

Conwy Catchment Abstraction Management Strategy

April 2004



ASiantaeth yr
Amgylchedd Cymru
ENVIRONMENT
AGENCY WALES

Published by:

Environment Agency
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IC code: WE-04/04-250-BHFU

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Vision for Conwy CAMS area

The main aim of a Catchment Abstraction Management Strategy (CAMS) is to define the resource availability status of a catchment by determining the quantity of water it requires to maintain or improve its riverine environment, and to provide a comprehensive licensing policy to ensure the sustainable management of the surplus. The uniform process by which this is achieved should result in the management of water abstraction in a consistent manner across England and Wales.

In the Conwy catchment, as elsewhere across England and Wales, each licence application will be determined individually, following consultation with the relevant organisations. Each determination will take account of Area, Regional and National licensing policy and the Conwy Catchment Abstraction Management Strategy described in this document.

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Introduction

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 Catchment Abstraction Management Strategy should be read in conjunction with *Managing Water Abstraction*.

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

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Consultation on the Conwy 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 in a sustainable way, 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
- Targeted information request
- CAMS Stakeholder Group

The leaflet was distributed in Sept. 2001. 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 Conwy 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 Conwy CAMS stakeholder group and the interests they represent are as follows:

- Steve Mayall Hydrology and Water Resources Management Team Leader, *Project Executive*
- Jacques Sisson Catchment Abstraction Management Officer, *Project Manager*
- Margaret de Wolfe Chairperson, *Small Businesses*
- Jon Baxendale Innogy Hydro, *HEP users*
- Huw Jones Dŵr Cymru, *Public Water Supply*
- Keith Heminsley Secretary, Conwy Anglers Association, *Angling Interests*
- Chris Wynne North Wales Wildlife Trust, *External Conservation Groups*
- Carri Lane Technical Officer (Biodiversity), *Fisheries, Ecology and Recreation EAW*

In addition to the distribution of awareness raising leaflets and the instigation of a stakeholder group, a Targeted Information Request (TIR) was also undertaken. The following organisations were asked to raise issues related to water abstraction in the Conwy catchment.

- Countryside Council for Wales
- North Wales Wildlife Trust
- CEFAS
- North West and North Wales Sea Fisheries Committee
- Forest Enterprise
- Snowdonia National Park Authority

No issues relating to abstraction were identified by these organisations for the Conwy CAMS area.

There was also a formal consultation on the Conwy CAMS through a consultation document, distributed in **July 2003**. The responses received were analysed and taken into account as the strategy was finalised. This CAMS document now sets out the final strategy that has been determined for the Conwy CAMS area.

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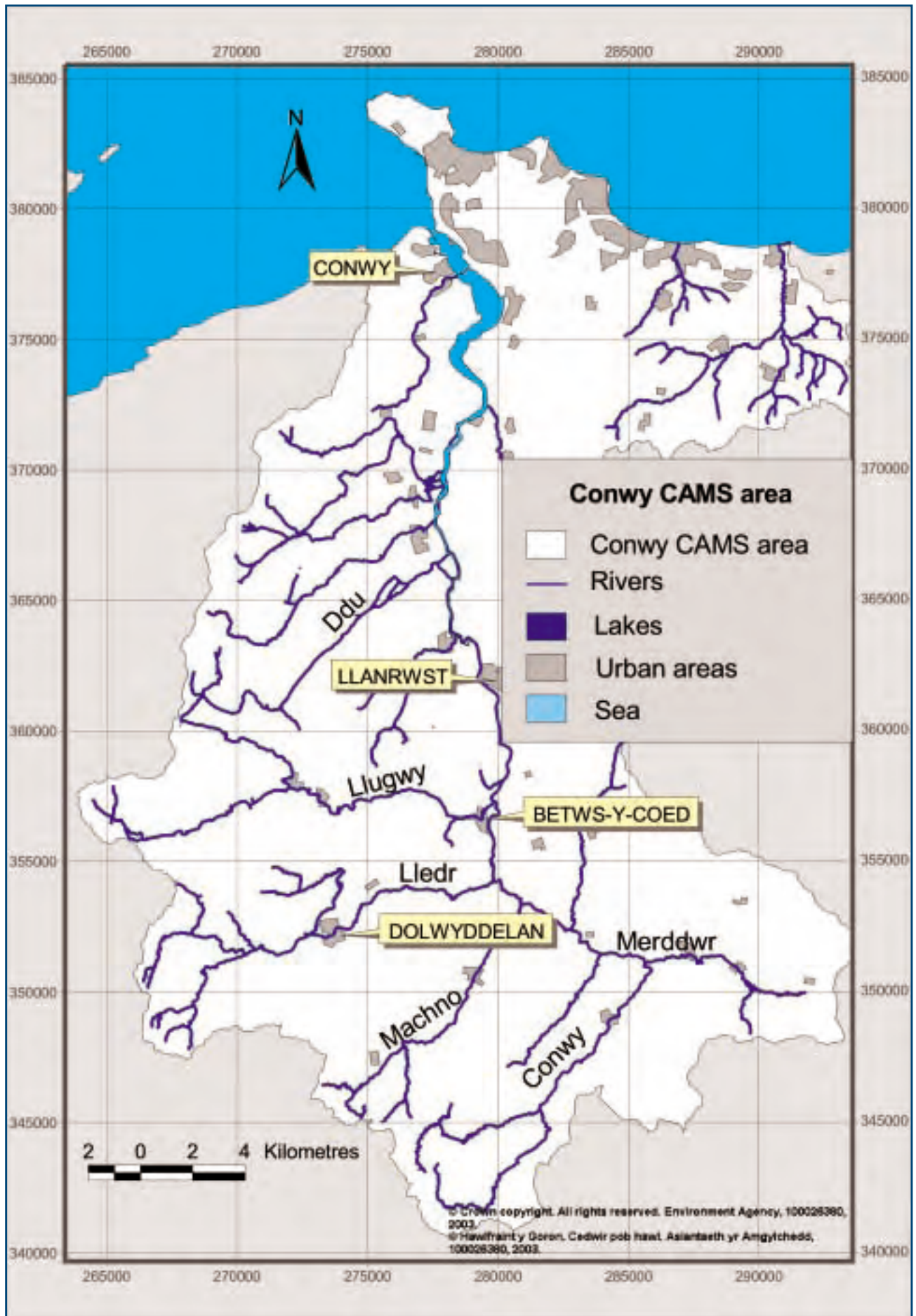
The Conwy CAMS area

3.1 Surface water features

The Afon Conwy is the third largest river discharging into the Irish Sea along the North Wales coast. It drains a catchment of 678km², the main drainage channel covering a distance of 55.88km. *See Map 1.*

The Conwy arises in the Snowdonia National Park, specifically, the Migneint range, at 460m AOD. The Upper Conwy flows across upland moors through to grazing land, falling 450m to emerge as the Lower Conwy which flows through extensive flood plains meeting the tidal limit at Tan Lan. Several major tributaries join the Upper Conwy, the Afonydd Llugwy, Lledr and Machno from the west and the Merddwr and Iwrch from the east and from the south, the Afon Serw.

The Lower Conwy is further augmented by the rivers Crafnant, Ddu, Porth Llwyd, Dulyd and Roe from the west, and from the east, the Afon Hiraethlyn. As with many North Wales rivers the Conwy can be described as 'flashy', there is immediate run-off, only a very small proportion is detained in the thin peaty soil.



3.2 Geology and Hydrogeology

The hydrological characteristics of a catchment are determined by its location and physical attributes. These physio-graphical factors are themselves determined by geological history.

The Conwy catchment can be divided into three physio-graphical areas.

- the lowlands of alluvium and estuarine silts bordering the river.
- the rugged area of Ordovician rocks and high relief to the west of the river, and
- the Silurian area of rounded concordant hills to the east of the river.

During the Pleistocene Period, approximately 1.8 million years ago, glaciers, ice sheets and sea level movements moulded the catchment into its present form. The Ordovician sedimentary formations, with their interspersed volcanics, i.e. extrusive Silurian, Ordovician and Cambrian tuff shot through with intrusive dolerite and basalt, were more resistant to the ice. This formed the spectacular upland glacial features now seen to the west of the river which make up that part of the Snowdonia National Park

The homogenous Silurian deposits to the east yielded more readily, resulting in the rounded moorland summits of the Denbighshire Moors. In post glacial times, as sea level levels rose and fell, the valley floor has been filled in with muds and silts from below and by alluvium carried down from the fast flowing rivers above. See figure 1.

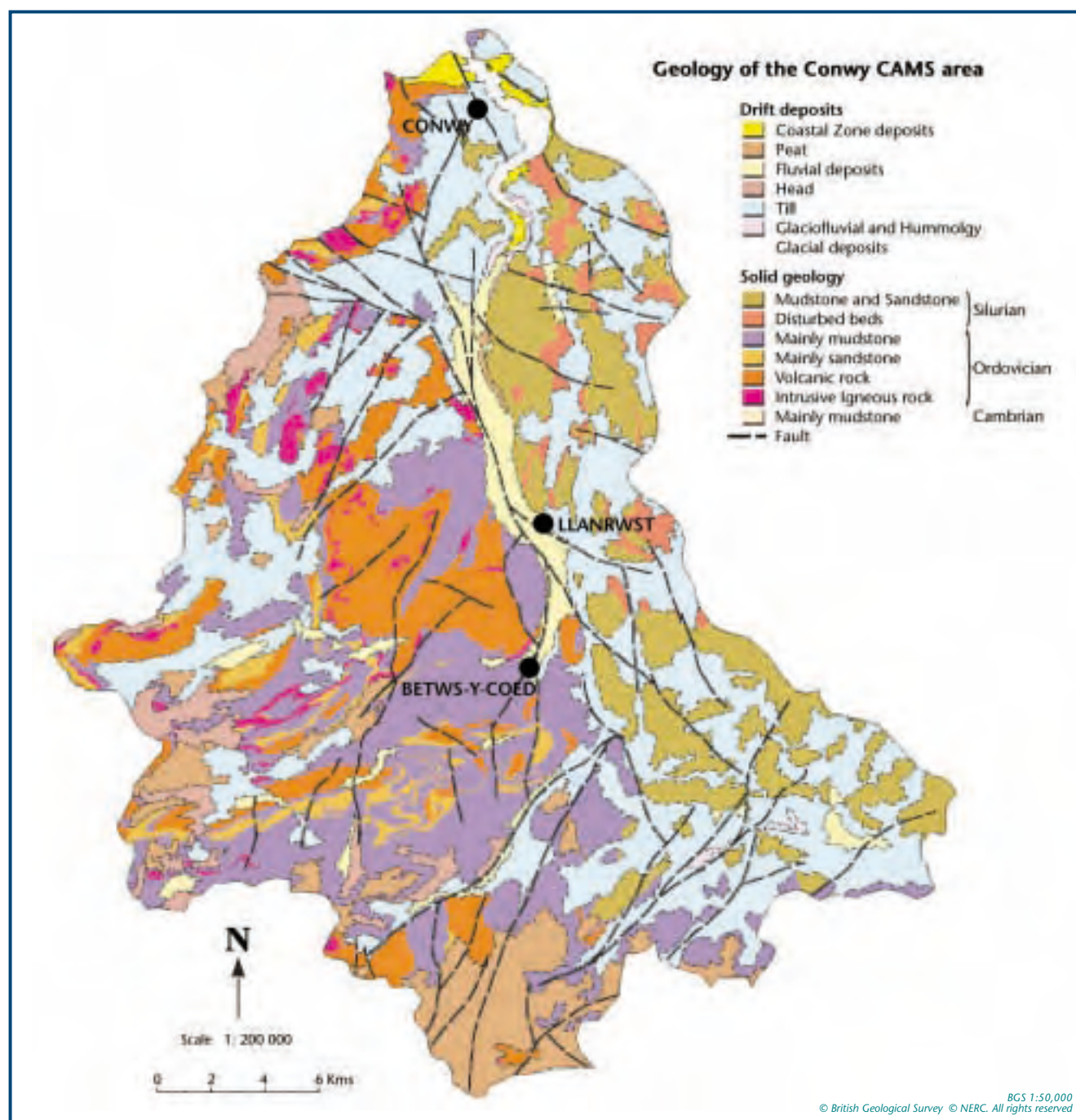


Figure 1. Geology of the Conwy CAMS area

The Ordovician and Silurian rocks do not make good aquifers. For this reason groundwater abstraction in Gwynedd at the present time is exempt from licensing (see Section 5). In order to understand groundwater movement in this catchment schematic cross sections have been constructed. See figure 2.

