



**Affinity Water
Central Region
Drought Management Plan
A Summary**

February 2013

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About Affinity Water

Affinity Water (AW), central region, provides public water supplies to a population of 3.2 million in the Home Counties to the north and west of London. The area contains a number of North London boroughs and extends into rural parts of Essex, Hertfordshire and Buckinghamshire.

Where Our Water Comes From

The water we supply comes from a number of sources - 60% comes from an underground source (the aquifer) known as groundwater. We have over 250 boreholes (underground deep water wells) spread across North London and the Home Counties. A further 40% of the water we supply comes from river sources, notably the River Thames and imported water from our neighbour, Anglian Water. We are able to abstract water from these sources by permission from government through the issuing of licences. The water we take from the River Thames and import from Anglian Water is not affected by drought conditions so our Drought Management Plan focuses on the behaviour of our groundwater sources. You can find more detail about our water sources in Section One of the Drought Management Plan.

Introduction and Overview of Our Drought Management Plan

All water companies are obliged to write drought management plans that demonstrate how they plan to monitor and manage future drought related events. The plan must show how they will restrain demand and mobilise extra resources when they are needed whilst minimising the need for Drought Orders and Drought Permits - the mechanisms that allow us to restrict use of water or change our abstraction plan for our water sources. The Plan must also show how we will achieve all this while ensuring the supply to customers remains secure.

Our Plan is agreed with the Environment Agency (EA) and approved by the Secretary of State following public consultation and provides a decision aid tool for use by our Drought Management Group (DMG).

The Plan is subject to consultation both prior to and following its preparation as a draft document. The pre-consultation process involves feedback from key stakeholders including the EA and OFWAT – the water industry regulator - as well as other water companies.

A drought is a natural event that cannot be prevented. As no two drought scenarios are ever the same, flexibility has been built into the plan to allow for the most efficient and effective way of dealing with different drought situations. Our drought plan is built on our experience of managing a range of droughts in the last 20 years, in particular those of 1988 to 1992, 1995 to 1998 and 2005 to 2007. We have a pro-active approach to managing drought and our objective is to secure public water supplies at all times.

This Plan explains how we manage droughts. We carefully monitor data we obtain on the flow of rivers in our supply region and how rainfall affects them. Where the data shows evidence of the onset of drought, this triggers the formation of a Drought Management Group (DMG). From that point on, this group is responsible for implementing actions to ensure the public water supply is maintained throughout the duration of drought conditions.

The Plan defines the role of individuals within the Company and how they will interact with third parties and the Environment Agency in particular. It contains details of our environmental

monitoring and communication plans and how the information we obtain on the condition of our groundwater sources triggers actions.

The plan also details a range of potential measures to maintain the balance between available water supply and the amount demanded by our customers. It sets out the steps we will follow once a decision is taken to submit a formal application to the Environment Agency for Drought Permits or Drought Orders.

The plan indicates how the severity and duration of drought is assessed and forecasted and when and how drought actions are implemented.

Finally, the plan explains how and when we will identify the end of a drought and what actions are required to bring drought-related activity to an end.

For more information on our Plan please go to our website at <https://central.Affinitywater.co.uk/docs/drought-management-plan.pdf>.

The purpose of the Drought Management Plan

The primary purpose of our Drought Management Plan is to ensure we can maintain essential supplies to customers through drought conditions. The overall objective is to establish a comprehensive set of plans and procedures that define the process for managing drought conditions. This includes action plans for how we will manage any restrictions on non-essential use of water as well as provisions for environmental monitoring and communications. The Plan enables us to:

