfly *Ceriagrion tenellum*. Notable butterflies include the Pearl-bordered Fritillary *Boloria euphrosyne* and Marsh Fritillary *Euphydryas aurinia*. Three rare moth species breed here: Double Line *Mythimna turca*, Silver Hook *Eustrotia uncula* and Double Kidney *Ipimorpha retusa*. Also found is a very rare and threatened Mollusc *Lymnaea glabra*.

Carrine Common SAC

(also designated as Carrine Common and Penwethers SSSI)

Both dry and wet heaths are present within this SAC. The site supports a variety of wetland habitat types including fen-type meadows, wet-heath bog and mire communities. The wet areas are dominated by Purple Moor-grass *Molinia caerulea* and the rich wetland flora also includes Dorset Heath *Erica ciliaris*, Bog Asphodel *Narthecium ossifragum*, Bog Pimpernel *Anagallis tenella* and Royal Fern *Osmunda Regalis*, which is locally abundant.

The Lizard SAC

(Includes Goonhilly Downs SSSI, West Lizard SSSI and East Lizard Heathlands SSSI)

In total this SAC covers over 3257 hectares. A large proportion is defined as water dependent. The area supports a nationally unique series of oligo-mesotrophic (nutrient poor) water bodies that feature stoneworts (Chara species) typical of calcareous lakes. Stoneworts present include three Red Data Book species: Baltic Stonewort *Chara baltica*, Lesser Bearded Stonewort *Chara curta* and Strawberry Stonewort *Chara fragifera*. There are also widespread examples of the serpentine variant of Mediterranean temporary ponds on the Lizard heaths. There are a number of rare species including chives *Allium schoenoprasum* and Dwarf Rush *Juncus capitatus*. Also unique to the Lizard area is a type of wet heath *Erica vagans* – *Schoenus nigricans* heath.

In poorly drained areas of the West Lizard SSSI Black Bog-rush *Schoenus nigricans* and Purple Moor-grass *Molinia caerulea* is found with associated species including Tormentil *Potentilla Erecta*, Betony *Stachys Betonica*, Saw-wort *Serratula tinctoria*, Great Burnet *Sanguisorba officinalis* and Western Gorse *Ulex gallii*. Pigmy Rush *Juncus pygmaeus*, a very rare plant species (Red Data Book) has been recorded. Hayle Kimbro Pool and Ruan Pool provide good wetland habitat, both supporting Common Spike-rush *Eleocharis palustris*, Alternate Water-milfoil *Myriophyllum alterniflorum*, Floating Club-rush *Eleogitum fluitans* and Pill-wort *Pilularia globulifera*. Hayle Kimbro Pool also supports the largest population of Lesser Water-plantain *Baldellia ranunculoides* in Cornwall and North of the pool at Ponson Joppa is the only population on the Lizard of Bog Myrtle *Myrica gale*.

The East Lizard Heathlands supports the rare Cornish Heath *Erica Vagans* (Red Data Book). 'Tall Heath' is found in flat, wet areas and is co-dominated by Cornish Heath *Erica Vagans*, Black Bog-rush *Schoenus*

nigricans and Purple Moor-grass *Molinia caerulea*. The ditches and streams of the area support wetland species including Lesser Water-parsnip *Berula erecta*, Cuckoo Flower *Cardamine pratensis* and Water Figwort *Scrophularia auriculata*. Ancient cart tracks provide excellent habitat for the rare Pygmy Rush *Juncus pygmaeus* (Red Data Book) and the nationally scarce Yellow Centaury *Cicendia filiformis*.

Red Moor SSSI

Much of the Southern part of this SSSI is acidic marshy grassland and wet heath merging into Sphagnum-dominated bog. There are also areas of willow carr. Royal Fern *Osmunda regalis* grows extensively and in places forms an understorey in the willow carr. The ponds and ditches support some 13 species of dragonfly and damselfly including the nationally scarce Blue-tailed Damselfly *Ischnura pumilion*. The site is of particular importance for aquatic beetles including the very scarce *Hydrochus nitidicollis*.

Tregonetha and Belowda Downs SSSI

This site is noted for the extent of Northern Atlantic wet heaths with cross-leaved heath *Erica tetralix* and the occurrence of two nationally rare and highly localised types of mire. The site supports nationally scarce plants including mosses and liverworts. The diverse habitats provide niches for a range of breeding birds. The site plays an important role in enabling otters *Lutra lutra* to move between the catchments of the River Fal, River Camel and the River Menalhyll.