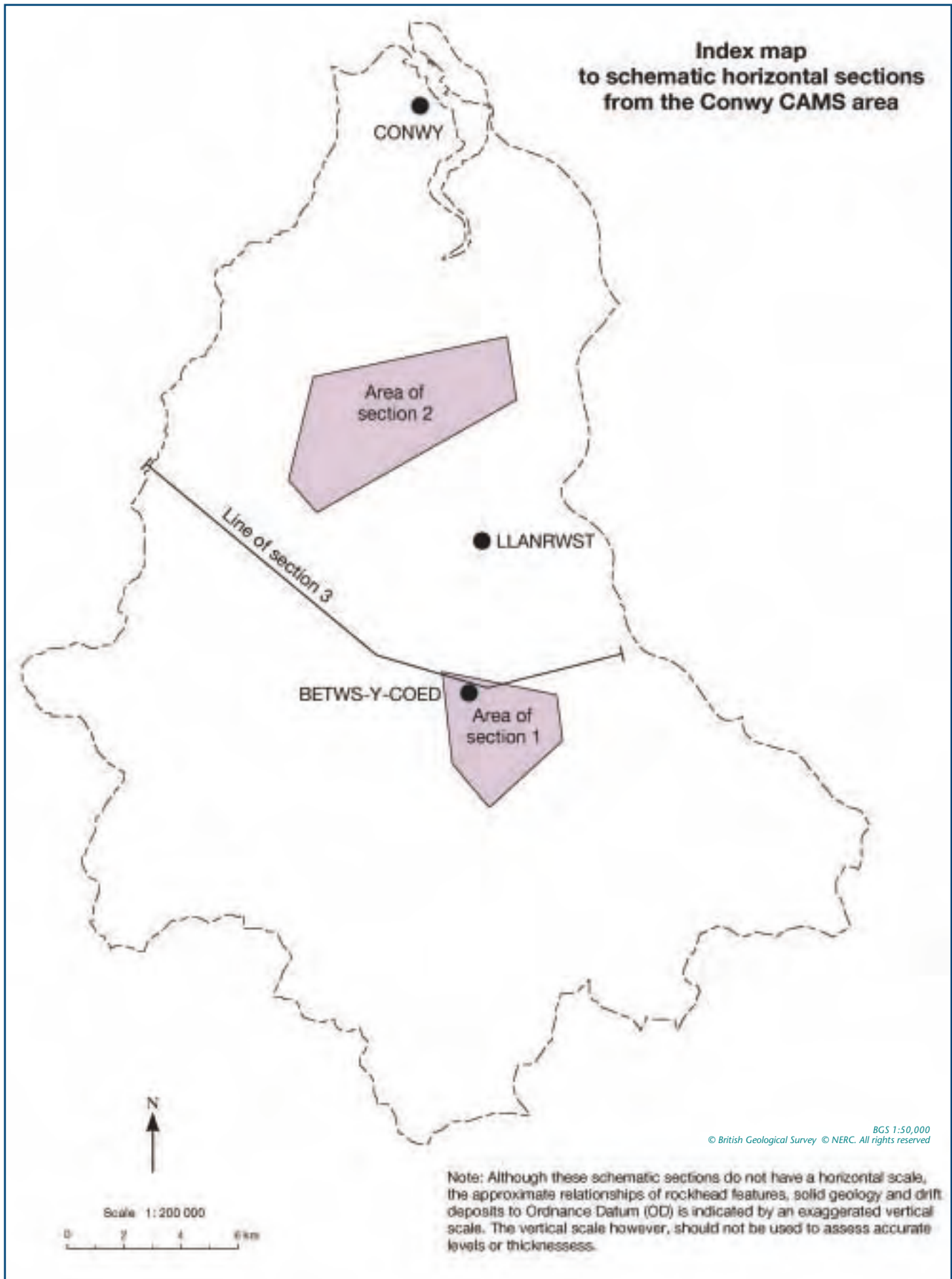


Figure 2. Locations of cross-sections in Conwy CAMS area.

Cross section 1 is situated in the upper Conwy, section 2 in the lower and section 3 across the centre of the catchment. See figures 3,4 and 5.

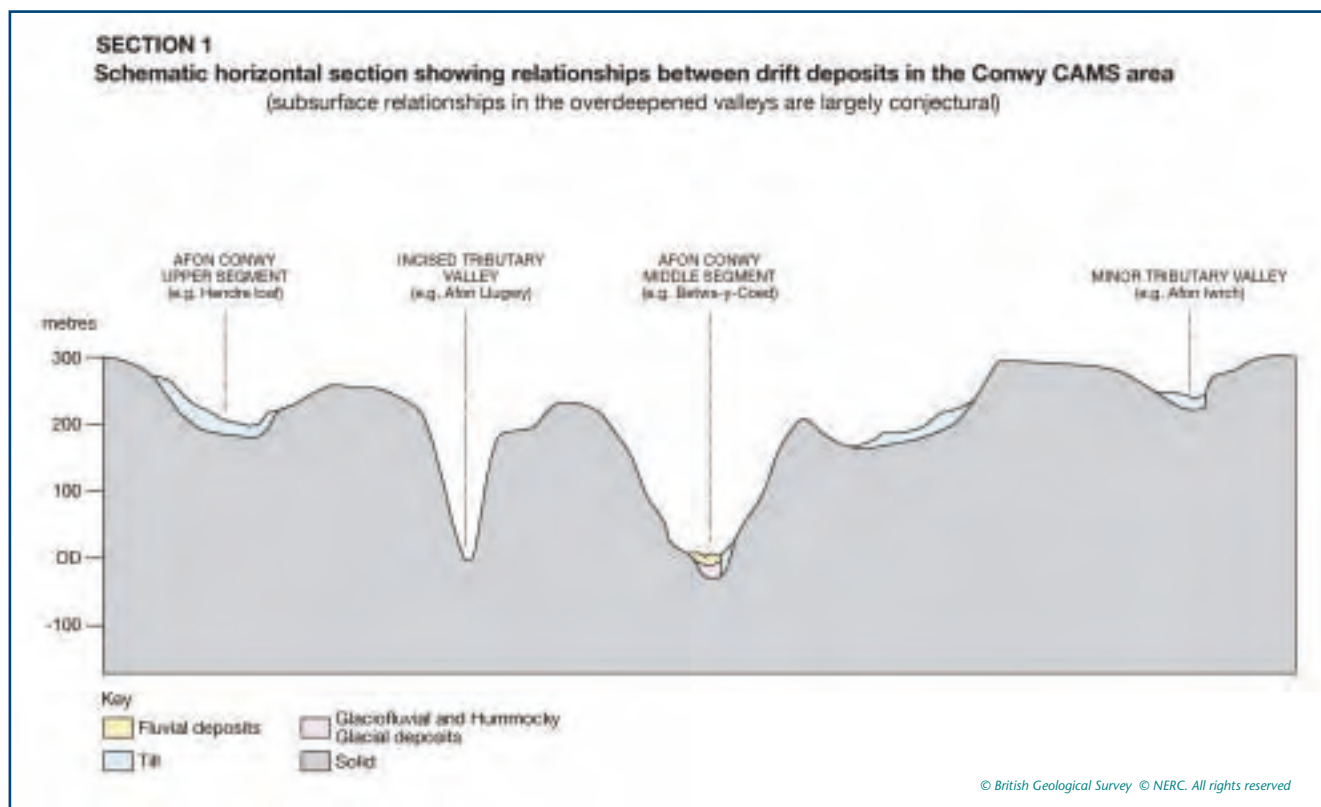


Figure 3. Cross-section 1. situated in the upper catchment.

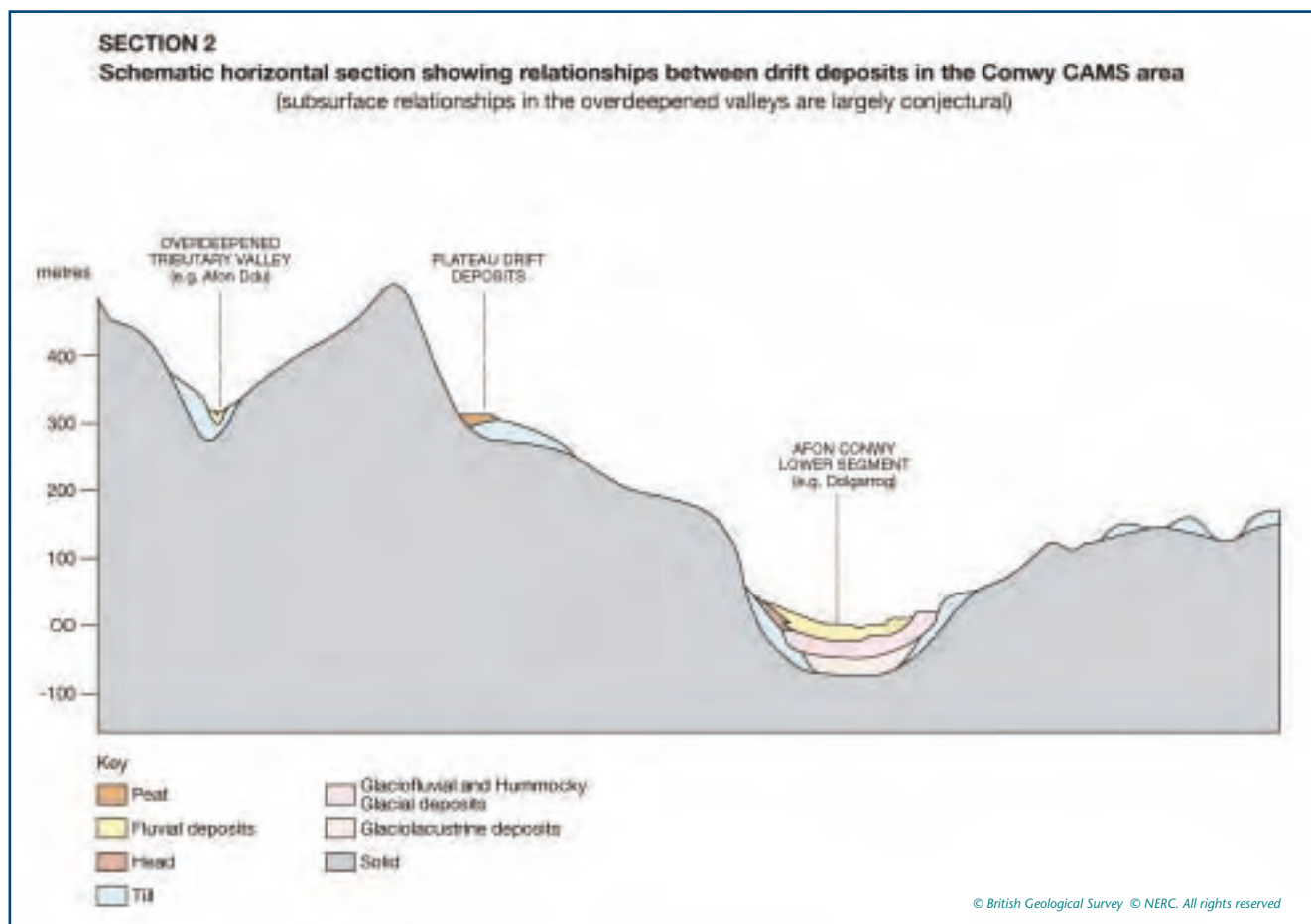


Figure 4. Cross-section 2. Situated across the lower catchment.