- predict the onset of a forthcoming drought using defined drought triggers;
- monitor, forecast and assess likely drought severity;
- monitor the effects of drought and the measures taken;
- assign roles and responsibilities within the Company to manage a drought event;
- implement an action plan to manage the drought throughout;
- carry out drought management options based on historic experience and data to reduce demand or supplement resources and maintain security of supply to customers;
- efficiently manage the communications process and liaise with customers, stakeholders, other water companies, our regulators and internally within AW by identifying target audiences and appropriate communications channels ;
- exercise new powers on restrictions for non-essential use introduced by The Water Use (Temporary Bans) Order 2010 and prepare for Drought Orders to restrict non-essential use of water and Emergency Drought Orders to restrict essential use of water and provide for emergency supplies to customers.
- provide suitable levels of information, regular dialogue, co-ordinated communication and accurate information to the many groups that need to be kept informed.
- prepare for the application and implementation of Drought Permits and Drought Orders to increase abstraction by monitoring the effect of our operations on the environment during drought

Background Information

We operate in the South East of England (see Figures 1 and 2 below), a very dry region of the UK, with only half the average UK rainfall supplying 1.1 million households.



Figure 1: Affinity Water within the South East of England

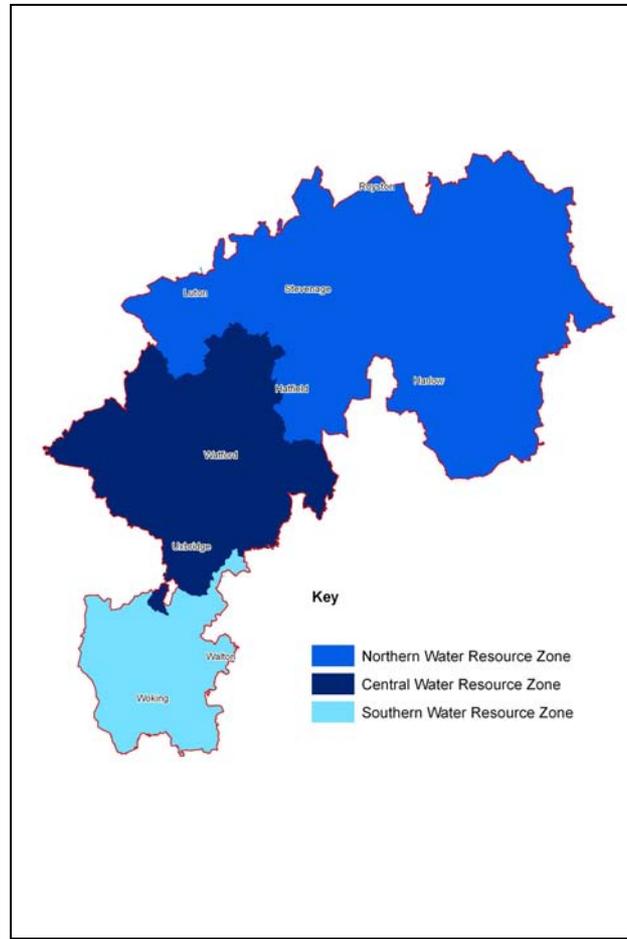


Figure 2: Map of AW operating area and Water Resource Zones (WRZ)

We aim to manage the available water resources efficiently to ensure we can secure a continuous supply of high quality water to meet the demands of our customers, while ensuring the sustainability of those resources and minimising any impact on the environment.

In the South East region, water companies source their supplies of raw water in the following ways:

- 1) River abstraction;
- 2) Reservoirs filled by river abstraction or impoundment of river water;
- 3) Groundwater abstraction from boreholes and springs.

Depending on where you live, the amount of raw water your water company obtains in each of these ways varies. Even within one water company area, there may be differences in the balance of water from these sources. This difference in how each water company obtains its water supplies causes variability in how drought resilient they are and this affects how they respond to drought conditions.

It takes at least several months of below average rainfall to initiate a water resources drought. Particularly important is winter rainfall as it is this that replenishes most water resources. The low groundwater levels and river flows that result from this type of dry period reduce water availability from rivers and boreholes, and reservoir levels fall. This poses a risk to a water company's ability to supply its customers.