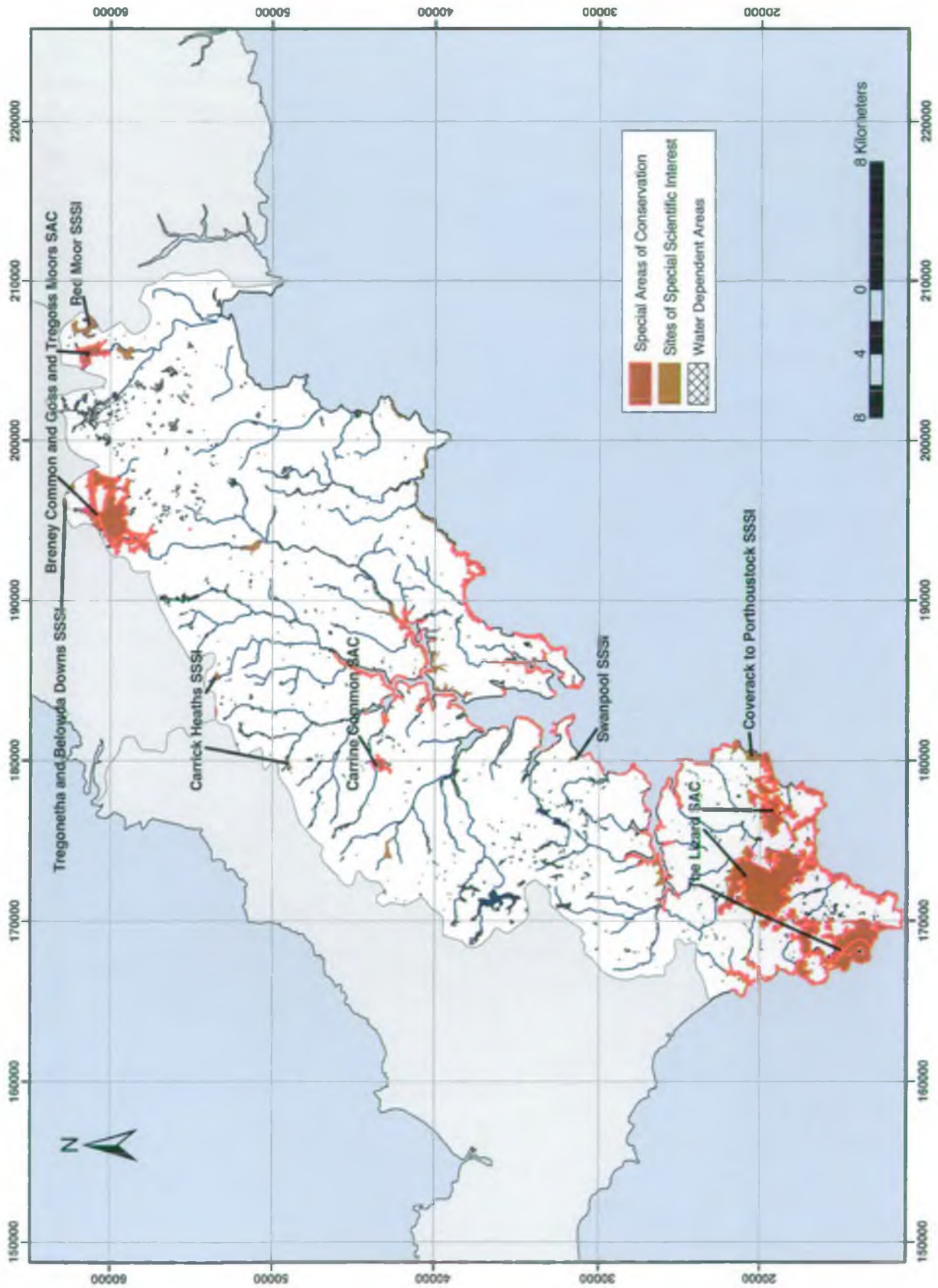
Carrick Heaths SSSI

Ten sites all located within a 12km radius of Truro. These areas comprise mosaics of wet and dry heathland types characterized by populations of Dorset Heath *Erica ciliaris* a nationally rare plant species and a prime constituent of Southern Atlantic Wet Heath. Nationally scarce moss and liverwort species include *Brachythecium mildaenum* and *Calliergon sarmentosum*. The Carrick Heaths also support a range of characteristic fauna, notably the nationally scarce pearl-bordered fritillary *Boloria euphrosyne* and two locally important species of dragonfly – the Emperor Dragonfly *Anax imperator* and the Broad-bodied Chaser *Libellula depressa*. Birds recorded include Willow Warbler *Phylloscopus trochilus*, Snipe *Gallinago gallinago* and Coot *Fulica atra*.

Swanpool SSSI

Highly water dependent, the Swanpool is a lagoon located behind Swanpool Beach. The pool is fed by a small stream and seepages from the Swanvale catchment. The pool is cut off from the sea by a

Figure 6 Water dependent designated sites.



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shingle bar forming a large freshwater lake, however it is still connected to the sea via a tidal culvert that maintains brackish water conditions. The pool is of particular importance for two reasons, one as an example of a brackish lagoon which is a rare habitat (British total is 770 ha) and secondly as the only location of the rare Bryozoan, the Trembling Sea-mat *Victorella pavida*.

Coverack to Porthoustock SSSI

Tall heath is found where drainage is impeded and is characterised by Cornish Heath *Erica vagans*, Black Bog-rush *Shoenus nigricans*, Purple Moor-grass *Molinia caerulea*, Cross-leaved heath *Erica tetralix* and Saw-wort *Serratula tinctoria*. In waterlogged areas especially around The Grove and Lowland Point, willow carr dominated by Rusty Willow *Salix cinerea subspecies oleifolia* is found. Lady fern *Athyrium filix-femina* and Male Fern *Dryopteris filix-mas* occur along with Broad Buckler Fern *Dryopteris dilatata* and Great Horsetail *Equisetum telmateia*. The Grove also supports a large colony of the nationally scarce Dotted Sedge *Carex punctata*.

As well as the sites described above there are many other designated sites containing smaller, yet still important, areas of water dependency within Fal and St Austell Streams CAMS area.

In addition to the designated sites this CAMS area also contains numerous areas of undesignated sites, where water is essential to the flora and fauna, and these areas are recognised as important habitat in the Cornwall Biodiversity Action Plan (BAP).

Figure 6 highlights the water dependent designated sites.

3.5 Ecology and Fisheries

The Environment Agency collects and analyses a large amount of ecological data. The information gathered can give an indication of problems in the river. This information has been used to guide the assessment of water resource availability for this area.

Fish are an integral part of the aquatic environment and often provide the best indicators of a well-balanced river ecosystem due to their position in the food chain. Fish rely on an adequate supply of water throughout their life cycle and this is especially important for salmonids. Of particular importance is the effect of water flow on the migration of Atlantic salmon *Salmo salar* and Sea trout *Salmo trutta*, both downstream as smolts and upstream as adults from the sea. Generally an increase in river flow – known as spates – stimulate these movements. This is important

in enabling adult fish to negotiate obstructions and get upstream to spawning grounds. Direct abstractions pose a risk to downstream moving juvenile salmonids, smolts and spawned adults (kelts) through entrapment and damage and could create areas of unnaturally low water levels downstream of an abstraction point. An abstraction strategy must minimise this risk. Valuable salmonid habitat is found within most of the rivers of this CAMS area from the headwaters to the sea.

Larger rivers that have been surveyed for salmonids and other fish species within the area include the Helford rivers, the Truro rivers (River Kennal, Calenick, Kenwyn, Allen and Tresillian), River Fal, Caerhayes Stream, St Austell (White) River and the Par River. Many smaller streams also have been surveyed within this area. Most of the above rivers and streams surveyed contain Brown Trout *Salmo trutta*, Sea Trout *Salmo trutta* and Eel *Anguilla anguilla* populations. The River Carnon is a notable exception and when surveyed in the early 1990's no fish species were recorded.

Atlantic salmon have been recorded sporadically on the River Kennal (1986), Tresillian River (1986) and more frequently in recent years on the River Fal (1992, 1995, 1998, 2001 and 2003), although in all cases juvenile salmonid abundance has been low. It is uncertain whether the River Fal salmonid population has yet become self-sustaining as juvenile abundance remains intermittent and at low levels. Water quality improvements on the River Fal have undoubtedly aided the initial recolonisation of this species from its complete absence in the 1970's and 1980's and it is hoped such improvements will continue.

Historical electric-fishing abundance data for salmonids and other fish species at historical survey sites within the area are available from the Environment Agency on request.

Angling within this CAMS area (mainly for Brown Trout, Sea Trout and Eels) occurs most notably within the River Kennal, Tresillian and River Fal where Sea Trout fishing is developing as a valuable economic benefit to the area. There are no licensed net fisheries for Atlantic Salmon or Sea Trout within this area.

Inland Stithians reservoir is a South West Lakes Trust (SWLT) water and offers brown and Rainbow Trout fishing. Argal Reservoir is also a SWLT fishery and contains a variety of coarse fish such as Carp *Cyprinus carpio*, Pike *Esox lucius*, Common Bream *Abramis brama*, Tench *Tinca tinca* and Eels *Anguilla anguilla*. There are also a number of other inland trout and coarse fisheries within the area and they are described in the 'Get Hooked' Guide to Angling in South-West England 2005 (www.gethooked.co.uk).

3.6 Recreation and Tourism Amenities

As with much of Cornwall, recreation within the Fal and St Austell Streams CAMS area is most intense on the coast. The coastal area is heavily used for watersports including sailing, surfing, water skiing and windsurfing as well as fishing, birdwatching, coast path walking and traditional beach holidays. Inland recreation is on a lesser scale, but numerous activities take place.

Inland water resources are an important resource for a variety of sports and recreation within this CAMS area. For instance canoeing takes place on the River Fal below Tregony. Stithians Reservoir run by the South West Lakes Trust (SWLT) includes a newly built "Angling and Watersports Centre" that caters for canoeing, sailing, and trout fishing and also offers an attractive reservoir side campsite. Lake fishing is popular at Stithians and Argal reservoirs (both SWLT run) and at other smaller enclosed fisheries for trout and coarse fish. River angling, primarily for salmonids, mainly occurs on the River Kennal, Tresillian River and River Fal. The reservoirs at Stithians and Argal are also popular locations for birdwatching, with hides provided by the SWLT. Birdwatching is also notable at Swanpool SSSI and on the Lizard peninsula but probably also takes place at a number of other sites throughout the area.