SECTION 3
Schematic horizontal section showing solid geology of the Conwy CAMS area (drift deposits not shown)



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Figure 5. Cross-section 3. Situated across the central catchment.

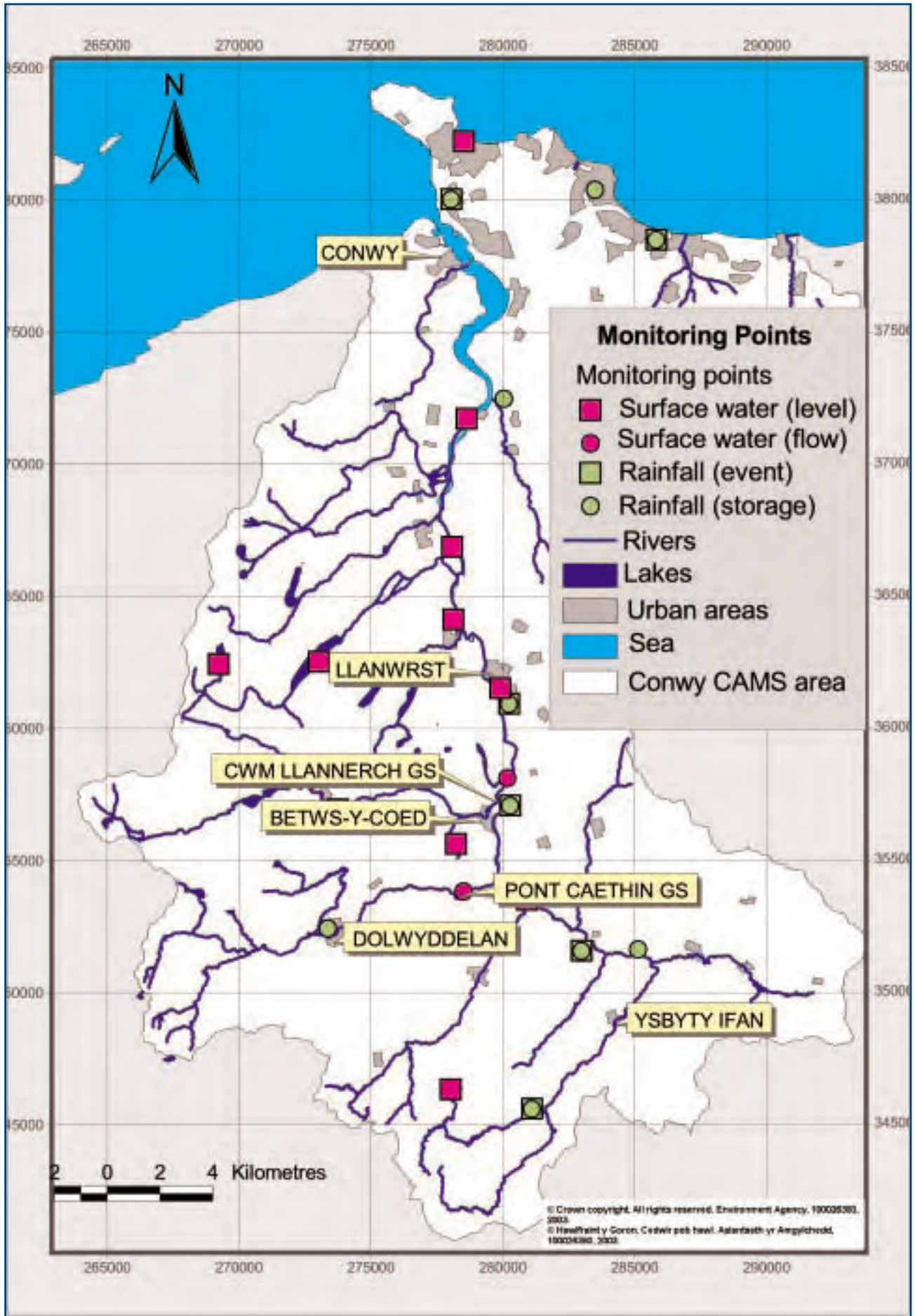
3.3 Hydrological Monitoring

Water resources in the catchment are monitored by a hydrometric network. Data from this network is used on a routine basis for drought and flood monitoring, water resource investigations and has also been used to assess resource availability in this CAMS. *See Map 2.*

The catchment is served by two flow gauging stations (GS). Pont Caethin GS is situated on the Afon Lledr, approximately 2km upstream of the confluence with the main river. Cwm Llannerch GS is on the main river 6km upstream of the tidal limit. Level readings are taken every 15 minutes at both stations and flows are calculated using established level to flow relationships. There are five other sites in the valley measuring river levels which are also telemetered, sending in readings every 15 minutes.

Those at Tal-y-cafn, Dolgarrog and Trefriw were initially installed to monitor any changes in tidal surges following the construction of the Conwy tunnel which conveys the A55 under the river estuary. Conwy Falls GS measures flow into the conwy fish pass. When low flows are detected, entrance to the tunnel is closed and water redirected over the Falls to ensure the compensation flow, set to protect flora in the steep gorge, is met. The fifth river level gauge at Pont-y-Fawr in Llanwrst is primarily to measure flood levels.

Map 2. Gauging stations and rain-gauges in Conwy CAMS area



3.4 Major abstractions, transfers and discharges

Several Hydro-Electric Power (HEP) schemes operate in the catchment, some for small businesses such as the woollen mill at Trefriw, and another, at Dolgarrog, for the production of energy for the National Grid. (See Map 3).

Both of these, plus Llyn Dulyn HEP, are located on tributaries which discharge downstream of the tidal limit and are not included in this strategy (see section 5.6). Of the two HEP schemes within the remaining Conwy CAMS area, the Ceunant Ty'ny Ddol scheme is one of the few constrained licences in the catchment, with a hands off flow of 70l/s and the other at Penmachno is no longer operated although the licence still exists.

HEP schemes are generally considered to be non-consumptive. If the degree of abstraction is likely to impact on the reach which is being depleted i.e. the section between abstraction and discharge, the abstraction licence will be issued with Hands Off Flow conditions. Since the mid 1990's, EA Wales has applied a consistent methodology to the investigation and determination of proposals for run of river hydropower developments in North Wales. Further applications for HEP schemes will continue to be determined on their individual merit taking account of the need to protect minimum flows and flow variability. There are eight major public water supply (PWS) abstractions within the Conwy catchment, the licences for which are all held by Dŵr Cymru.

These are all surface water abstractions (SWA). Four of the licences are for abstraction of water from reservoirs situated outside of the main CAMS area. These reservoirs are inter-linked by tunnels and leats and form an integrated system for hydropower generation and PWS. This area will be managed as a separate water resource management unit, WRMU3. The remaining PWS abstractions are in WRMUs 1&2 (see Map 7).

Figure 6. shows the relative abstracted values of the various types of abstractions in management units 1 and 2. Figure 7. shows the relative abstracted values for WRMU3.

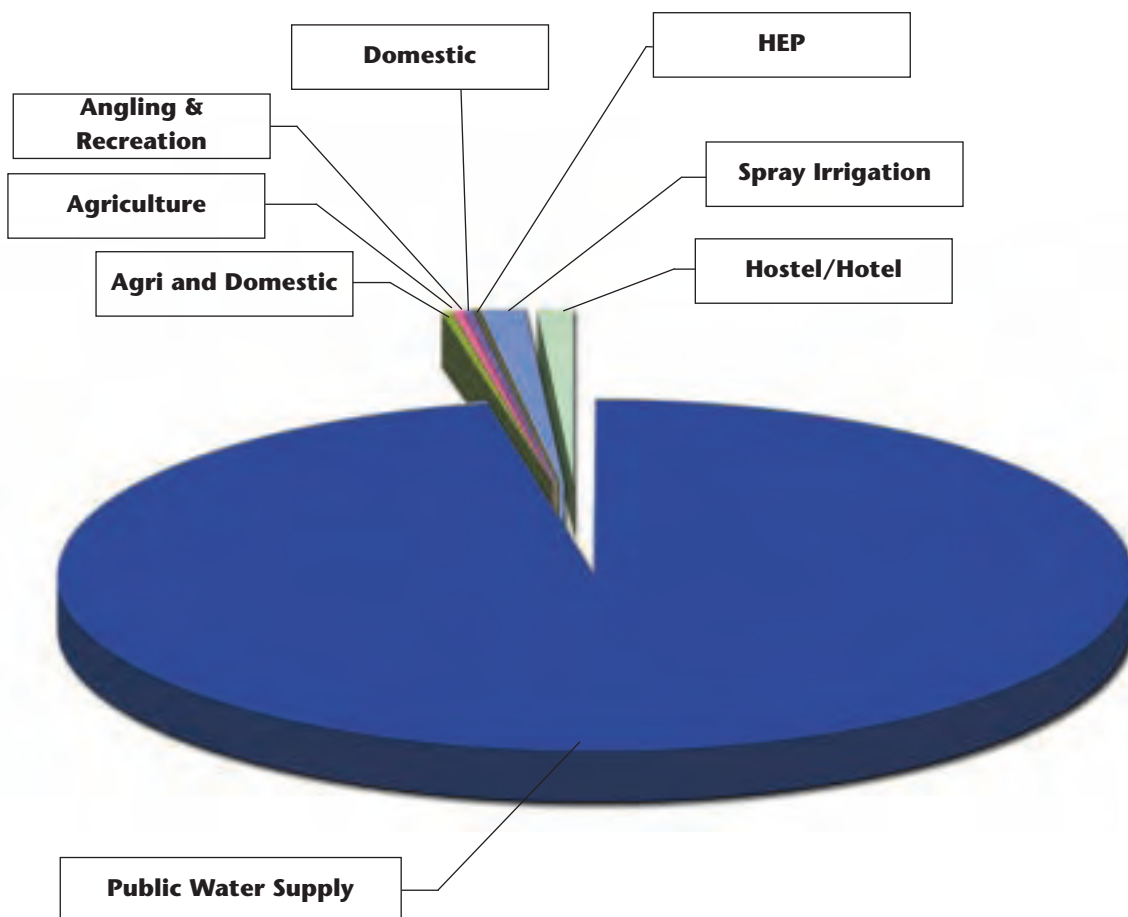
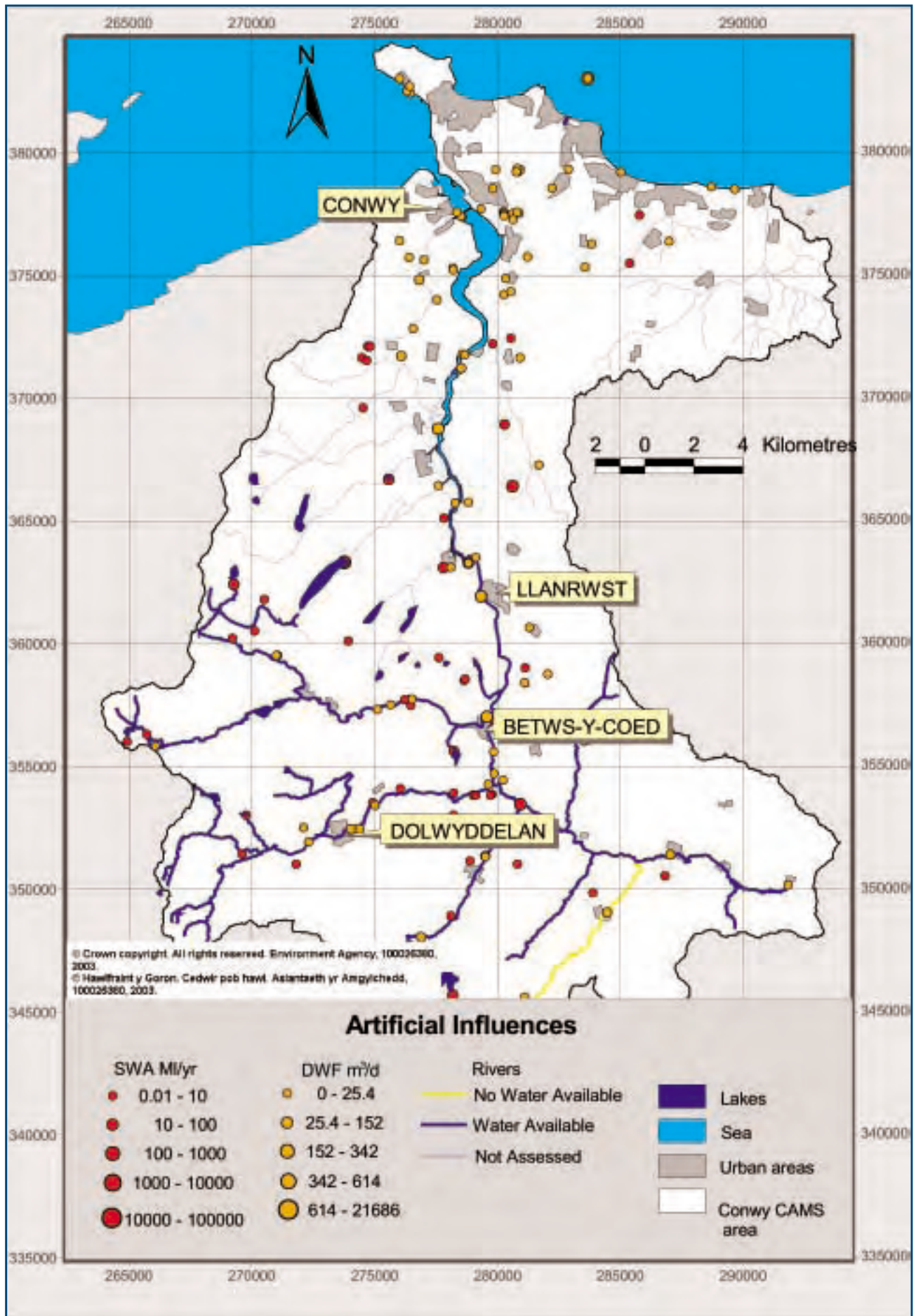