To manage this risk and minimise increases in water bills, water use restrictions are an important measure that we can use to reduce demand during drought. They not only enable us to maintain essential supplies but also help to conserve water resources for later in a drought while reducing the environmental impacts of abstraction during this critical period.

We will only impose water use restrictions upon customers if they are absolutely necessary. We fully appreciate the confusion that can be caused among some customers when one company introduces restrictions but its neighbouring company does not. Clearly from a customer point of view, if restrictions need to be imposed then a simple and consistent approach should be adopted for introducing water use restrictions across the South East. Where it is necessary to appeal for restraint or impose restrictions, we will always give as much information to you as possible. The reasons why companies may have to react differently in terms of restrictions and their timing are explained below:

Differing levels of drought severity across the region: Whilst droughts across the South East will generally be caused by a regional trend of several months of below average rainfall, more local differences in rainfall may cause differing levels of drought severity across the region. In other words, the need to impose restrictions for one company may not equally apply to another company in the South East.

Differing vulnerabilities at Water Resource Zone level: Due to the way the water supply system has developed over time, many water company supply areas are sub-divided into Water Resources Zones (WRZs). How WRZs are supplied with water varies. This mix of WRZ types means that even if there were not a significant difference in drought severity across the region, WRZs will tend to react differently to the same drought, with certain Zones experiencing higher levels of risk to supplies than others. For example, a WRZ dependent on combined river abstraction and reservoir storage for supply may have a different level of risk to one based on groundwater abstraction. A water company may need to introduce water use restrictions in its more vulnerable WRZs while it may not need to extend the ban to the remaining Zones in its area of supply.

The introduction of new powers in the form of the Temporary Ban has provided an opportunity for the water companies in the South East to review their drought plans and develop a more unified approach than in the past to introducing water use restrictions across the region. However, due to the local differences highlighted above, not all plans will be the same.

Frequency of Droughts

Looking at the information we have available to us on previous droughts, we estimate that we would not need to apply for a temporary ban on water use more than once every 10 years. We believe Drought Permits or Drought Orders will be needed no more than once in every 20 years. Even in the more severe drought situations it is likely that we would avoid the use of standpipes or making water available on a rota system though it remains an option in case of an extreme emergency.

Drought Triggers

We use information about our water sources to plan when and what steps will need to be taken when we decide we must escalate our drought plan. The set of conditions that cause an escalation is known as a drought trigger. You can find more detailed information about our drought triggers in the Drought Management Plan, Section Two.

We define a set of alert levels known as 'Drought Zones' in our DMP that describe what action will be taken in escalating drought conditions:

Drought Zone Level 1 – Drought Awareness

Groundwater levels are below the long term average for this period so this first trigger creates a state of readiness within the Company to ensure that proper consideration is given to the risk of drought occurring

Drought Zone Level 2 – Voluntary Demand Reductions

At this point we increase activity both in terms of managing our supply and creating public awareness of the situation. We liaise with the Environment Agency and with neighbouring water companies and we convene the Drought Management Group.

Drought Zone Level 3 – Compulsory Restrictions on Use

Entering this Drought Zone would trigger more significant actions to restrain demand. This may include temporary usage restrictions and much more communication with our customers.

Drought Zone Level 4 – Unprecedented Drought Conditions

Water levels in this Drought Zone would be at an extremely serious position. Drought Permits would be introduced to provide some support for managing the water supply. We would then implement Drought Orders to increase the level of restrictions on use. All other available options and actions would be considered as the drought becomes groundbreaking.

The onset and likelihood of a drought is relatively straightforward to predict through regular analysis of our river flows and by understanding the amount of rainfall that has entered the aquifer (recharge). We continually monitor and record groundwater levels, surface water levels and rainfall within our supply area, so that the risk of drought and its influence on water resources can be assessed and forecast and appropriate drought measures can be put in place in good time to maintain supplies to our customers.