Bankside recreation is afforded via a network of public and other footpaths. Most notable is the Minerals Tramway in the Carnon Valley, a cycleway linking Pentewan and St Austell and an extensive network of paths around the Luxulyan Valley. Stithians, College and Argal reservoirs have attractive trails around their perimeters. Elsewhere there are a number of public footpaths running alongside watercourses and several of the conservation designated sites are open to the public. A number of tourist attractions are located alongside or in close proximity to watercourses such as Caerhays Castle and Gardens close to St Austell.

3.7 Water Quality

Routine monitoring shows that the surface water quality within this area is generally very good. Meeting future water quality objectives and making water quality improvement relies partially on ensuring sufficient flows within the river for dilution.

River Quality Objectives (RQOs) are the water quality targets for all major rivers in England and Wales. The targets specify the water quality needed in rivers

in order to rely on them for water supplies, recreation and conservation. Eight measures are used as indicators of the health of the rivers:- dissolved oxygen, biochemical oxygen demand, total ammonia, un-ionised ammonia, pH lower limit, dissolved copper, hardness and total zinc. These classes are used to set the target River Quality Objectives. Every stretch of a major river has a target expressed as a River Ecosystem Classification. If the target is not met, the Environment Agency aims to find the causes and set out actions needed to improve the quality of rivers.

Most river stretches within this CAMS had compliant RQOs. The exceptions to this pattern were: the River Par and tributary Carbis Stream which had significant and marginal failures for ammonia, pH and biochemical oxygen demand (BOD), Crinnis River had marginal failures for copper levels, Coombe Stream, Gwindra Stream and St Dennis Stream had significant failures for pH. All of these failures are thought to be caused by local discharges and diffuse pollution. In a similar way there was a failure in the Carnon catchment for copper, zinc, pH and BOD thought to be caused by the presence of abandoned mines. Therefore none of the failures are attributable to water resources.

The purpose of the General Quality Assessment (GQA) scheme is to provide a broad snapshot of river quality across England and Wales. GQAs describe water quality based on ecological and chemical criteria. The ecological part of the assessment is based on macro-invertebrates that live on the riverbed and can be seen with the naked eye. They include the larvae of insects such as mayflies and caddis flies, snails, shrimps and worms. Macro-invertebrates are used because their presence or absence reflects water quality and habitat type. The chemical assessment describes quality in terms of chemical measurements that detect the most common types of pollution. Rivers are assessed on the level of biochemical oxygen demand (BOD), ammonia and dissolved oxygen (DO).

Results from the recent GQA indicate water quality is poorest in the east of the area on watercourses in the River Fal, River Par and St Austell River catchments and in the Carnon River catchment to the west. These patterns are thought to be unrelated to abstraction. For instance the poor water quality in the St Austell area is partially attributed to industrial development and the presence of abandoned metalliferous mines. In a similar vein the poor water quality in the Carnon catchment results from the abandoned mine complexes in the area. Away from these heavily industrialised catchments water quality is good, as might be expected.

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 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, 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

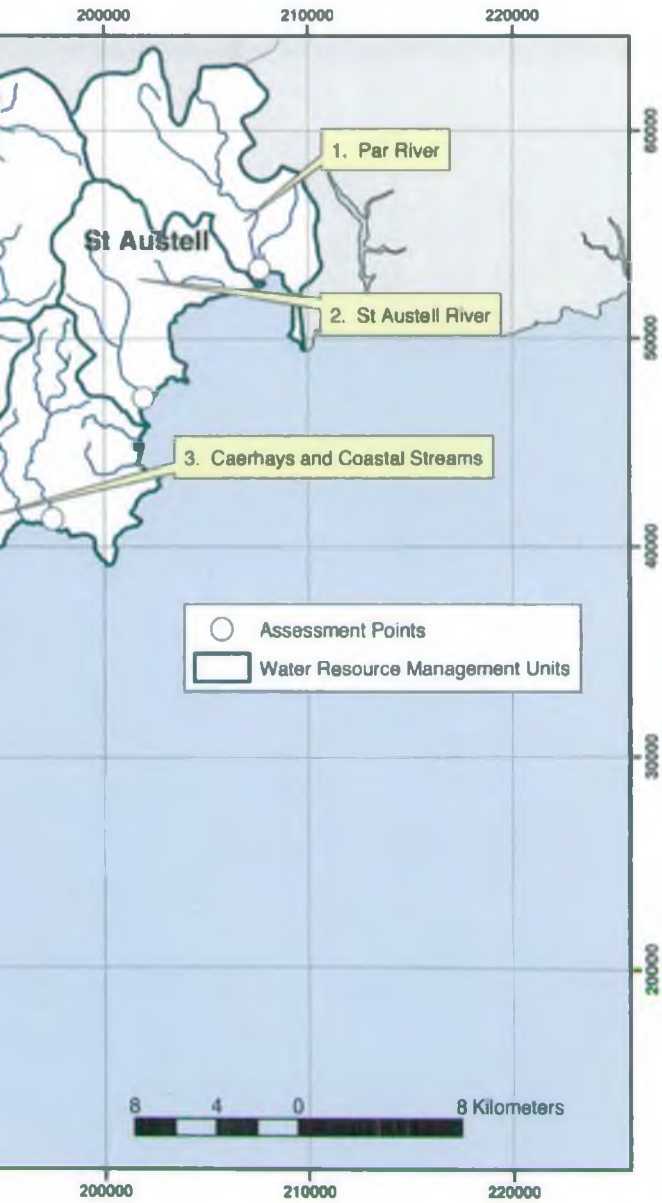
Indicative resource availability status	Definition	Colour coding for illustration on maps
Water available	Water likely to be available at all flows including low flows. Restrictions may apply.	Blue
No water available	No water available for further licensing at low flows although water may be available 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



Environment Agency 100026150 2003.

Figure 7

Water resource management units.





Poltesco

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

This framework involves the development of an understanding of the water resources of the CAMS area and assessment of the surface water. These results 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. These are known as water resource management units (WRMUs). For surface water 'assessment points' (Aps) are located on the river network. These river Aps are the focus of the resource assessment and abstraction licensing. Further details on how these CAMS were defined are provided in the technical document for this CAMS.

Figure 7 shows the 12 WRMUs that have been defined for this CAMS

Resource assessment of river assessment points

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 (in other words 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.

Table 2 | Environmental weighting scores

Assessment Point Number	Assessment Point Name	Environmental Weighting Score
1. Par	SX 0764 5335	High
2. St Austell	SX 0194 4711	High
3. Caerhays and Coastal Streams	SW 9747 4130	Very high
4. Upper Fal	SW 9376 5064	Very high
5. Lower Fal	SW 8874 4234	High
6. Tresillian River and Kestle Stream	SW 8697 4650	High
7. Allen and Kenwyn Rivers	SW 8278 4469	High
8. Carnon River	SW 7902 3928	High
9. Kennal	SW 7758 3847	Very high
10. Penryn River	SW 7888 3418	Very high
11. Helford Estuary Streams	SW 7009 2638	Very high
12. The Lizard Streams	SW 7703 2490	Very high

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).

Figure 8 and Table 2 shows the ecological sensitivity for each assessment point in the Fal and St Austell Streams 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 really 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” 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. 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 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). “Over-abstracted” represents abstraction that is already unsustainable whereas “over-licensed” represents the potential for damage should the full licensed amount be abstracted.