Figure 6. Relative abstracted values in Water Resource Management Units 1&2.



Map 3. Artificial Influences in Conwy CAMS area.

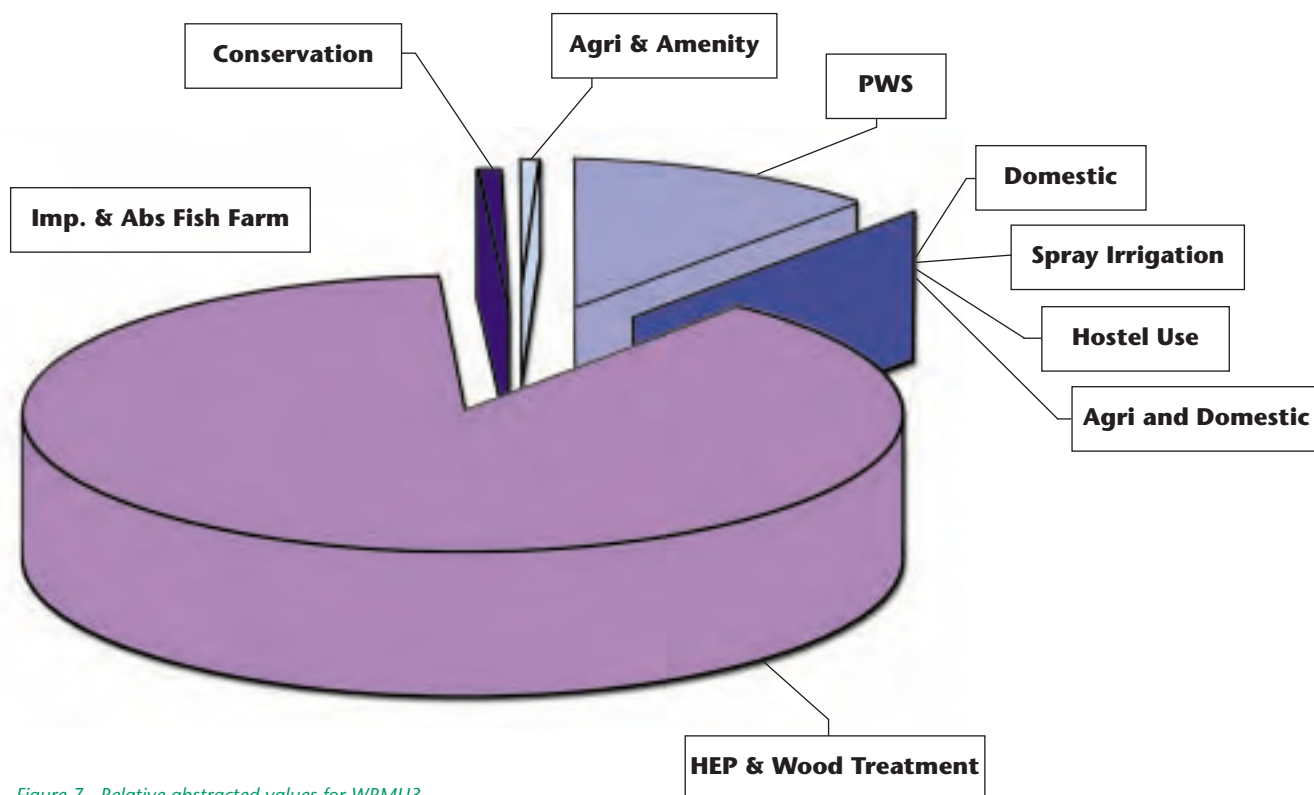


Figure 7. Relative abstracted values for WRMU3

The largest challenge to maintaining the public water supply (PWS) in the catchment is the influx of tourists during the summer months. There is a 100% increase on the demand from Llyn Elsi for Betws-y-Coed, a 50% increase at Capel Curig from Ffynnon Llugwy and a 40% increase at Llanrwst from Llyn Cowlyd.

Of the remaining 53 abstraction licences 22 are for domestic purposes, 8 for hotels, hostels and public WCs, 7 for agricultural and domestic purposes (but NOT spray irrigation), 5 HEPs, 4 spray irrigation, 3 fish farms, 2 for agricultural use only and 2 for conservation purposes.

Many of the consented discharges in the Conwy catchment area do not specify an amount. This makes it impossible to know the exact volume of water returned to the catchment. There is very little industry in the Conwy catchment area, and therefore most of the discharged waters are from sewage treatment works (STW), fish farms and Hydroelectric Power Schemes (HEP).

The majority of the STW are situated in small villages and are only required to deal with small volumes (<100m³/d). The larger towns, such as Llanrwst, Dolwyddelan and Betws-y-Coed whilst handling larger amounts, are still only consented to discharge <700m³/d. The largest discharge by far (89% of the total consented discharged amount for the catchment) is made out to sea from Ganol STW. A substantial amount of the water abstracted for public supply is therefore not returned directly to the catchment. Discharges are measured in terms of Dry Weather Flow (DWF). This sets a minimum dilution for the effluent.

3.5 Water Quality

There are some water quality concerns in the upper catchment due to acid rain and any abstractions which would result in reduction of dilution of polluted mine waters would also be cause for concern.

The water quality of the river and its main tributaries is monitored as part of the General Quality Assessment (GQA), the biological component of which is carried out every five years. The last two surveys were conducted in 1995 and 2000. The Conwy has shown very little change in biological quality since 1995, having 82% of sites classified as either good (B) or very good (A). There were only three sites which showed a biological downgrade, and only one of those was classed as significant. That was on the Gyffin, a tributary which discharges downstream of the tidal limit. No explanation for the change in grade could be found. It may be the result of an isolated pollution incident.

Upstream of Fairy Glen, Afon Machno.



3.6 Land Use

The catchment is predominantly rural with sheep farming as the main land-use to the west and mixed dairy, beef and sheep farming to the east. Land cover is shown spatially in Map 4 and by percentage in figure 8. The lowland flood plain area, downstream of Betws-y-Coed, has some arable farming which requires an enhanced level of drainage. The area is designated an Internal Drainage District (IDD) and is administered by the Environment Agency.

To the west of Betws-y-Coed there is a large afforested area, Gwydyr Forest. This is maintained and managed by Forest Enterprise. The forest contains many abandoned mine adits which leach mine waters containing metals into several tributaries of the main river. This is exacerbated by the effects of acidification, most apparent in the upland catchments of Lledr, Machno and Llugwy.

The upper catchment is given over to mainly sheep farming. This area is most affected by acid rain and the thin peaty soil is best suited for grazing.

At the other end of the catchment, Conwy estuary is in part managed by the Royal Society for the Protection of Birds (R.S.P.B). It has important salt marshes which have been landscaped into several ponds for observation purposes.



Sheep grazing on the banks of Afon Conwy.

