



Your local supply, on tap

# AWE Drought Management Plan update 2014

## Planning for Droughts

March 2014



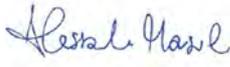
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## Asset Management document control sheet

### Document amendment history

Version	Status	Date	Amendment to this version
1.0	Issue	26/02/14	First issue. Subsequent revisions should be expected.
1.1	Issue	04/04/14	Formatting of current DMP to Affinity Water company template
1.2	Draft	31/03/14	Key changes made to main body of document to reflect revised WRMP (November 2013). Appendices not updated (agreed with EA). Draft DMP annual update ready for peer review.
1.3	Draft	09/04/14	Peer review by EP, SC complete, amendments included. Executive Summary updated.
1.4	Draft	11/04/14	Peer review by MP complete, amendments included
2.0	Draft	14/04/14	Approved for issue.

### Document approval

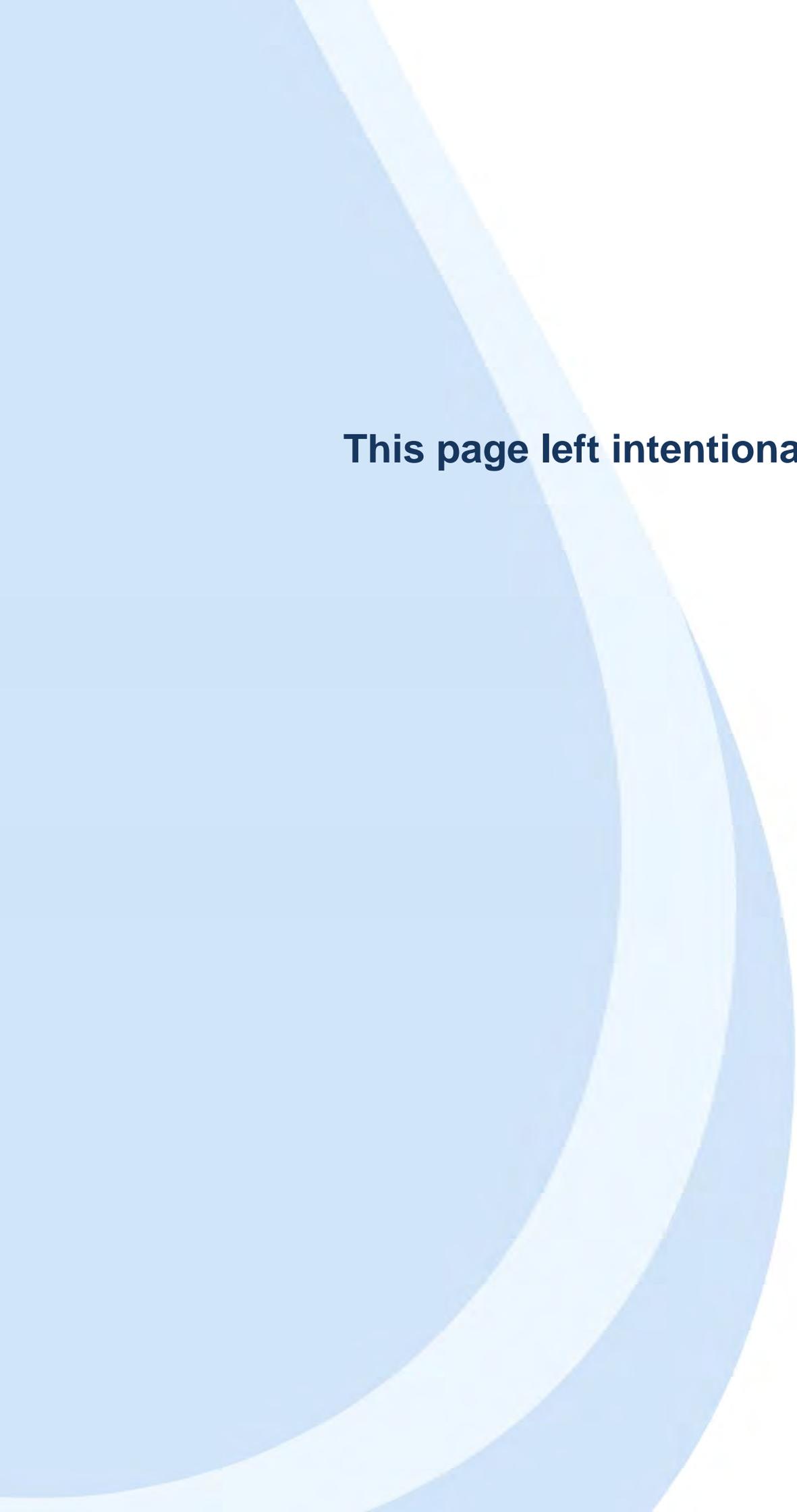
Document title	AWE Drought Management Plan update 2014			
	Name	Signature	Title	Date
Author/originator	Alessandro Marsili		Asset Engineer	04/04/14
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Approver 1 (internal use)	E Powers		Asset Sustainability Manager	11/04/14
Approver 2 (external use)	S Clark		Programme Manager	14/04/14

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## Executive Summary

This is the second annual update of the Affinity Water Drought Management Plans (DMP) published in February 2012. Since the original publication the three regions operated by Affinity Water have undergone unification and this update seeks to align our three DMP and ensure a consistent Planning approach is taken throughout the company. We are required to produce a full revision of our DMP by March 2015 which will be in the form of one Plan covering all 8 Water Resource Zones and this work has already commenced.