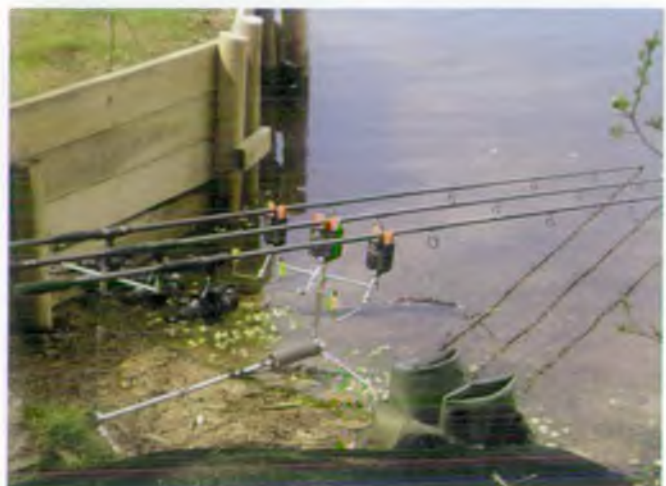
4.2 Water resource management units in the Fal and St Austell Streams CAMS area

The Fal and St Austell Streams CAMS area has 12 WRMUs based around the major rivers within the catchment. The units do not include rivers below the tidal limit, estuaries and coastlines. Whilst an abstraction licence may be needed in these areas, the impact on river flow is usually insignificant.

4.2.1 WRMU 1 Par River

The unit consists of the River Par and tributaries, including Tywardreath Stream, Bokiddick Brook, Carbis Stream and Treverbyn Stream. Also included is a hydrologically independent stream at the eastern edge of the WRMU. The source of the assessed river (Par River) is near the A30 in the North of the unit and it has a catchment of approximately 68km². The assessment point is at sea level where the Par River enters the sea.

Within this unit there is a spot flow gauging site on the Par River located at NGR SX 0752 5353 and daily rain gauge site at Roche NGR SW 9895 6063.



Fishing at Argal Reservoir

For the majority of their route through the upper half of this unit these watercourses flow over land with very little fall in landform, 130m AOD near the Northern boundary to 110m AOD near Luxulyan. After the Bokiddick Brook joins the Par River the watercourse enters the steep sided Luxulyan valley and quickly drops to around 20m AOD. Much of the remainder of the course of the river is within wide flood plains.

Designated sites shown to be water dependent within the unit are Breney Common SAC/SSSI, Red Moor SSSI and a number of County Wildlife Sites.

The Par River WRMU currently has a Resource Availability status of Water Available.

4.2.2 WRMU 2 St Austell River

The unit consists of the St Austell River, including tributaries such as Gover Stream, Polgooth Stream and Hembal Brook. The WRMU also includes the Crinnis River to the east.

The catchment of the assessed river, the St Austell River, has an area of approximately 39 km². Parts of the Northern inland boundary reach between 255m and 305m AOD, however approximately one third of the boundary of this unit is coastline with the land rising quite steeply from sea level to around 70m AOD. The St Austell River (sometimes referred to as 'The White River') rises at an altitude of approximately 220m AOD near Carthew and flows from north to south on the Western side of the unit. The watercourse flows through areas of flood plain for much of its course south of St Austell and ultimately discharges over Pentewan Beach. The assessment point is at sea level where the St Austell River enters the sea.

Within this unit there is a spot flow gauging site on the St Austell River at Molinegy GS NGR SX 0071 4947 and a daily raingauge site at Carthew NGR SX 0020 5590.



Greensplatt Pit

There is one SAC/SSSI and three other SSSIs within the unit but none are shown as water dependent. There are a number of County Wildlife Sites some of which have areas of water dependency.

The St Austell River WRMU currently has a Resource Availability status of Water Available.

4.2.3 WRMU 3 Caerhays and Coastal Streams

The assessment river is the Caerhays Stream including tributaries the St Ewe Stream and Hewas Water which has a catchment area of approximately 29 km². Also within this unit are all the other coastal streams between WRMU 2 and 5 as well as hydrologically discrete catchments such as Mevagissey Stream, Port Mellon Stream, Portholland Stream, Trengrouse Stream, Percuil River and Ruan River.

More than half of the boundary of this unit is coastline with the land rising relatively sharply from sea level to heights of 75–80m AOD in the Western part of the unit and 85–105m AOD towards the Eastern part. The land is not shown thereafter to rise significantly within the unit. The Caerhays Stream rises at approximately 100m AOD in the East of the unit and flows into the sea at the assessment point (Porthluney Cove).

Within the unit there is a temporary flow monitoring site at Caerhays on the Caerhays Stream NGR SW 9271 4223 and daily raingauge sites at St Mawes NGR SW 8496 3500, Sticker NGR SW 9732 4915 and Trevithick Farm NGR SW 9635 4519. There is also a tipping bucket raingauge at Polmassick Bridge NGR SW 9717 4554.

The SAC and SSSIs located within this unit are located in coastal areas and are not shown to be water dependent. There are a number of County Wildlife Sites located further inland which do have significant areas dependent on water.

The Caerhays and Coastal Streams WRMU currently has a Resource Availability status of Water Available.

4.2.4 WRMU 4 Upper Fal

The catchment of the assessed river (River Fal) covers an area of approximately 48 km². This unit includes the upper River Fal from the source near St Dennis to just downstream of the point where Coombe Stream joins near Grampond Road. Also included are tributaries such as Dubbers Stream, St Dennis Stream, Gwindra Stream and Goverseth Stream.

There is a spot flow gauging site at Trenowth on the upper Fal River NGR SW 9373 5060.

A large area in the middle of the unit is described as 'urbanised' being the site of extensive china clay



Footpath along St Austell River

workings. There has also been a long history of both underground and surface mineral extraction in the North of the unit. This has resulted in disturbed and man-made soils with poor drainage and the development of perched water tables with numerous open water pools that now support an important range of water dependent flora and fauna.

Goss and Tregoss Moors SAC/SSSI falls within this unit and approximately half of the Tregonetha and Belowda Downs SSSI, both noted for their water dependent ecology.

The Upper Fal WRMU currently has a Resource Availability status of Water Available.

4.2.5 WRMU 5 Lower Fal

The unit includes the lower River Fal from the point where Coombe Stream joins near Grampound Road to the assessment point at the tidal limit. It also includes all tributaries together with a watercourse that flows into the tidal water below the assessment point. The assessment river catchment (River Fal) within this unit covers an area of approximately 62 km² with a change of altitude from 30m AOD to sea level at the assessment point. The River Fal flows through the centre of the unit in a generally south westerly direction.

There is primary gauging station site at Tregony on the Lower Fal at NGR SW 9207 4474.

The SACs, SSSIs and CWS located within this unit are not shown to have any significant areas of water dependency.

The Lower Fal WRMU currently has a Resource Availability status of Water Available.

4.2.6 WRMU 6 Tresillian River and Kestle Stream

As well as the Tresillian River and Kestle Stream WRMU this unit also includes the Trevella Stream together with other tributaries that flow directly into tidal waters. The catchment of the assessment river (Tresillian River) covers an area of approximately 60 km². The Kestle Stream rises in the Northwest of the unit where the landform reaches 140m AOD. The Tresillian River has its source along the northern boundary of the unit where the landform in places reaches 180m AOD. The two watercourses flow separately through most of the unit in a generally southerly direction towards the estuary. The Kestle Stream joins the Tresillian River above the assessment point.

There is a temporary flow monitoring site downstream of Ladock on the Tresillian River located at NGR SW 8933 5080.

Parts of the Fal and Helford SAC (also designated Upper Fal Estuary and Woods SSSI) fall within this unit. There are some relatively small areas shown to be water dependent. Also present within the unit is one area of the Carrick Heaths SSSI. There are ten County Wildlife Sites within the unit, which show varying areas of flora and fauna that are water dependent.