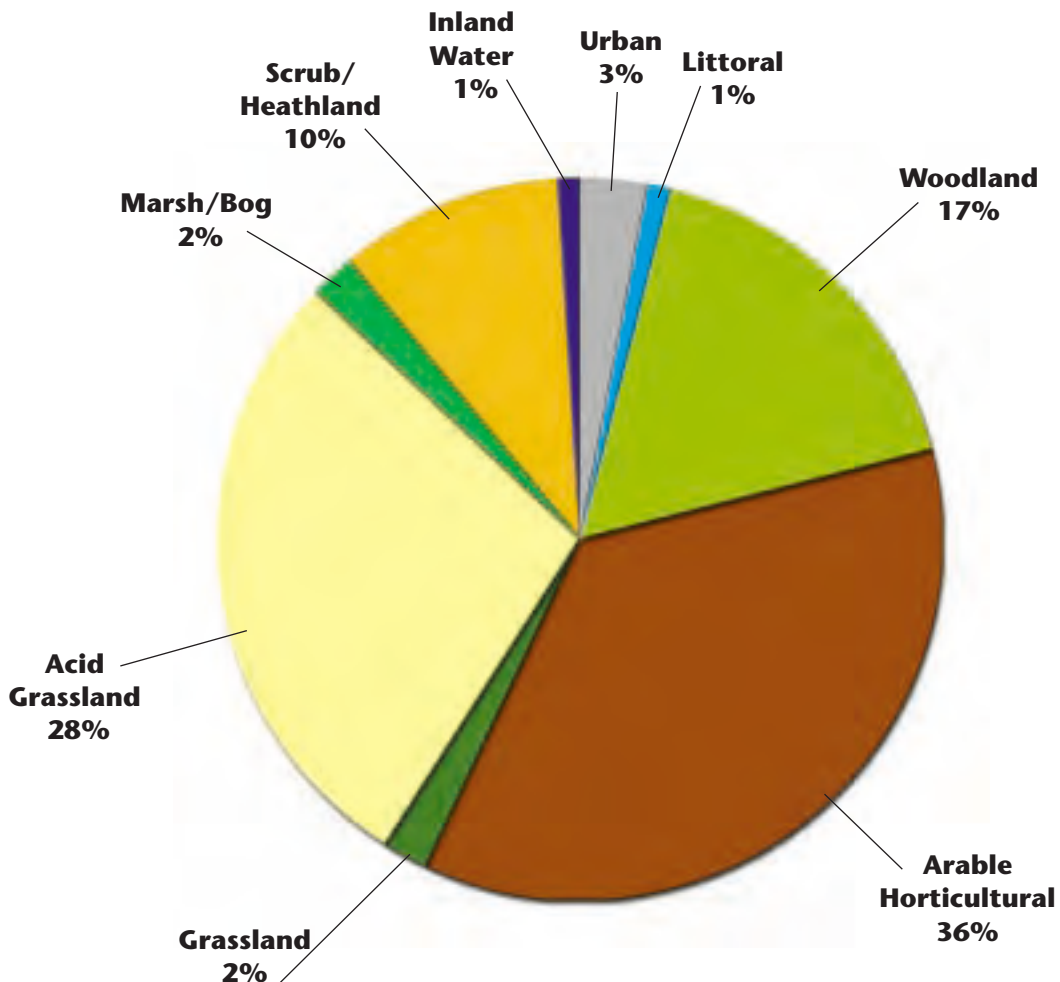
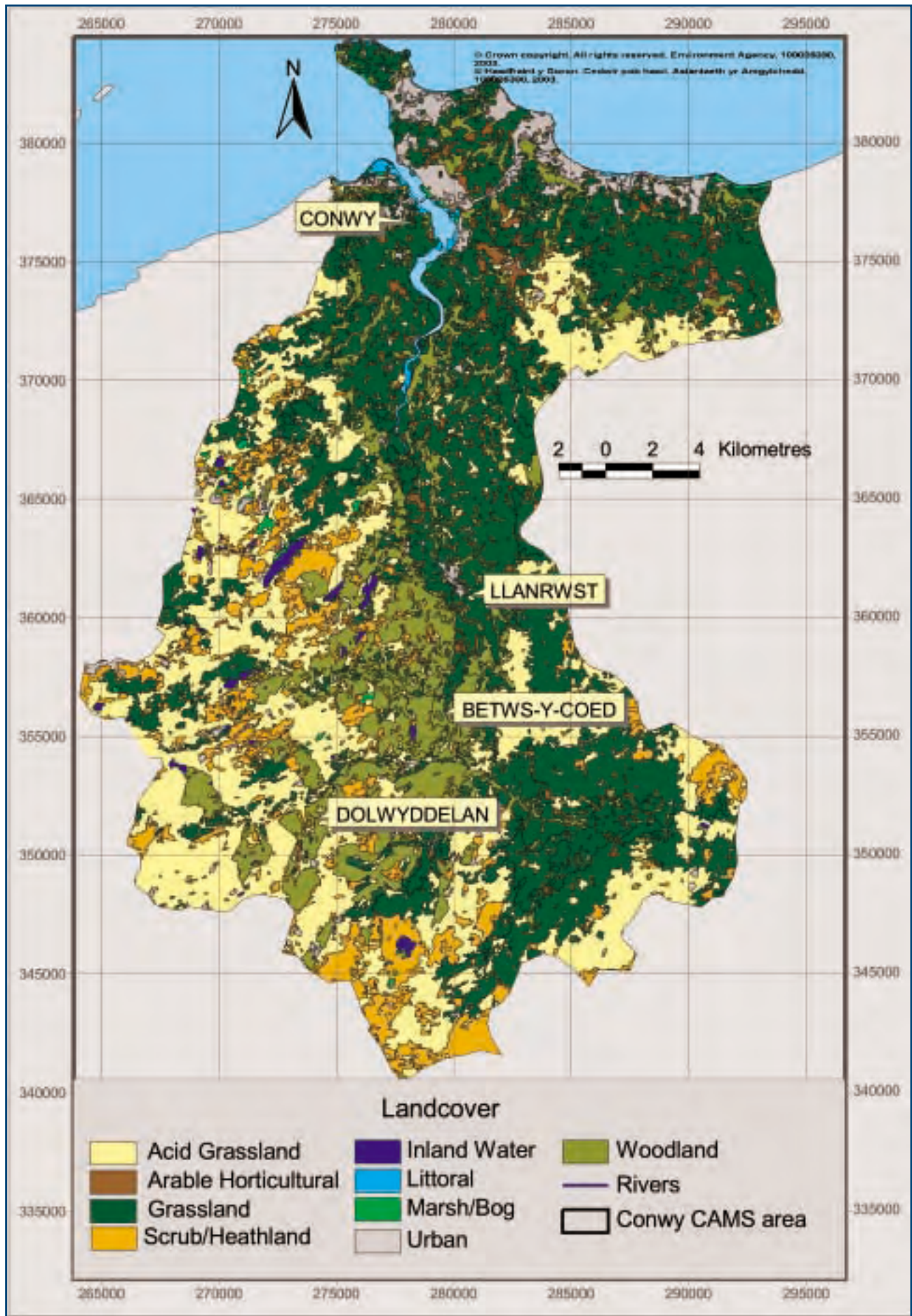


Fig 8. Percentage land use in Conwy CAMS area



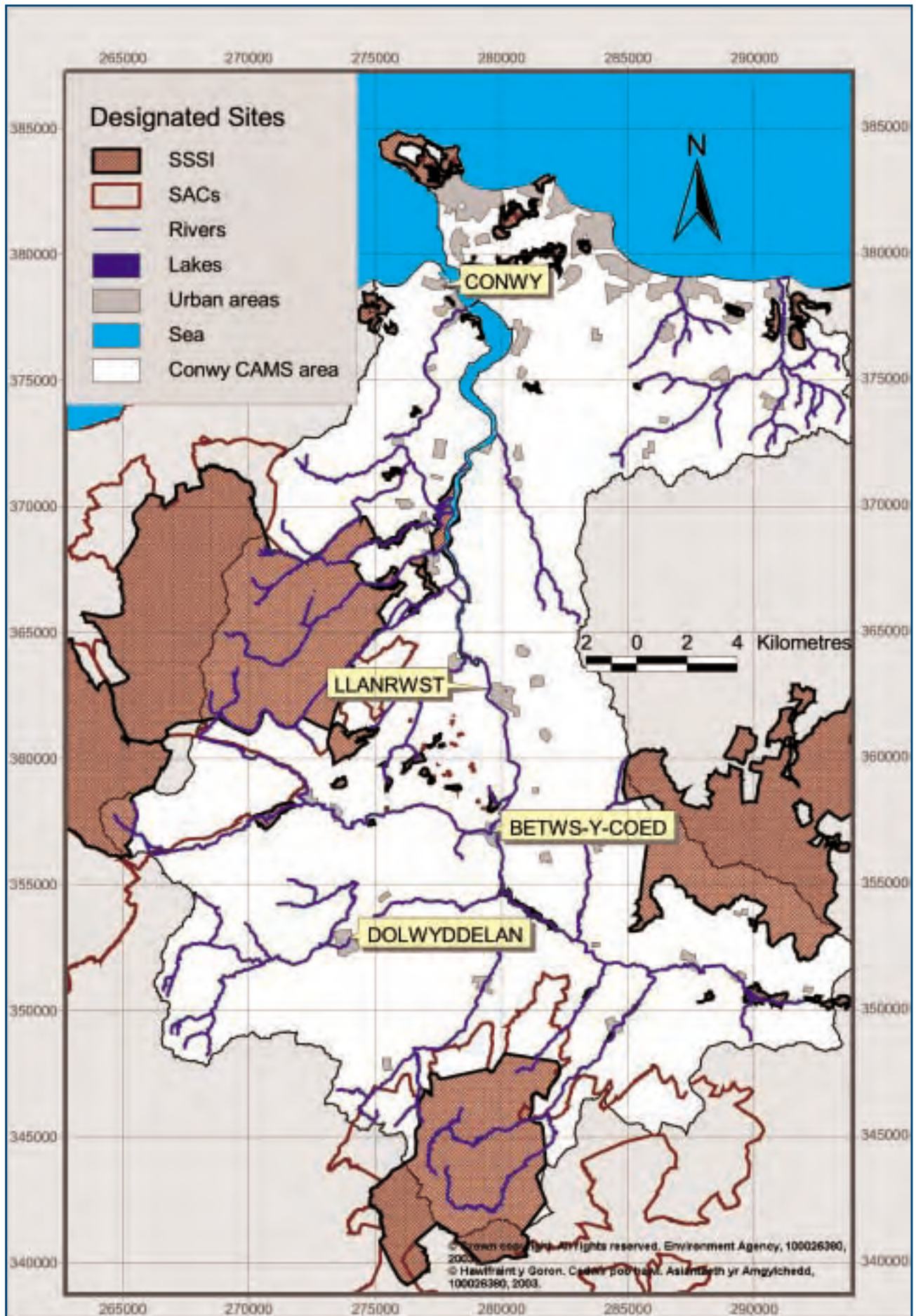
3.7 Ecology and Fisheries

The Conwy catchment is an important salmon and sea trout fishery. There are 15 angling clubs which fish the Conwy and its tributaries. They are amalgamated into the Conwy Valley Fisheries Association. The opening of the Conwy Falls Fish Pass in 1993 has extended salmonid spawning grounds to the upper Conwy, although angling for these fish above the Falls is prohibited by local bye-law. River fishing for brown trout is permitted above the falls and also on the lower Conwy, Llugwy and Machno.

The catchment contains many important conservation sites. The western and southern aspects of the catchment fall within the Snowdonia National Park. There are 5 candidate sites for designation as Special Areas of Conservation (cSAC) under the Habitats Directive in the catchment and 46 Sites of Special Scientific Interest (SSSIs), 25 of which are water dependant. See *Map 5*.



Leaping salmon above Conwy Fish Pass.



3.8 Recreation and Amenity

Tourism plays a large part in the local economy. The use of the estuary at Conwy for recreation, in particular motorised craft, has resulted in the introduction of a voluntary code of conduct to prevent disturbance of nesting estuarine birds. This is patrolled by the Conwy Estuary Users Group.

Further up the river there is the town of Betws-y-Coed, a major tourist attraction in the valley.

Apart from angling, another popular sport is canoeing. There are access agreements in place between anglers and the Welsh Canoeing Association to minimise damage to spawning grounds. Canoeists are concerned that the river reaches in some areas have become more flashy i.e the rate of run off in some places has been increased, possibly due to land drainage improvement works. This also means that the length of time the rivers 'stay up' has been reduced.

4

Resource Assessment and Resource Availability Status

4.1 Introduction

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

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

To easily provide information on the availability of water resources within a catchment that may be used for consumptive purposes, a classification system has been developed. This 'resource availability status' indicates the relative balance between committed and available resources, showing whether licences are likely to be available and highlighting areas where abstraction needs to be reduced. This does not replace the need for licence determination process which is applied to individual licence applications. More information on the determination process is given in Annex Two of Managing Water Abstraction.