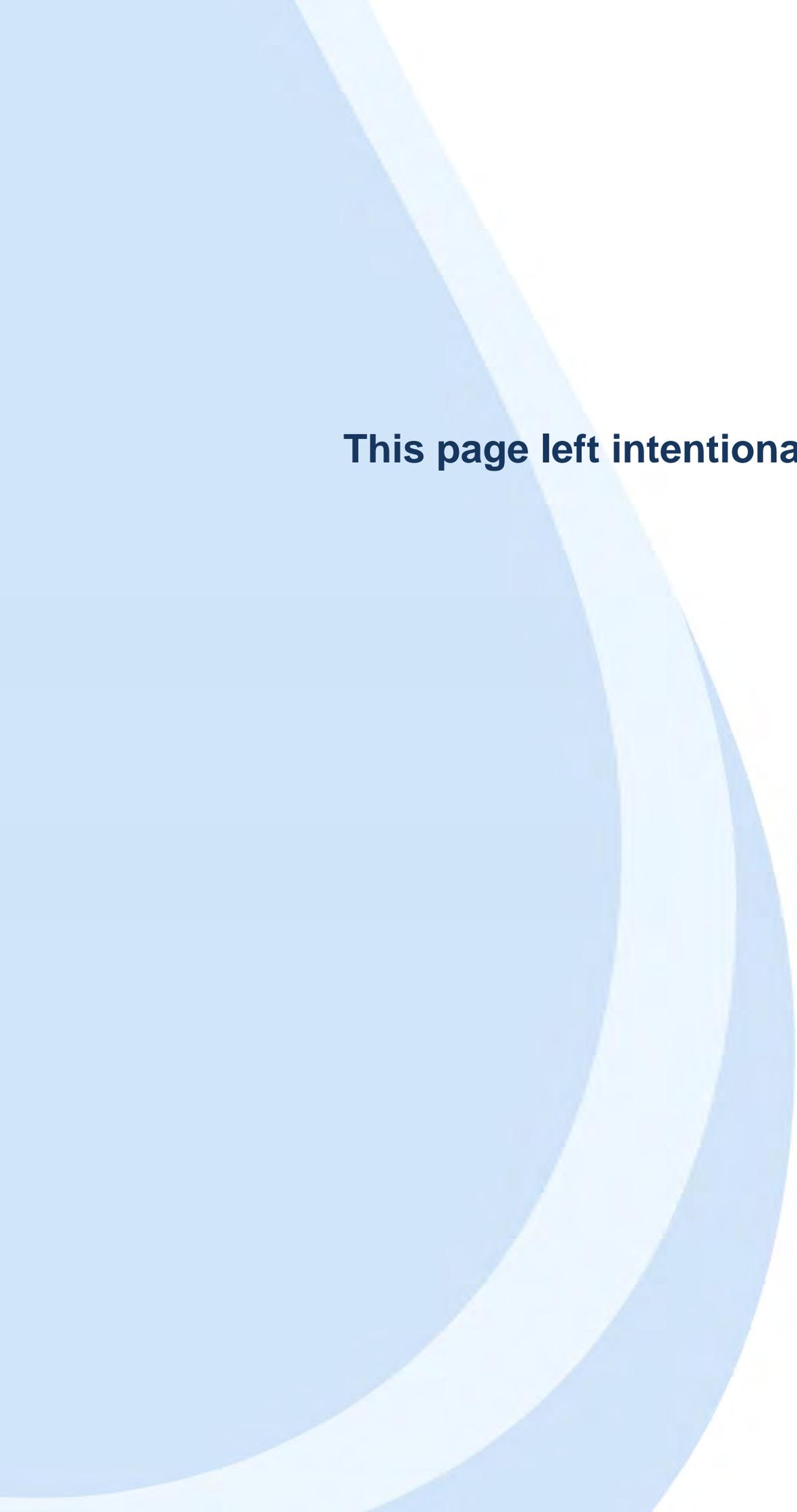
This update incorporates small changes to reflect proposals within our PR14 revised draft Water Resources Management Plan (WRMP). This refers mainly to the Levels of Service reported in the revised draft WRMP, which have yet to be formally accepted, but are an outcome of the WRMP consultation process. The main change is the introduction of a 5<sup>th</sup> Drought Zone trigger and a re-alignment of the actions across Drought Zones 3, 4 and 5. The 2015 full revision will address these and reflect changes that will occur due to the sustainability reductions we are facing in AMP6 and AMP7. We do not envisage a need to enact our DMP during 2014 due to the high groundwater level position and therefore for this update we have only made changes within main text and not the Appendices or defined the subtle changes that will be required to the actions and communications strategies which will all be updated as part of the 2015 full revision.