The Tresillian River and Kestle Stream WRMU currently has a Resource Availability status of Water Available.

4.2.7 WRMU 7 Allen and Kenwyn Rivers

Along with the Allen and Kenwyn Rivers this unit also includes the Calenick Stream together with other tributaries that flow directly into tidal waters. The assessment river (River Kenwyn) catchment covers an area of approximately 20 km² with a change of altitude from 100m AOD from the source near Callestick to sea level at the assessment point.

There is a primary gauging station at Truro on the River Kenwyn NGR SW 8198 4503, a daily raingauge site at Newham NGR SW 8330 4329 and tipping bucket rain gauges at Allet NGR SW 7956 4854 and Truro College NGR SW 7922 4495.

Carrine Common SAC (also designated as Carrine Common and Penwethers SSSI) falls within this unit. Also present are some areas of the Carrick Heaths SSSI. These designated sites show significant areas of water dependency. There are a number of County Wildlife sites within the unit, those with significant water dependent areas are contained within the SAC or SSSI.

The Allen and Kenwyn Rivers WRMU currently has a Resource Availability status of Water Available.



Kennal Vale

4.2.8 WRMU 8 Carnon River

This unit consists of the Carnon River including the tributaries Hale Mills Stream, Lanner St Day Stream, Hicks Mill Stream, Perranwell Stream, Baldhu Stream and Ringwell Stream. Also included are some tributaries that flow directly into tidal waters. The catchment of the assessment river (Carnon River) covers an area of approximately 43 km² with a change of altitude from 80m AOD from the source near the A30 at Blackwater to sea level at the assessment point.

There are two primary gauging station sites within this unit, one at Bissoe NGR SW 7744 4128 and one at Devoran Bridge NGR SW 7910 3943. Both are on the Carnon River. There is a daily raingauge site at Trevince NGR SW 7364 4092.

A small area of the SAC, Fal and Helford, and an important SSSI, West Cornwall Bryophytes, fall within this unit but neither are indicated as water dependent. There are seven County Wildlife Sites (CWS) indicated with areas of water dependency.

The Carnon River WRMU currently has a Resource Availability status of Water Available.

4.2.9 WRMU 9 River Kennal

As well as the River Kennal this WRMU includes the tributaries Stithians Stream, Polmarth Stream and Carnmenellis Stream. The unit also includes small streams that flow directly into tidal waters. The River Kennal catchment (the assessment river) encompasses an area of around 32 km² with a change in altitude from 200m AOD at the source near Four Lanes to sea level at the assessment point.

Stithians Reservoir is located within this unit and has been formed by impounding the water of the River Kennal. There is a very large abstraction for the water company's Stithians Water Treatment Works (WTW) where water is forwarded by main out of this unit to Redruth, Camborne and Chacewater. Some water is also transferred to the River Cober (outside of this unit) which ultimately feeds Wendron WTW.

There is a primary gauging station on the River Kennal at Ponsanooth NGR SW 7620 3765 and a daily raingauge site at Stithians NGR SW 7380 3710.

There is no SAC or SSSI within this unit. There are, however, a number of County Wildlife Sites (CWS)

The River Kennal WRMU currently has a Resource Availability status of Over-abstacted.

4.2.10 WRMU 10 Penryn River

Penryn River WRMU includes several hydrologically independent catchments: Argal Stream, Swanpool Stream and Maenporth Stream. The Argal Stream was chosen as the assessment river. The Argal Stream catchment encompasses an area of around 9 km² with a change in altitude from 150m AOD at the source near Halvasso to sea level at the assessment point.

The Water Company has a licence to abstract water from College Reservoir and Argal Reservoir for treatment at College Water Treatment Works for public water supply.

A spot flow gauging site is located at Helland Mill on the Argal Stream NGR SW 7540 3190 and a tipping bucket raingauge at Penryn Reservoir NGR SW 7769 3360.

Only one of the SSSIs located within the unit is shown to be significantly water dependent namely the Swanpool SSSI. The Swanpool is a brackish lagoon located behind Swanpool Beach. The pool is of particular importance for two reasons, one as an example of a brackish lagoon which is a rare habitat (British total is 770 ha) and secondly as the only location of the rare Bryozoan, the Trembling Sea-mat *Victorella pavida*.

The Penryn River WRMU currently has a Resource Availability status of Over-abstracted.

4.2.11 WRMU 11 Helford Estuary Streams

This unit includes the Porth Navas Stream, Lestraines River, Carvedras Stream, Gweek River, Helford River, Rosevear River and Trelowarren Stream. From all these hydrologically independent systems the Helford River was chosen for assessment.

The catchment of the assessment river covers an area of approximately 14 km² with a change of altitude from 80m AOD from the source near Helston to sea level at the assessment point.

There is a spot flow gauging site on the Helford River at Gweek NGR SW 7042 2650.

A small part of The Lizard SAC (also covering the northern part of the Goonhilly Downs SSSI) extends into the southernmost part of this unit. This area is shown to be water dependent. There are many County Wildlife sites (CWS) within the unit and the majority have areas of water dependence although for the most part these areas are relatively small. An example of a CWS site with more extensive areas of water dependency is North Goonhilly Downs CWS (46.196ha) that contains fine and extensive examples of unenclosed, undisturbed wet Lizard heath.

The Helford Estuary Streams WRMU currently has a Resource Availability status of Water Available.



Kennal Intake

4.2.12 WRMU 12 The Lizard Streams

There are many hydrologically independent watercourses within this unit including the Gunwalloe Stream, Cury River, Mullion Stream, Kynance Stream Poltesco River and Porthallow Stream. They all discharge to tidal waters. The assessed river is the Manaccan River with a catchment area of approximately 14km². Cliffs rising in some areas to over 60m AOD bound the South, West and East of the unit. From the cliffs the land gently rises towards the North to a height of 105m AOD. The Manaccan Stream rises on the Eastern edge of the Serpentine platform.

Within this unit there is a spot flow gauging site on the Manaccan River at Manaccan NGR SW 7675 2487 and a tipping bucket raingauge at Lizard Lighthouse NGR SW 7048 1150.