There are four categories of Resource Availability Status (RAS), as shown in *Table 1*.

So that water resources are assessed consistently in similar situations, a framework for resource assessment and

management to be applied in all CAMS areas has been developed.

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

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

Due to the nature of the underlying geology of the Conwy catchment area the groundwater resource is considered insignificant and groundwater abstraction has been exempt from licence control since the 1960's (see 'Gwynedd Exemption from Control Order' 1965). Accordingly there are no GWMUs in the Conwy catchment.

The catchment is divided according to sub-catchments or AP Areas. Where these are assessed as having the same Resource Availability Status they have been amalgamated to form a Water Resource Management Unit (WRMU).

Map 6 shows the AP Areas that have been defined for the Conwy CAMS. Further details on how these were defined are provided in the technical document for the Conwy CAMS.

Indicative Resource Availability Status	Definition	Colour coding for illustration on maps
Water available	Water likely to be available. Restrictions may apply.	Blue
No water available	No water available although there may be exceptional circumstances in which a licence may be available.	Yellow
Over-licensed	No water available on the basis of licensed abstractions. Full use of existing licences has the potential to cause unacceptable environmental impact.	Orange
Over-abstracted	No water available on the basis of licensed and actual abstractions. Existing abstraction is causing unacceptable environmental impact.	Red

Table 1 *Resource availability status categories*

4.2 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 (i.e. their vulnerability to abstraction impacts). It also takes account of other flow needs. These objectives represent the minimum flow that we are aiming to protect. This then affects the amount of water that is available for abstraction.

These 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 A to E, A being most sensitive to abstraction and E being the least sensitive.

Table 2 and Map 6 shows the Environmental Weighting score for each assessment point area in the Conwy CAMS catchment 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 achieved 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.

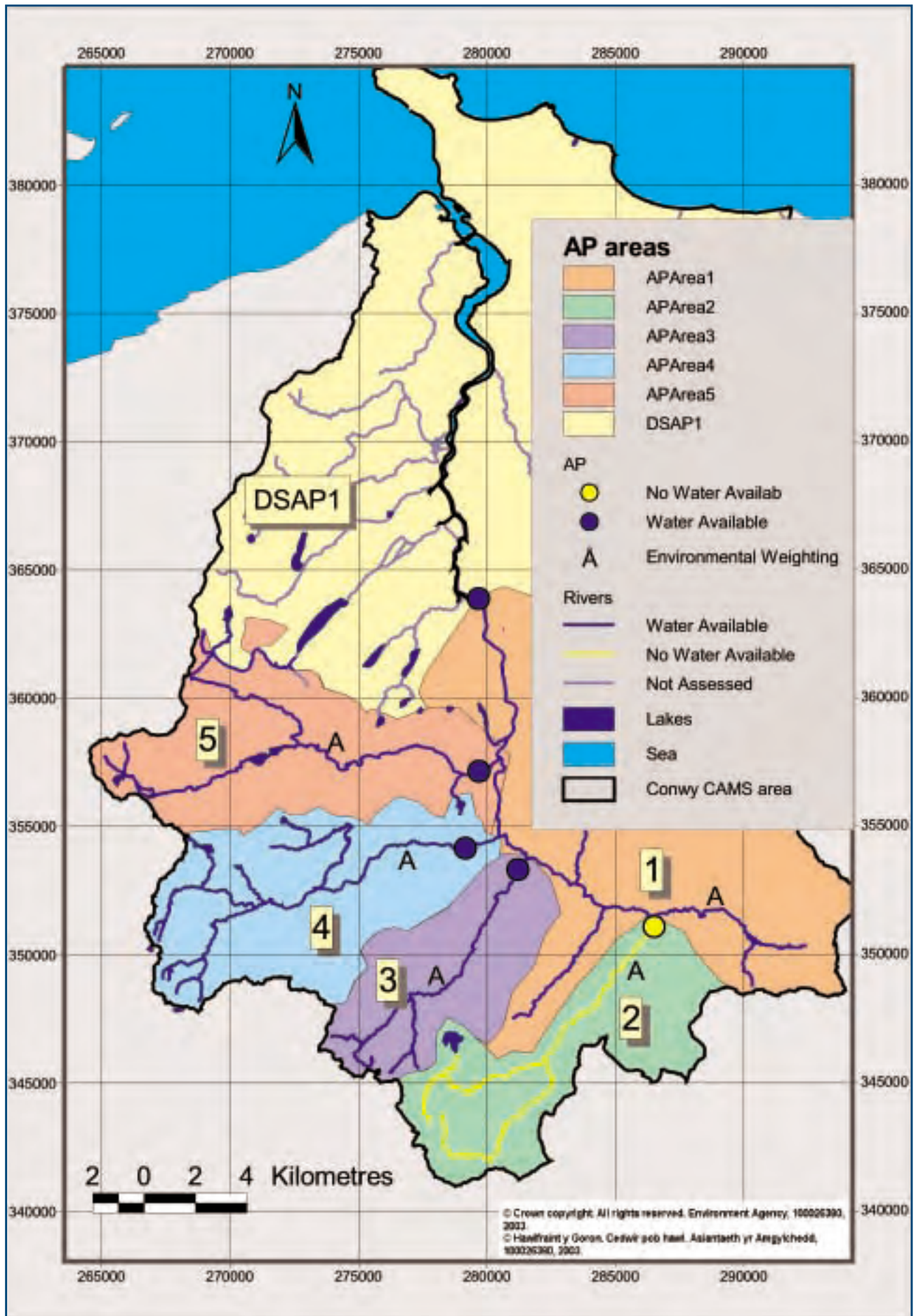
The resource assessment for surface water uses a scenario which assumes that all licences are being fully utilised; that is, the full authorised volume is being abstracted. However, many licences are not used fully and therefore in reality the resource availability can be different. If the result of 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.

Assessment Point	Water Resource Management Unit	Environmental Weighting band	Areal Extent km ²	Resource Availability Status
AP1	1	A	130	Water Available
AP2	2	A	53	No Water Available
AP3	1	A	44	Water Available
AP4	1	A	74	Water Available
AP5	1	A	73	Water Available
*DASP1	3	N/A	309	Not assessed

Table 2 Resource Availability Status of Assessment Point areas

*DSAP Downstream of assessment point 1.

Map 6. AP areas in the Conwy CAMS area with Environmental Weighting scores.



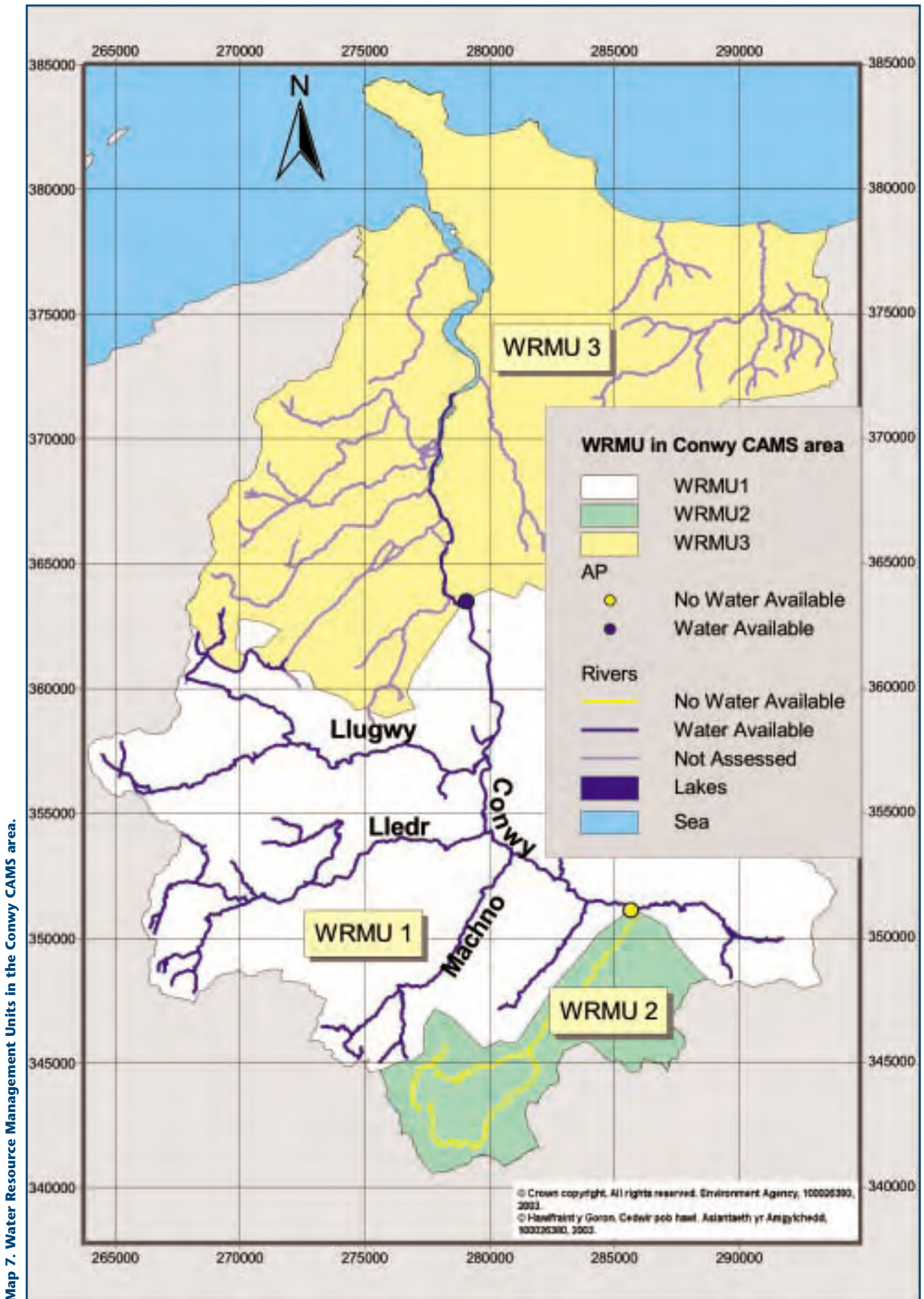
The Conwy catchment is underlain with hard Ordovician rock to the west and softer Silurian rock to the east. Neither lends itself to being a good aquifer. As a consequence groundwater in this area is mainly confined to drift deposits in the alluvial flood plain and is considered to be of negligible importance.

The catchment will therefore be managed as a series of surface water units, each draining to an Assessment Point. These AP Areas are shown on *Map 6*. There are 5 AP Areas consisting of 4 major tributaries draining into the main channel. Their areal extent and resource availability status are shown in *Table 2*. Four of the AP Areas have the same Resource Availability Status, that of 'Water Available'. These areas will be managed as one Water Resources Management Unit (WRMU).

AP Area 2 will be managed slightly differently due to its 'No Water Available Status', but the distinction will be slight as it only just falls into this category.

Also shown is the large area downstream of AP1, the tidal limit (DSAP1). As *Table 2* shows, it makes up almost 50% of the Conwy Catchment area. This area is not part of the main Conwy CAMS strategy 2003, but will be managed as one unit encompassing several 'mini' CAMS. Assessment Points have been assigned to the major tributaries in this area which drain downstream of the tidal limit. Monitoring at these points will be used to construct a theoretical hydrological model of the sub-catchment. Six of the Public Water Supply reservoirs are in this area. Large water transfers are ongoing in this area as the reservoirs are all inter-linked by tunnels and leats. Any further development in this area will be subject to an 'appropriate assessment' under the European Commission (EC) Habitats Directive, as it falls within the Eryri cSAC (*see Map 5*).