We hold important information from previous droughts to aid us in planning and managing how we will handle future drought management.

We carry out work to aid our understanding of the drought triggers and support the monitoring process including a detailed study of winter rainfall, recharge and the level of moisture in the soil (soil moisture deficit).

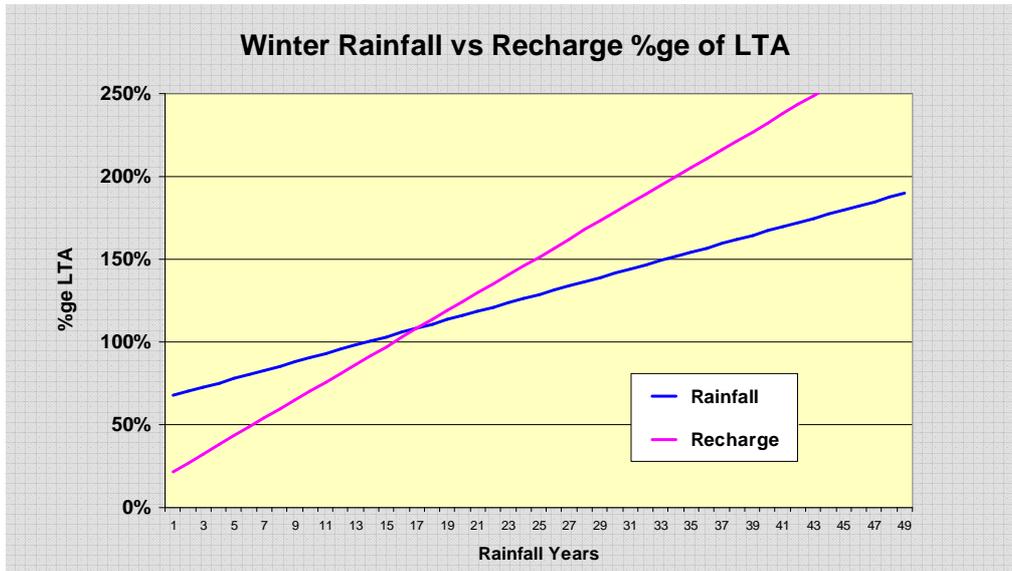


Figure 3: Comparison of long term average (LTA) rainfall and recharge

Winter rainfall is important for groundwater recharge. However not all rainfall enters the aquifer; under normal conditions it takes 100% of the long term average of winter rainfall to provide enough water to return groundwater levels back to normal conditions. When we have less rainfall in autumn the deficit in soil moisture remains and we see less recharge to the aquifer as a result.

Figure 3 shows the relationship between rainfall and recharge and demonstrates that where we have significantly less or significantly more rainfall than the long term average, there is a magnified effect on recharge. So for example, a winter rainfall pattern of 80% of the long term average provides approximately 60% recharge and conversely 150% rainfall gives 200% of recharge.

Groundwater levels will normally reach lowest points around November. With low winter rainfall the lowest point may be delayed until January or even later. If this is the case then the recharge period will be shorter and groundwater rise limited. Groundwater levels will normally reach their highest point around March. With low winter rainfall they may peak before this, again decreasing the length of the recharge period and therefore the amount of water level rise. In most circumstances summer rainfall does not impact on groundwater levels but may support the flow of some rivers.

More information on rainfall, recharge and soil moisture deficit can be found in the DMP Section 2 and Appendix 2.

Managing Demand and Supply during a Drought

A number of different actions have been assessed and planned for during a drought. An overview of the demand side and the supply side actions is given in the following table followed by more information on each option.