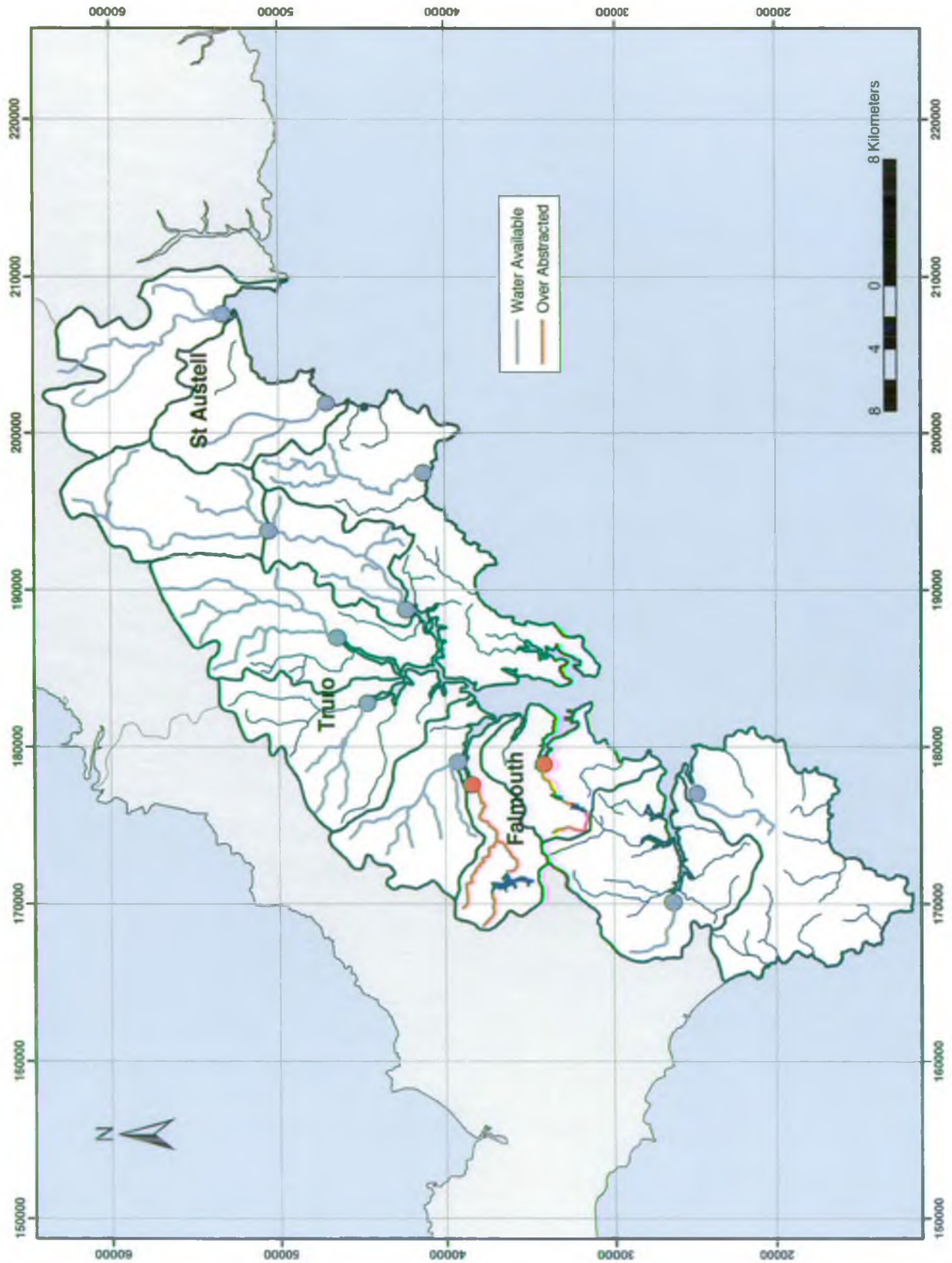
Most of the Special Area of Conservation (SAC) known as "The Lizard" that in total covers over 3257 hectares lies within this WRMU. A large proportion of this SAC is defined as water dependent. The area supports a nationally unique series of oligo-mesotrophic water bodies and also unique to the Lizard area is a type of wet heath *Erica vagans* - *Schoenus nigricans* heath. There are many SSSIs within the unit, the majority located within the SAC.

There are numerous County Wildlife sites (CWS) within the WRMU many containing substantial areas that are defined as water dependent. Although many of these sites fall within the boundaries of the SAC and/or the SSSIs there are others that do not fall within these designations.

The Lizard Streams WRMU currently has a Resource Availability status of Water Available.

Figure 9 shows the water availability status of each unit.

Figure 9 | Water Availability Status.



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Proposed licensing strategy

5.1 Sustainability appraisal

5.1.1 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.

5.2 Existing licensing strategy

The existing Abstraction Licensing Policy for the Cornwall area is a system which aims to manage water resources, prevent new licences derogating existing water interests, and prevent water abstraction adversely affecting the environment. Proposed abstractions are assessed in terms of size and consumption and potential impact on nearby river flows or groundwater levels. This is done using empirical data from gauged flow surveys, water level monitoring, pumping test studies or by theoretical analysis using rainfall run-off models and groundwater simulation software.

The policy uses a first-come-first-served system that acts to prevent watercourse depletion under low flow conditions. With surface water abstraction, this is often

done by means of Hands Off Flow (HOF). The HOF is based on an environmental allocation with protection for existing users. To protect flow variability, a licence may only authorise the abstraction of a proportion of the flow above the HOF.

It is not usually possible to link groundwater to a Hands Off Flow. Instead groundwater abstractions are compared to the amount of flow in the nearest watercourse under low flow conditions and abstraction is only authorised if it is likely to be locally insignificant. The criterion for local insignificance is that the abstraction should not exceed 10% of the watercourse flow that is exceeded 95% of the time.

All new licences are issued with an expiry date. The expiry date is usually 31 March 2018 to link with the proposed CAMS review period.

A licence inspection visit is made to new Licence Holders within six months of issue. Further inspections will be made within the duration of the licence at a frequency dictated by the size of the abstraction and potential for environmental harm. The Environment Agency also makes routine catchment inspections, investigates reported incidents of abstraction and ensures activities conform with water resources legislation.



Part of the stakeholder group at Blackpool Pit

5.3 Catchment overview of proposed licensing strategy

This document outlines the proposals for a new licensing strategy for the Fal and St Austell Streams area. Following the consultation periods, the final licensing strategy will be determined and published in the CAMS document. The strategy provides an indication of whether licences are likely to be available and the conditions that should be expected on licences. Anyone is entitled to apply for a licence, even if the strategy indicates that there may not be water available.

Any surface water licence will be subject to a Hands Off Flow. The licence will need to make provision for how the flow is to be measured to show compliance with the HOF condition. Where practicable the HOF may be measured at an Agency gauging station. If it proves not practicable to measure the flow at a gauging station the applicant will need to install a local means of measurement that meets this need. It would be preferable if abstraction offtakes are engineered for automatic compliance with HOF conditions. The structure will need to incorporate a means for measuring the actual abstraction and screens to prevent the ingress of fish.

Where there is a need to prevent the ingress or egress of fish we will refer to science report 'SC030231 Screening for Intake and Outfalls: A Best Practice Guide'. All licences will refer to the means by which the abstraction is measured to show compliance with the licence provisions. Where the means for measuring the abstraction is a water meter we will refer to our abstraction metering good practice manual.

Applications for new abstractions will be dealt with on a case by case basis. In all cases, licence applications will be considered under the requirements of the Water Resources Act 1991 as amended by The Water Act 2003. Local issues of derogation and environmental impact will always be assessed and may override the status of the catchment defined in this CAMS.

5.3.1 Approach to time-limiting

Time limits are an effective tool for managing water resources and provide a means for the Agency to deal with environmental uncertainty, changing needs for water and for ensuring efficient use of water. There will be a presumption that the Agency will issue all new licences and variations of abstraction licences subject to a time limit, irrespective of source, volume or purpose.

Time-limited licences will carry a presumption of renewal where the Agency is satisfied that the following three tests are all met:

- Environmental sustainability is not in question
- There is a continued justification of need
- Water is being used in an efficient manner

The common expiry date for all time-limited licences within the Fal and St Austell Streams CAMS area is 31 March 2018. The normal duration for a licence will be 12 years, but shorter or longer time limits may apply in circumstances that the Agency may determine.

5.3.2 Surface Water Licences

In order to maximise abstraction whilst maintaining the variability of flow (required by many aquatic species), a tiered system of hands-off flows will be 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 limit the impact on flow variability.

For potential applicants of 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 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 and therefore allowing abstraction to take place.

5.3.3 Impoundments

Applications for new impoundments will be dealt with on a case-by-case basis.