The three WRMUs are shown in *Map 7*.



5 Licensing Strategy

5.1 Sustainability Appraisal

A sustainability appraisal process has been developed to enable the 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 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 Catchment overview of licensing strategy

The Conwy CAMS area is in Gwynedd. All groundwater abstractions in this area are exempt from licensing under the Gwynedd River Authority 'Exemption from Control Order, 1965', except where deemed to be in continuity with surface water.

Most surface water abstractions do require a licence. Applications to abstract more than 20m³/d need to be advertised for two consecutive weeks in a local paper and once in the London Gazette, and details of the proposed abstraction should be displayed within 8km of the proposed abstraction point for 28 days to allow any objections to be raised.

The application is subject to appraisal by the licensing officer who will consult with internal and external consultees as appropriate. The applicant may be asked to present an Environmental Report in support of the application, the findings of which will be taken into consideration when the licence is undergoing determination.

Depending upon the findings the licence may or may not be issued, or issued with constraints designed to protect environmental needs and to prevent derogation of existing abstractions.

The Environment Agency Wales will continue to assess each licence application on its own merits. Particular regard is given to environmental impact, potential derogation of existing abstractions, protected rights of licence holders and the social and economic needs of the catchment.

Present exemption conditions will continue to apply, see 5.2. Groundwater abstraction in Gwynedd at present will remain exempt from licensing although eventually groundwater abstractors may be encouraged to register their abstraction on a Protected Rights Register. This will ensure that their water source is protected from derogation by other potential abstractors. It is proposed that eventually groundwater abstractions in Gwynedd will be licensed as long as the abstracted quantity is above a de minimis. The Agency will be required to set a local exemption threshold. It is proposed at this stage to set a 20m³/d threshold for both surface and groundwater abstractions in the North Wales area. These changes will be dependant on changes to the existing legislative framework.

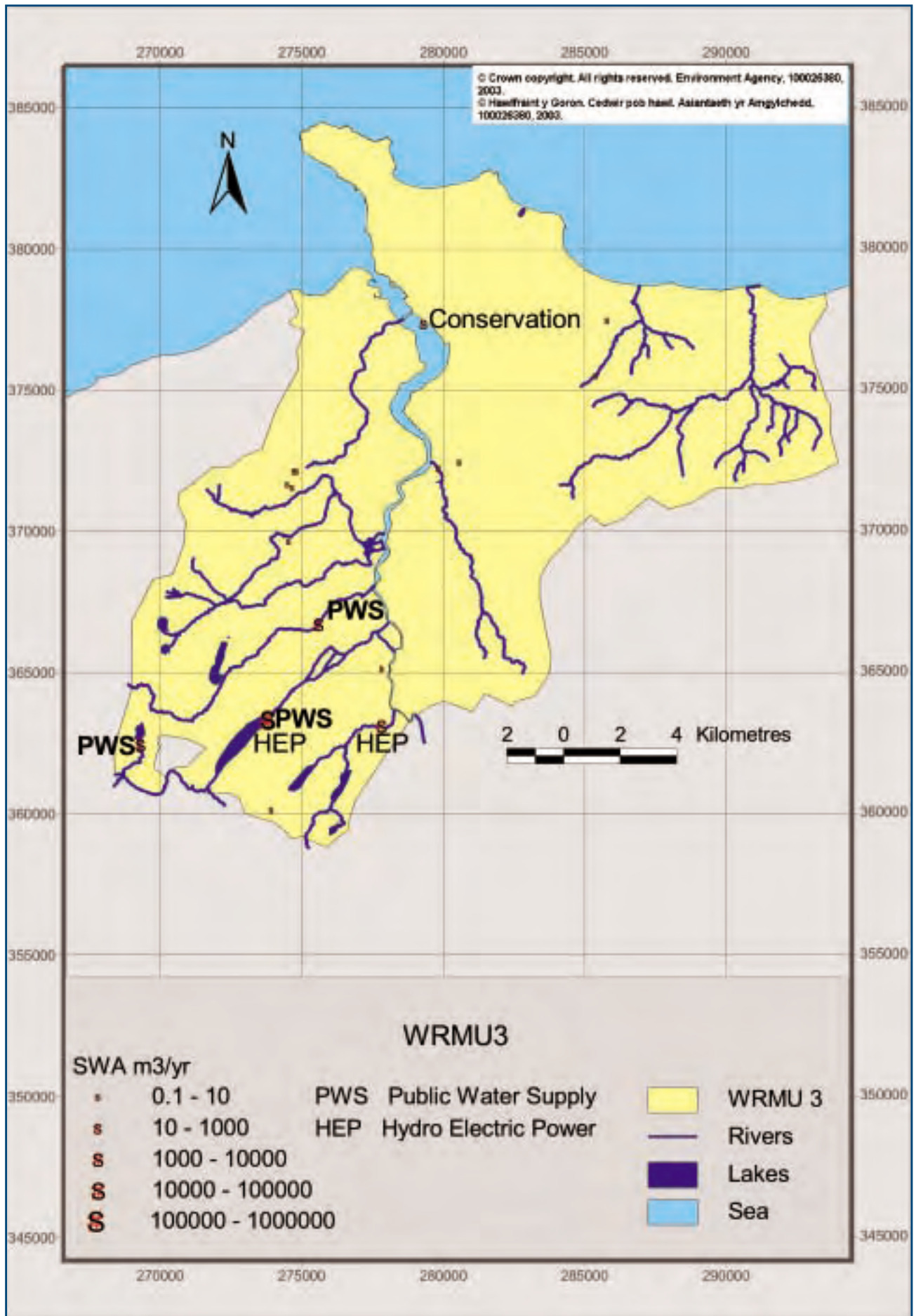
All new licences and those undergoing renewal will be subject to time-limiting constraints. This may be dependent upon the nature of abstraction and proposed water usage. Licences in a particular area will have a common end date. This will coincide with the CAMS review for that catchment area and will generally be issued for a maximum of 12 years. See Table 3.

Licensing Officers will compare quantities requested with benchmark figures derived and reported through various 'Optimum Use' research and development initiatives. Applicants will also be made aware of the five-fold hierarchy of water efficiency measures:

- good housekeeping,
- management,
- reuse,
- recycle,
- redesign.

CAMS	Start	Publication	2nd round of CAMS	3rd round of CAMS	Licence common end date
Conwy	01.04.2001	31.03.2003	31.03.09	31.03.15	31.03.16

Table 3 Conwy CAMS publication and licence end-dates



Map 8. Water Resource Management Unit 3

Ideally volumes should be negotiated with the applicant before a formal application is made.

It is Agency policy that all licences issued after Oct 2001 shall be time-limited and have regard to water efficiency.

Time-limited licences issued before this date, will, if appropriate, contain a reminder to the holder to have regard for efficient water use added at renewal. Non time-limited licences with no water efficiency conditions cannot be subject to this imposition, but the Agency will continue to encourage water efficiency as ‘best practice’.

The Resource Assessment and Management (RAM) Framework was used to assess the Resource Availability Status (RAS) of the catchment. Based on this assessment, the Conwy catchment was divided into three Water Resource Management Units (WRMU).

5.3 Water Resource Management Unit 1

5.3.1 Resource Availability Status and results of the Sustainability Appraisal.

For Water Resource Management Unit 1, The Resource Availability Status (RAS) was calculated to be ‘Water Available’. i.e. a small amount of surplus water which can be licensed without constraints until such time as this surplus water has been allocated. After that further licences will be constrained with a ‘hands-off’ flow (HoF) condition. If this quantity becomes fully utilised, the RAM Framework provides several tiers of HoF values for this RAS which will be used as successive licences are issued.

5.3.2 Guidance on the assessment of new applications

Licences to abstract from the main CAMS rivers within this unit will continue to be issued without constraints until the surplus water available has been allocated. In addition all new licences will be subject to time limiting and water efficiency will continue to be expected as best practice. There are no plans for industrial, commercial or domestic developments before the next round of CAMS in this catchment area. Applications are likely to be small and for domestic or agricultural purposes.

5.3.3 Renewals and management of existing licences

As there is no discernible impact in WRMU 1, licences will continue to be renewed at their present rate of abstraction unless abstractors wish to increase the volume of abstraction and can demonstrate a need and water efficiency. Variations of existing licences will present the opportunity for time limits to

be added and water efficiency measures to be appraised. Applications are subject to 3 tests, justification of need, water efficiency and sustainable management of the resource.

5.4 Water Resources Management Unit 2

5.4.1 Resource Availability Status and results of the Sustainability Appraisal

Water Resource Management Unit 2 at present only supports one abstraction licence, that of the Public Water Undertaking from Llyn Conwy. The RAS of this unit was assessed as ‘No Water Available’. The Ecological River Flow Objectives (RFO) from which the RAS is derived were met 94% of the time based on a worst case scenario of assumed full licence abstraction.

5.4.2 Guidance on the assessment of new applications

There are no discernible ecological impacts due to abstraction in WRMU2 and as in WRMU1 there are no plans for industrial, commercial or domestic developments before the next round of CAMS. Any licence applications in WRMU2 are likely to be small and for domestic or agricultural use. The licensing strategy for this unit will be to remain at ‘No Water Available’, therefore the consumptive value of an application will be considered. Any additional licences are likely to be constrained with a ‘hands-off’ flow condition to protect low flows variability and minimum flows.

5.4.3 Renewals and management of existing licences

There is only one abstraction licence in WRMU 2, that of the public water supply from Llyn Conwy. This licence is not fully utilised and is unlikely to require a variation upwards before the next round of CAMS. As the RFOs are met 94% of the time, there is little justification for revocation of all or part of this licence. It will continue to function as under the present conditions

5.5 Water Resources Management Unit 3

5.5.1 Resource Availability Status and results of the Sustainability Appraisal

To the west of the main river channel, Water Resources Management Unit 3 is made up of four naturally occurring sub-catchments containing 5 reservoirs. These are inter-linked by tunnels and leats which convey water from one reservoir to another. There are several licences operating in this area, (see Map 8). There are three Public Water Supply abstractions and two abstractions to generate Hydro Electric Power and one in

the estuary to augment the R.S.P.B. nature reserve. The remainder of the abstractions in this unit are relatively small and mainly for domestic use.

The tributaries for this unit drain into the main channel below the tidal limit and so it is difficult to assess the effect, if any, they may have on the main river flow. Due to the complex nature of WRMU3 the Agency is undertaking a modelling project in partnership with the abstractors and conservation authorities. Until this project has been appraised a Resource Availability Status for this unit is not available.

5.5.2 Guidance on the assessment of new applications

It is unlikely that there will be any applications for significant abstractions in WRMU3 before the next round of CAMS. There are no plans for any further commercial, industrial or domestic development in this area. Any new applications will be assessed on their individual merits.

5.5.3 Renewals and management of existing licences

The major licensed abstractions in WRMU3 are for public water supply. As there are no associated issues with these abstractions and as there are no plans to apply for an increase in quantities, these licences will continue to be managed as at present.

5.6 Opportunities for licence trading in the Conwy 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 abstraction rights between two or more parties. More detailed information is available in Section 4 of '*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 abstraction licence trading within current legislation. Consultation on more detailed proposals will follow in spring 2003. After considering responses to the consultation exercise, in the Autumn of 2003, further information will be made available to update Licence Holders on the Agency's conclusions for a detailed framework within which licence trading will take place.