Table 1 Overview of drought actions

Drought Zone Level 1				
Water efficiency campaign				
Inform the EA that Drought Zone 1 has been breached				
Drought Zone Level 2				
Demand side actions	Internal discussion on approach to restrictions and concessions	Appoint customer support advisers re restrictions, Q&As produced, website updated	Prepare for temporary use bans. Send notifications to papers and radio stations	Allow customers to request exceptions to a ban
	Enhanced leakage reduction and pressure management			
Supply side actions	Water source performance assessments	Assessment of internal and external water transfers		Run multiple scenarios of the network model
	Agree with EA increased monitoring	Amend monitoring programme associated with Drought Permits		Undertake surveys to assess state of the rivers
Drought Zone Level 3				
Demand side actions	Temporary ban restrictions in place	Lifting of any concessions (except for the frail and disabled)	Start preparing for Drought Order application for commercial restrictions	Submit Drought Order application to Secretary of State
	Enhance leakage reduction			
Supply side actions	Utilise inter-company water transfers	Optimise groundwater sources (i.e. replacing pumps, deepen pump intake)	Additional output where applicable	Negotiate additional bulk imports from neighbouring companies
	Plan for fast tracking engineering work, pressure control schemes and re-commissioning of dormant licensed sources	Increase frequency of monitoring for the top of the list permit sites	Start preparing for Drought Permit applications	Increase frequency of monitoring for the rest of the permit sites
	Apply for the permits at the top of the list	Apply for the remainder permits of the list		

Drought Zone Level 4					
Demand side actions	Commercial restrictions Drought Order in place	Monitor effectiveness of commercial restrictions		Application for an extension if necessary	
	Enhance leakage reduction				
Supply side actions	Potential Drought Orders for increase of peak licences. This option will be formed following Drought Zone 2 and 3 assessment of options where there is identified deficit	Implementation of infrastructure improvements	Implementation of pressure control schemes	Re-commissioning of dormant licensed sources	Negotiate additional bulk imports from neighbouring companies
	Drought Permits in place	Intensive environmental monitoring in place for all the permitting sites (potentially other sites as well)		Application for an extension if necessary	

Water efficiency measures have been and continue to be promoted in recognition of the essential role played by demand management in maintaining the supply/demand balance.

Metering: Metered customers are generally more receptive to water efficiency programs as there is a greater financial incentive for them to reduce their water usage – lower consumption of water equals a lower bill. During a drought however, it is likely that non-metered customers would also become more receptive to the (increased) promotion of water efficiency information.

In recognition of high consumption, all customers who operate a garden sprinkler are required to pay by metered charges as well as those with integrated swimming pools. The adoption of metered charges is actively encouraged though the policy of metering properties upon change of owner though this has now been suspended as it is no longer supported and funded by the water regulator, OFWAT. Our current policy is to increase the proportion of customers who are metered by metering all new properties and offering free meters to customers who request them. We are proposing to continue our policy on compulsory metering from 2015 because we operate in a region that is designated as under serious water stress. We plan to increase the proportion of homes that pay their water charges on a meter from 38% to 90% by 2030.

Tariffs: The way we charge for water could have an effect on demand - we are evaluating the cost-effectiveness and influence on consumption of new tariffs and this is being considered as a possible option for future demand management.

Promoting water efficiency: We actively promote water efficiency measures through the media and many other channels to all our customers via newsletters, direct contact, talks to local groups and national lobbying via Water UK and associated networks. This is supported through work done by our Educational and Environmental Centre, especially with student groups. We also have a strong record of distributing water saving devices.

We have a wide range of initiatives including consumption self audit packs and reducing consumption among industrial and commercial customers via water regulations, inspections and

key customer contacts. We actively work on communicating in the ways our customers tell us they prefer to be communicated e.g. web site, media, information sent with bills.

Working with other organisations: Our experience of the drought in 2006 indicates that a comprehensive and co-ordinated communications campaign will lead to a reduction in demand. Working collectively with other water companies for example during the 2006 BeatTheDrought.com initiative was significantly more effective than activity carried out in isolation.