Stithians Reservoir Sports Centre

5.3.4 Changes to the current licensing system

The proposed licensing strategy is very similar to the previous licensing policy except that the flows and groundwater levels will now be protected according to a nationally consistent resource assessment method. The cumulative impacts of licences within catchments will be dealt with by grouping their effects and applying common conditions and restrictions so that abstractors can be managed in units (WRMUs). The proposed strategy also provides a guide to potential abstractors outlining the current resource status of the WRMUs and the status we would like to aim for in the next six years.

5.4 Water resource management units 1, 2, 3, 4, 5, 6, 7, 8, 11 and 12

(Par River, St Austell River, Caerhays and Coastal Streams, Upper Fal River, Lower Fal River, Tresillian River and Kestle Stream, Allen and Kenwyn Rivers, Carnon River, Helford Estuary Streams and The Lizard Streams).

5.4.1 Resource availability status and results of the sustainability appraisal

From the resource assessment it was determined that the Par River, St Austell River, Caerhays and Coastal Streams, Upper Fal River, Lower Fal River, Tresillian and Kestle Stream, Allen and Kenwyn Rivers, Carnon River, Helford Estuary Streams and The Lizard Streams have a resource availability status of Water Available.

To decide how to manage abstraction in the catchments for the next six years, the Environment Agency has to consider the options below.

The sustainability appraisal process identified Option 1: Stay at Water Available as the best option. This is because there are no anticipated developments that are likely to require large consumptive abstraction over the next six years.

As the environment is not threatened and there is no need to look at recovering licensed water it was not necessary to consider tier 2 options.

Option 1	Option 2	Option 3
Stay at <u>Water Available</u> (allow further licensed abstraction but maintain a surplus of water for the environment)	Move to No <u>Water Available</u> (allow further abstraction and balance the needs of the environment and abstractors)	Move to Overlicensed (allow further licensed abstraction to threaten the environment)



Stithians Reservoir

5.4.2 Guidance on the assessment of new applications

Surface water licences for both consumptive and non-consumptive use may still be issued. The use, however, may not be reliable for purpose without the provision of winter filled water storage.

Licences to abstract from groundwater may still be granted.

Abstractions within a SAC boundary or directly affecting a SAC are only permissible if they do not have an impact on the conservation features. As a guide any abstraction that alone or in combination with others exceeds 10% of daily mean flow will need to be supported by an environmental statement to this effect.

5.4.3 Renewals and management of existing licences

As existing time limited licences expire applications for renewal will be determined with regards to this strategy.

5.4.4 Key issues for consultation

Question 1:

Does the status and proposed target status seem reasonable to you for each of the units?

Question 2:

Are there any issues with these units you would like to bring to our attention?

5.5 Water resource management units 9 and 10 (Kennal River and Penryn River)

5.5.1 Resource availability status and results of the sustainability appraisal

The Kennal River and Penryn River WRMUs have a resource availability status of Over Abstracted. The Sustainability Appraisal determined that there are unlikely to be any significant implications associated with this as the ecological information showed there to be no negative environmental effect. To decide how to manage abstraction in the catchments over the next six years, the Agency has to consider the following options.

Tier 1 Options

Option 1

Stay at Over Abstracted (actual abstraction may increase but no further consumptive abstraction is licensed)

Option 2

Move to Over Licensed (voluntary reduction in abstraction by existing licence holders)

Option 2

Move to No Water Available (enforced recovery of licences)

Option 3 is theoretically the best option for the environment, however review of the available ecological information showed no negative environmental effect. There would be no benefit in moving to Option 3, which would require paying compensation and entail considerable costs if not actually needed. The sustainability Appraisal process identified Option 1 as the preferred option whilst appropriate ecological monitoring continues.

There is a need to look at recovering licensed water, therefore Tier 2 Options were considered.

Tier 2 Options

Option 1

It would be beneficial to the Kennal WRMU and the Penryn WRMU if water could be saved through efficiency as it could help alleviate some of the over abstraction. At present, however, there is no evidence to suggest that the abstraction process is having any adverse impact on these WRMUs. Secondly there can be no guarantee of the quantities of water that may be recovered as the result of an efficiency campaign and, therefore, it is difficult to predict what effect this option will have on the WRMUs.

Option 2

Continued and extended monitoring will be able to provide more comprehensive data about these units, and provide a good base of knowledge on which future options can be based.

Option 2 was considered to be the most suitable option for these units at the current time. It will continue to provide more information and the best basis for long term catchment management decisions. Option 1 was rejected on the basis that there is no guarantee of the amount of water that may be recovered to make the option viable.

5.5.2 Guidance on the assessment of new applications

These WRMUs currently have been assigned a status of Over Abstracted. This means that it is unlikely that any reliable surface water licences can be issued for consumptive use.

Surface water licences for non-consumptive use or with a net benefit to the environment may still be issued irrespective of the resource availability status. Licences to abstract from groundwater may still be granted providing either the use is not consumptive or there is no direct hydraulic connection between the groundwater source and nearby surface waters.

5.5.3 Renewals and management of existing licences

As existing time limited licences expire applications for renewal will be determined with regards to this strategy.

5.5.4 Key issues for consultation

Question 3: Why do you think these catchments are important to be investigated?

Question 4: Does the status and proposed status for each of these units seem reasonable to you for each of these units?

Question 5: Are there any issues with these units you would like to bring to our attention?

5.6 Opportunities for licence trading in the Fal and St Austell Streams 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).

5.7 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 web site will be updated to provide information as the Water Act is implemented.



St Mawes

Future developments in the CAMS area

Our trawl for issues has not identified any significant future developments for the CAMS area that is likely to have a significant impact on water resources.



Use of water in Blackpool Pit

Summary of key issues for consultation

The development of the Fal and St Austell Streams 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 5 however the key issues on which we are looking for a response are summarised below.

Q6. What is your interest in this area?

Q7. Does this strategy meet with your expectation and why/why not?

Q8. Do you think that the Environment Agency has covered your water needs?

Q9. Do you agree with the options chosen and why/why not?

Q10. What future issues within the area would you like to make us aware of?

Glossary

Abstracted flow

Hydrograph representation of flow removed from river 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. 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

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.

Aeration zone

That zone below the surface of the ground but above the saturation zone, and in which water is present at below atmospheric pressure and where air/gases are present at atmospheric pressure (used in the definition of water table). Also termed the unsaturated zone.

AOD

Abbreviation for Above Ordnance Datum.

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 and collectively have an influence on natural flows or levels.

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.

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.

Conservation Regulations 1994

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

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.

Derogate

To depreciate or diminish - used in abstraction licensing where a proposed new licence would reduce resources to an existing authorised abstraction.

Derogation

In legal terms, the taking away of protected rights under the Water Resources Act due to the granting of a new licence.

Designated water dependent sites

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

Direct Discharge

The introduction into groundwater of any substance that is contained in list I or II in the Groundwater Directive without percolation through the ground or subsoil.

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.

Drift

A loose, deposit of sand, gravel, clay etc.

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

A means whereby water companies and/or the Environment Agency can apply to the Secretary(ies) of State for the imposition of restrictions in the uses of water and/or which restricts or stops abstraction where environmental damage is being caused.

Drought Permit

The mechanism by which the Environment Agency (with the consent of the local Navigation Authority, if applicable) permits a Water Company to abstract water outside of the normal terms of an Abstraction Licence.

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.

EU European Union

EU Wild Birds Directive (1979)

Implemented through the Conservation (Natural Habitats, &c) Regulations along with the Habitats Directive 1992 – collectively known as the Habitats Directive. A network of sites has been established to protect important and threatened species.

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 was transposed into UK law in 2003.