5.7 The impact of the Water Bill

The Government, as well as the Environment Agency and other organisations, considers that significant changes to the water abstraction authorisation system are now needed in order to

help ensure that we continue to use water resources sustainably. Over the last few years, Government proposals and decisions have been set out in a series of consultation and decision papers, resulting in the publication of a draft Water Bill in November 2000. The proposed Water Bill will complement existing Agency initiatives, such as the review and curtailment of damaging abstractions, the development of a framework for trading in water rights, implementation of the Agency's policy on time limiting licences and the development of CAMS.

The Bill was included in the Queen's speech in November 2000 and is currently being considered by Parliament. When enacted, the responsibility for many of its provisions will fall to the Agency and will result in significant changes to the water resources authorisation system over a period of years. In order to support the implementation of the new legislation, the Agency will produce clear guidance both for Agency staff and existing or potential licence holders and other key stakeholders in order to explain and facilitate the introduction of these important changes.

6

Future developments in the Conwy CAMS area

Although there are several different types of commerce in the area, most are dependent upon tourism. With a Water Resource *Status of Water Available* for virtually all of the catchment, it is unlikely that further development will be limited by abstraction.

Gross Domestic Product figures from the Office of National statistics puts the prosperity of the North Wales Valleys, such as Conwy, at less than 75% of the European Community average. This makes the area eligible for Objective I funding and Assisted Area Status. Most of the jobs are seasonal, mostly tourist service industry and catering. According to the 2001 Census only 9.9% of full time employment was in manufacturing.

Conwy Borough Council hopes to grant planning permission to new industries which will create 6400 jobs by 2013. Sites close to urban centres and the A55 have been reserved for this purpose. The area in the Conwy CAMS to be allocated to industry and office developments is 3 hectares at Llanrwst.

It is understood that 135 new houses may be built in Llanrwst between 1998 and 2013, but new housing elsewhere in the area will be restricted to existing buildings. It is unlikely that these new developments will put a strain on either water supplies or discharge facilities.

7

Post-CAMS appraisal

The Environment Agency Wales will review the Conwy CAMS in 2007 and publish the revised strategy in 2009. In the interim success of the first CAMS will be assessed using the following indicators.

- Resource status of WRMU 1 moves **towards** 'No Water Available' resource availability status. Licences will continue to be granted without constraints until the all surplus water has been allocated. A tiered system of 'Hands off Flows' constraints will then be applied for consumptive licences.
- Resource availability status of WRMU 2 remains the same at 'No Water Available'. The unit will not be ecologically compromised by the introduction of consumptive abstraction licences.
- The agency will continue to protect the significant contribution by WRMU 2 to Public Water Supply.
- The ecology of the catchment area will continue to be monitored through the Headline Indicator (3 year rolling) programme, and the Junior Salmon Monitoring Programme (5 year rolling programme). In addition the upper Conwy has several sites which are monitored every year to assess the success of the Conwy Fish Pass.
- Inspections of abstractions within the CAMS area will continue to be made to ensure compliance.
- Water efficiency will continue to be encouraged.
- The Agency will continue to ensure that protected rights are not affected.
- New licences will be issued which will continue to protect low flows and flow variability.
- A hydrologic model of WRMU 3 will be completed in time for the next round of CAMS.

Glossary

Glossary of Terms

Abstraction	Removal of water from a source of supply (surface or groundwater).	Consent conditions	Terms under which a discharge consent is issued, typically covering limits on flow rate and quality of water discharged, in order to protect the needs of the receiving water and of key end users
Abstraction impact	The affect of water abstraction on the river and environs.	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.
Abstraction licence	The authorisation granted by the Environment Agency to allow the removal of water from a source.	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.
Alluvial deposit	Layers of sediment resulting from the activity of rivers. Usually fine material eroded, carried, and eventually deposited by rivers in flatter areas such as flood plains or lake beds.	Demand	The requirements for water for human use.
Aquifer	A geological formation, group of formations or part of a formation that can store and transmit water in significant quantities.	Demand management	The implementation of policies or measures which serve to control or influence the consumption or waste of water.
Artificial impacts	Combined impacts of abstraction and discharge on flows at the assessment point.	Derogate	To depreciate or diminish - used in abstraction licensing where a proposed new licence would reduce resources to an existing authorised abstraction.
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	Derogation	In legal terms, the taking away of protected rights under the Water Resources Act due to the granting of a new licence.
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.	Designated water dependent sites	Legally defined nationally and internationally important sites potentially affected by water management or water quality issues.
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.	Discharge	The release of substances (i.e. Water, sewage etc.) into surface waters.
Borehole	Well sunk into a water bearing rock from which water will be pumped.	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.
Catchment	The area from which precipitation and groundwater will collect and contribute to the flow of a specific river.	Drift	A loose, deposit of sand, gravel, clay etc.
Compensation flow	Water released from reservoirs to maintain a flow in the river downstream.	Drought	A general term covering prolonged periods of below average rainfall resulting in low river flows and/or low recharge to groundwater,
Confluence	The point where two or more streams or rivers meet		

	imposing significant strain on water resources and potentially the environment.			reflect not only natural runoff from the catchment, but also artificial influences (abstraction, discharge etc) that occur upstream of the measurement point.
Dry Weather Flow	DWF (Dry Weather Flow) is essentially the flow in the sewer system when there is no rain. Most sewers accept rain water either as surface water from roads or roof water from buildings. It includes domestic sewage, trade inputs and infiltration which is the amount entering the pipework from groundwater. The official definition is ‘the average daily flow to the treatment works during seven consecutive days without rain (excluding a period which includes public holidays) following seven days during which the rainfall did not exceed 0.25 millimetres on any one day.’	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).
		Groundwater Management Units		Administrative sub-divisions of aquifers, defined on geological and hydrogeological criteria, which form the basis for groundwater resource management and licensing policy decisions.
Ecosystem or Ecological River Flow Objectives/ level requirements	The minimum river flows (or water levels) required to protect ecological objectives.	Groundwater Protection Policy		Environment Agency policy relating to groundwater recharge areas to control activities having the potential to pollute underground water.
Environmental allocation	The amount of water that is required to support the ecology of a river.	Habitat		Place in which a species or community of species live, with characteristic plants and animals.
Environmental flow/ level requirements	River flow or water level needs within a catchment to prevent ecological damage.	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.
Environmental impact	The total effect of any operation on the environment.	Hands-Off Level		Level below which an abstractor may be required to stop or reduce abstraction (i.e. groundwater level or river stage, to be specified on a licence, as a condition of that licence).
Environmental River Flow Objectives	The minimum river flows from the area required to protect ecological and other environmental objectives.	Homogenous Hydrogeology		To be of the same kind. Branch of hydrology concerned with water within the Earth’s crust.
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.	Hydrology		The study of water on and below the earth’s surface.
Fauna	Animal population of a particular area or epoch.	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
Flood plain	Land adjacent to a watercourse that is subject to flooding.			
Flora	Plant population of a particular area or epoch.			
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			management and planning, water quality and ecological protection and improvement, flood defence design, flood forecasting and flood
Gauged flow records	Records of flow in river as conventionally measured. They			

	warning.		
Hydrometry	The measurement of water on or below the earth’s surface.	Public water supply	Term used to describe the supply of water provided by a water undertaker.
Hydropower	Power generated from the natural gravitational fall of water by the installation of turbines, water wheels etc	Q50	The flow of a river which is exceeded on average for 50% of the time.
Internal Drainage Board	Internal Drainage Board. A local land drainage authority with powers to raise finance and do works.	Q95	The flow of a river which is exceeded on average for 95% of the time.
Land drainage	Actions taken to reduce waterlogging of agricultural land and to minimise flood risk.	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).
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.	Reach	A length of river
		Recharge	Water which percolates downward from the surface to the water table.
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.	Resource Availability Status (RAS)	The status of remaining resource availability defined for a river reach or groundwater management unit by application of the RAM framework for CAMS. Applies to low flow (Q95) condition and maybe: Water Available(WA-blue), No Water Available (NWA-yellow) Over Licensed (OL-orange) Over Abstracted (OA-red).
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.	River	An open channel in which inland, surface water can flow.
Licence trading	A commercial transaction for the purpose of transferring an abstraction licence between two parties.	River corridor	The continuous area of river, river banks and immediately adjacent land alongside a river and its tributaries.
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.	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.
Main river	The watercourse shown on the statutory ‘Main River Maps’ held by the Agency and MAFF. The Agency has permissive powers to carry out works of maintenance and improvements on these rivers.	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.
Managing water abstraction	Document produced in May 2001 on the CAMS Process	River reach	Unit of a river between two assessment points, delineated for the purposes of abstraction licensing and resource management.
Non-consumptive	This is where all abstracted water is returned to source a relatively short distance downstream of the abstraction point.	Scenario flows	The flows, which would leave the assessment point in the specified year, based on the assumed scenario abstractions and

	discharges.		
Source of supply	Either an inland water (river, stream, canal, lake, etc.) or underground strata. See Section 221 WRA91.	Telemetry	and environmental decisions. 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.
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.	Threshold	A Hands Off Flow (HOF) value within a sequence of HOFs, each INT MI/d higher than the previous.
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.	Tidal limit	The most upstream point within an estuary or river where water levels are subject to tidal variation.
Spray irrigation	Abstracted water sprayed onto grassland, fruit, vegetables etc. Can have a high impact on water resources.	Time limited licence	Licence with specified end date.
Springs	These occur where the water table intersects the ground surface.	Topography	Physical features of a geographical area.
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.	Treatment works (also Waste water treatment works)	Sewage treatment Works or Water Treatment Works.
Surface water	This is a general term used to describe all the water features such as rivers, streams, springs, ponds and lakes.	Trickle irrigation	The irrigation of crops by taking water direct to roots of plants, but without spraying or ejecting into the air.
Surface water catchment	The area from which runoff would naturally discharge to a defined point of a river, or over a defined boundary.	Water resource	The naturally replenished flow or recharge of water in rivers or aquifers.
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: <ul style="list-style-type: none"> - 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. 	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 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.
Sustainable management	The interpretation of the principles of sustainable development at a local/regional level within the boundaries of national and international political, economic		

List of Abbreviations

AONB	Area of Outstanding Natural Beauty.
AP	Assessment Point.
BAP	Biodiversity Action Plan.
CAMS	Catchment Abstraction Management Strategy.
CCW	Countryside Council for Wales.
DWF	Dry Weather Flow.
EW	Environmental Weighting of a river reach based on its physical, macrophyte, fisheries and macroinvertebrate scores.
GS	Gauging Station.
GQA	General Quality Assessment.
HOF	Hands off flow.
IDB	Internal Drainage Board. A local land drainage authority with powers to raise finance and do works.
IDD	Internal Drainage District. Area managed by IDB.
km	Kilometres.
km²	Square kilometres.
mAOD	Metres above ordnance datum.
m³/d	Cubic metres per day.
m³/s	Cubic metres per second.
ml/d	Megalitres (1000 cubic metres) per day.
PWS	Public Water Supply.
Q50	Flow exceeded during 50% of period over which flow data are being considered.
Q95	Flow exceeded during 95% of period over which flow data are being considered.
RFO	River Flow Objectives.
RQO	River Quality Objective.
R.S.P.B	Royal Society for the Protection of Birds.
SAC	Special Area of Conservation. Also cSAC when a candidate site.
SSSI	A Site of Special Scientific Interest i.e. an area given a UK statutory designation because of its conservation value.
STW	Sewage Treatment Works.
SW	Surface water.

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