We contribute to and support industry and academic research & development groups in order to understand the issues involved in promoting water efficiency nationally and we continue to participate in regional and national groups that seek to improve water efficiency.

The future: Our future plans for water efficiency include more active promotion to customers; finding new ways to influence behaviour that reduces water use; measuring water use more accurately in order to predict behaviour and setting more robust targets for water reduction. We will also continue to work with regional/national bodies to contribute to the best thinking on water efficiency measures; we will actively promote water efficiency within the Company and work hard to ensure that the balance of demand and supply side management is appropriate and effective.

Supply management: Since the last drought we have invested £35m in improvements of our network and water source optimisation schemes in order to increase our resilience under drought conditions. We continue to consider options to make our supplies as efficient and effective as possible through:

- Intra-company bulk transfers – utilise the flexibility of our infrastructure to move more water between Zones.
- Optimising our groundwater sources – investigate our sources and identify possible ways to optimise the performance of the source.
- Increasing the volume taken from existing sources of water – review sources and determine the possibility of increasing abstraction in some of them.
- Bulk imports – consider importing water from neighbouring companies where neighbouring drought conditions permit. This option is to be considered especially in Zones where the current network setting cannot support any internal transfers.
- Supply balancing – as our groundwater and surface water sources are managed together to meet demand, during a drought demand can be transferred between adjacent resource Zones as needed co-operatively.
- Engineering work – we will consider fast tracking infrastructure improvements in critical areas where demand is greatest e.g. laying new mains or replacing the existing ones with greater capacity mains.
- Pressure control schemes – we will assess possible changes in network pressure.
- Re-commissioning of sources – review and where appropriate re-instate dormant, abandoned or disconnected sources that are permitted under our licence to abstract water.
- Drought Permits/Orders – under a severe drought scenario we may be permitted to abstract more water than the normal limits allow or increase the rate at which water is taken from a

source. We might also be allowed to install pumps and treatment at currently unlicensed boreholes.

Appendices 4.1 and 4.2 within the DMP provide more detail on demand and supply management options including an overview of the key demand measures within each Zone once the triggers have been activated.

Restrictions during a Temporary Ban on Non-Essential Water Use

Once a drought becomes more serious, further more stringent measures are launched to manage water demand. Recent legislation now affords us a wider range of temporary water use restrictions that we can implement during a drought without requiring a Drought Order – the legislation sets out the categories of water use that can be restricted. In launching these new powers it is hoped that it will encourage better conservation of water earlier on in a drought to ensure supplies are protected for essential domestic use. Before any restriction is implemented under these new provisions, we will provide the opportunity for representations to be made by customers looking for their particular use of water to be considered as an exception to the ban.

Table 2: Summary of implementation policy for restrictions

Drought Zone 3 Temporary Ban restrictions	Drought Zone 4 –Drought Order restrictions
<ul style="list-style-type: none"> • Watering a garden using a hosepipe • Cleaning a private-motor-vehicle using a hosepipe • Watering plants on domestic or other non-commercial premises using a hosepipe • Cleaning a private leisure boat using a hosepipe • Filling or maintaining a domestic swimming or paddling pool • Drawing water, using a hosepipe, for domestic recreational use • Filling or maintaining a domestic pond using a hosepipe; and • Filling or maintaining an ornamental fountain • Cleaning walls, or windows, of domestic premises using a hosepipe • Cleaning paths or patios using a hosepipe • Cleaning other artificial outdoor surfaces using a hosepipe 	<ul style="list-style-type: none"> • Watering outdoor plants on commercial premises • Filling or maintaining a non-domestic swimming or paddling pool • Filling or maintaining a pond • Cleaning non-domestic premises • Cleaning a window of a non-domestic building • Operating a mechanical vehicle-washer • Cleaning any vehicle, boat, aircraft or railway rolling stock • Cleaning industrial plant • Suppressing dust • Operating cisterns