Ecosystem or Ecological River Flow Objectives/level requirements

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

Effective rainfall

That rainfall available 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 flow/level requirements

River flow or water level needs within a catchment to prevent ecological damage.

Environmental impact

The total effect of any operation on the environment.

Environmental River Flow Objectives

The minimum river flows from the area required to protect ecological and other environmental 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.

Environmentally Sensitive Area (ESA)

An area where the landscape, wildlife and historic interest are of national importance. Payments are made by MAFF/Welsh Office to ensure appropriate sensitive land use.

Episodic flood flows

Episodic fresh water flood flows.

Established right (also [pre-] existing right, [pre-] existing users' rights)

Right to carry out an activity whose effectiveness is dependent on river flow, and may thus be derogated by an activity upstream, which reduces the dependability of such flows in terms of quantity and/or timeliness. The right may be conferred by virtue of an abstraction licence, discharge consent, or the established practice of an activity explicitly exempted from such controls in the relevant legislation. It may, or may not, be a protected right.

Evapotranspiration

Water lost by evaporation and water taken up and used by plants.

Exceedance value

The percentage of time within the flow record that a flow is exceeded (also see flow duration curve).

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

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.

Fluvial

Associated with river processes such as flow and erosion.

Gauging station

A site where the flow of a river is measured.

Geomorphology Scientific

study of land forms and of the processes that formed them.

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).

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.

Hydroecology

The study of the interactions between ecological and hydrological processes in rivers and floodplains.

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.

Hydropower

Power generated from the natural gravitational fall of water by the installation of turbines, water wheels etc.

Impounding reservoir

A reservoir created by damming a natural watercourse.

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 Agency are taken into account. CAMS is a component of this.

Irrigation

Supply (land) with water by means of artificial canals, ditches etc, especially to promote the growth of food crops.

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 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.

Licence of Right

Licence granted under section 23 of the Water Resources Act 1963 in respect of an abstraction that was already in operation when that Act was implemented in 1965.

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.

Licensed entitlement

Amount of water that may be abstracted within the terms of a licence. Generally specified in terms of maximum per day, month and year (or season), with the monthly/annual amounts being typically less than the factored daily equivalent.

Licensing methodology

Procedure to aid licence determination.

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.

m³d⁻¹ Cubic metres per day.

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 shall be maintained by groundwater pumping, reservoir releases or inter-basin transfer.

Managing water abstraction

Document produced in May 2001 on the CAMS Process.

Maximum % abstraction impact

An indicator of the maximum abstraction impacts relative to natural flows in the specified year.

Mean flow

A long term average of the daily flow.

Meteorological data

Information relating to atmospheric processes.

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 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.

Native species

An indigenous animal or plant.

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.

Natural flows

The flows, which would naturally leave an Assessment Area or assessment point in the absence of any artificial impacts.

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.

Naturalised flow records

River flow records from which a best estimate of the effects of upstream artificial influences has been removed. These represent the runoff from the catchment that would occur if there were no artificial influences upstream.

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.

Peak flow

the maximum flow recorded during a high flow event.

Percolation

The descent of water through soil pores and rock crevices.

Perennial flow

River flow present through the entire year.

Permeability

The characteristic of a rock or soil that determines the rate at which fluids pass through the rock or soil under the influence of differential pressure.

PHABSIM

Tool for simulating the relationship between streamflow and available physical habitat (defined by the variables of depth, velocity and substrate cover).

Potable water

Water of a suitable quality for drinking.

Potential yield

The volume of water which can be withdrawn from a reservoir or aquifer in specified conditions, without depleting the storage so that withdrawal is no longer possible.

Precautionary principle

Where significant environmental damage may occur, but knowledge on the matter is incomplete, decisions made should err on the side of caution.

Precipitation

Deposition of moisture including dew, hail, rain sleet and snow.

Pre-existing (Users' Rights)

See 'established right'.

Prescribed flow

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

Primary gauging station

A permanent river flow gauging installation included in the National Surface Water Archive.

Protected right

Protected rights include all existing licensed abstractions, and certain exempt abstractions for domestic and agricultural purposes (excluding spray irrigation) not exceeding 20 m²/d.

Public water supply

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

Pumped storage reservoir

Surface water storage area where the natural inflow is supplemented by water pumped from a separate source, typically a nearby river.

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.

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.

Resource zone

The largest possible zone in which all resources, including external transfers, can be shared and hence the zone in which all customers experience the same risk of supply failure from a resource shortfall.

Restoring Sustainable Abstraction Programme (RSAP)

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

Return period

Refers to the return period of a flood or drought event. Flood or drought can be described in terms of the frequency at which, on average, a certain severity of flood is exceeded. This frequency is usually expressed as a return period in years, e.g. 1 in 50 years.

Revocation

Cancellation of licence and associated rights and benefits.

Rio Earth Summit, 1992

This was 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 in which inland, surface water can flow.

River corridor

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

River flow objectives (RFOs)

The minimum river outflows from the area required to protect ecological objectives, effluent dilution requirements, navigation and amenity in-river needs.

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.

Saline intrusion

The ingress of salt water into an aquifer, from sea or estuary, due to groundwater depression normally caused by excessive groundwater abstraction.

Salmonids

Members of the family salmonidae, includes 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 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.

Selective metering

Metered charging of a well-defined subset of households, such as a town, a region or particular types of customers (e.g. sprinkler users).

Sewer network

A route for drainage of surface water in urban areas as well as waste water.

Source of supply

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

Spate flows

Episodic fresh water flood flows.

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.

Specific yield

The ratio of the volume of water that will drain by gravity from a rock or soil that was initially saturated, to the volume of the rock or soil.

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. Can have a high impact on water resources.

Springs

These occur where the water table intersects the ground surface.

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.

Strata

Layers of rock, including unconsolidated materials such as sands and gravels.

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.

Telemetry

Telemetry is a means of collecting information that has been collected by unmanned monitoring stations (often for river flows or rainfall) using a computer that is connected via the public telephone system.

Threshold

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

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.

Topography

Physical features of a geographical area.

Total licensable resource

Is equivalent to the 'acceptable abstraction impacts' i.e. The abstraction impacts which are considered acceptable given target outflows in the specified year.
e.g. = Benchmark (Natural) river flows – RFOs,
or = (Surplus or Deficit) + Scenario Abstraction Impacts below.

Will vary with reference to assessment point and time frame (e.g. season).

Total rainfall

Precipitation as measured by a raingauge.

Total water management

All water management activities from source to end use (i.e. resource management, production management, distribution management and customer-side management).

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 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.

Underground strata

A term used to signify geology under the surface soil layer. If groundwater exists, or if water is being discharged to the ground, the geology underneath the soil layer is known as underground strata.

Universal metering

Metered charging of >95% of households in a defined geographical area.

Unlicensed abstraction

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

Unsaturated zone See 'Aeration Zone'.

Uptake

The degree to which a licensed entitlement is actually abstracted over a long period of time (sometimes related to the purpose and type of licence).

Uptake factor

Proportion of licensed entitlement that is actually abstracted (i.e. abstractors seldom take their full entitlement).

Usage factor

Proportion of the abstracted flow which is either not directly returned to the river, or whose return to the river is separately accounted for as a consented effluent return.

Utilisation

Proportion of licensed entitlement that is actually abstracted (sometimes referred to as 'uptake').

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 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 landowner.

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.

Water table

Top surface of the saturated zone within the aquifer.

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).

Yield

The reliable rate at which water can be drawn from a water resource. (see also Hydrological, Potential and Specific Yield).

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