Our DMP includes a set of formal statutory exemptions that are described in the legislation which allow certain types of normally banned water use to continue under these circumstances:

1) On the grounds of health and safety:

- *to clean the surfaces of a private leisure boat to prevent it from transferring invasive species to new waters.*
- *to clean the walls or windows of domestic premises.*
- *to clean paths or patios or other artificial outdoor surfaces*
- *to fill or maintain a domestic pond or ornamental fountain in which fish or other aquatic animals are being reared or kept in captivity.*

2) To fill or maintain a domestic swimming or paddling pool:

- *where necessary in the course of its construction.*
- *that is designed, constructed or adapted for use in the course of a programme of medical treatment.*
- *used for the purpose of decontaminating animals from infections or disease.*
- *used in the course of a programme of veterinary treatment.*
- *in which fish or other aquatic animals are being reared or kept in captivity.*

Drought Permits and Drought Orders

Our abstraction licenses contain conditions to ensure that we reduce or stop taking water once a water source has reached a certain level. There are very good reasons to retain the agreed levels in an ordinary year however once drought conditions appear, we need to make well judged decisions about the balance of need between the environment and the requirements of our customers for their essential water use. Where we believe we need to increase abstraction temporarily we apply to the Environment Agency for a Drought Permit.

To minimise the need for increased abstraction we also have the mechanism of the Drought Order available to us. A Drought Order allows us to place temporary restrictions on the use of water for non-essential purposes. There are several restrictions that apply depending on which Drought Zone Level is currently active (see Table 2). To protect essential water use – that which is needed for drinking, hygiene and sanitation – we must make difficult decisions about non-essential use that may well have a serious impact on the ability of some smaller businesses to earn their income e.g. garden landscapers, property maintenance companies, window cleaners. Wherever possible we avoid this level of restriction because we understand the impact it has on livelihoods but it cannot always be avoided.

Monitoring the Environment

We carry out routine collection of river, rainfall and water quality data irrespective of drought throughout our operating area and throughout each year. Full information on how and where we monitor including ecological factors, areas impacted by drought and our river catchments are included in Section Four and Appendices five and six of the DMP.

Compensation, Inconvenience and Enforcement

We recognise that the restrictions are an inconvenience for you. For some of our customers the impact is more serious so we appreciate your help at this difficult time in conserving essential water supplies and minimising the effect of the ban on all by observing the restrictions introduced.

If you have a metered water supply, you pay for the amount of water you use so a rebate would not apply. If you have an unmeasured water supply, the charges we make are for the supply of water for domestic purposes only. This is limited to water use for drinking, cooking, washing and sanitation. In normal circumstances you may use the water supply for the purposes covered by a temporary ban without further charge so no compensation or rebate is payable in the event that we need to impose restrictions.

If a temporary ban is in place, it is an indicator of the seriousness of the current water supply situation. For the good of all our customers we are obliged to treat any breaches of the ban seriously and full enforcement action is taken against any person or organisation failing to adhere to the restrictions in place.

Identifying the End of a Drought

The end of a drought can be defined as when the risk of impact from drought is no greater than during a normal year, and where normal conditions have continued for a period of time. It will be determined using the drought's triggers, with all restrictions able to be removed when groundwater levels have moved out of Drought Zone 3.

More information about Droughts

If you would like to find out more about any aspect of our Plan or drought action in general, visit one of the websites listed below for more information:

Website	For information on...
Affinity Water www.Affinitywater.co.uk/drought	Questions & answers The restrictions explained Our statutory notice General information on the drought in our area. Our Drought Management Plan
Environment Agency http://www.environment-agency.gov.uk/homeandleisure/drought/default.aspx	Drought maps The current drought situation The drought explained What you can do to help
Dept for Environment, Food & Rural Affairs (DEFRA) http://www.defra.gov.uk/environment/quality/water/resources/drought/	Abstraction licensing Water resources planning Information on Drought Orders