The Affinity Water DMP is built on our experience of managing a range of droughts in the last 20 years, in particular the multiple year groundwater droughts of 1988 to 1992, 1995 to 1998 and 2005 to 2007 and 2012. We have a pro-active approach to managing drought and our objective is to secure public water supplies at all times. This will be achieved by:-

- Being prepared for drought at any time and having our Plan ready to deal with it.
- Continuous monitoring of environmental conditions in partnership with the EA.
- Identifying the onset of drought and mobilising additional resources.
- Assessing drought duration and severity and the impact on water available to our customers.
- Minimising environmental impact of drought by optimising the use of our resources.
- Implementing measures to reduce the demand for water or increasing capacity of our assets to maintain security of supplies. Our actions will become more strenuous as drought deepens and lengthens.
- Acting and communicating with our customers and other stakeholders in partnership.

This Plan details our flowchart process that will be used to manage droughts. We demonstrate how routine hydrological data is monitored to determine the onset of a drought which triggers the formation of a Drought Management Group (DMG). The DMG is responsible for implementing actions to ensure public water supply is maintained through the drought.

The DMP defines individual roles and responsibilities within the Company during a drought and the required levels of interaction/liaison with third parties, in particular the Environment Agency. The Plan contains details of our Environmental Monitoring and Communication Plans and how hydrological triggers are linked to actions, as well as detailing a range of demand side and supply side measures that may be required to maintain the supply/demand balance. Within our Plan we outline the steps that should be followed in severe drought conditions when requirements for restrictions on use of water or additional abstraction could result in the mobilisation of Temporary Use Bans, Drought Orders for further restrictions and Drought Permits or Drought Orders to vary abstraction Licences. The Plan indicates how the severity and duration of drought is assessed and forecasted and when and how drought actions are implemented. Finally, our Plan provides an outline of how the company will identify the end of a drought and identifies the associated actions required at this point.



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# 1 Introduction

Drought Management Plans are a statutory requirement for all water companies as prescribed under section 39B of the Water Industry Act 1991 (WIA) and as introduced by the Water Act 2003. The purpose of the Drought Management Plan (DMP) is to demonstrate how Affinity Water East (AWE) plans to monitor and manage future drought related events, restrain demand and mobilise extra resources, whilst minimising recourse to drought orders and permits and ensuring security of supply. The 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) which is led by the Asset Management Director.

The DMP is subject to consultation both prior to and following the preparation of the draft Plan. The pre-consultation process involved feedback from key stakeholders including the EA and Ofwat as well as other water companies. This document outlines the Affinity Water East Drought Management Plan in six main sections:

- (i) introduction to our supply area and water resources;
- (ii) a description of the drought triggers and scenarios;
- (iii) a description of drought management actions;
- (iv) an outline of the Environmental Monitoring Plan (EMP);
- (v) a description of our Communications Plan;
- (vi) an outline of post-drought actions.

A drought is a natural event that can not 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.

This report is an update of the 2013 report, incorporating small changes to reflect what we have proposed as part of the draft Water Resources Management Planning (WRMP) process for AMP6. These refer mainly to the Levels of Service as reported in the draft WRMP, which have yet to be formally accepted, but are an outcome of the consultation process for that Plan. This mainly concerns the introduction of a 5<sup>th</sup> Drought Zone trigger and a re-alignment of the actions across Drought Zones 3, 4 and 5.

We are required to produce a full revision of our Drought Management Plan by March 2015 and work has already started on this. As the Drought Plan will not need to be enacted within 2014 due to the high groundwater level position, we have only made changes within main text and not the Appendices or defined the subtle changes that will be required to the actions and communications strategies. The full revision will also address the changes that will occur due to the sustainability reductions we are facing in AMP6 and AMP7 and will be subjected to consultation and agreement of our regulations as described below for the current Plan.

## 1.1 Objectives of Affinity Water East's Drought Management Plan

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The overall objective for the DMP is to establish a comprehensive set of plans and procedures that define the process for managing drought conditions. The DMP includes action plans for how we will manage any restrictions on non-essential use as well as provisions for environmental monitoring and communications. This DMP enables us to:-

- exercise new powers on restrictions for non-essential use introduced by The Water Use (Temporary Bans) Order 2010
- predict the onset of a forthcoming drought using defined drought triggers;
- monitor and assess likely drought severity;
- monitor the effects of drought and the measures taken under the DMP;
- provide drought management options based on historic experience and data to reduce demand or supplement resources and maintain security of supply to customers;
- assign roles and responsibilities within AWE to manage a drought event;
- efficiently manage the communications process with customers, stakeholders, other water companies, our regulators and internally within AWE by identifying target audiences and appropriate communications channels;
- provide suitable levels of information;
- ensure a regular dialogue and close working relationships with stakeholders;
- ensure our stakeholders receive accurate information direct from us;
- ensure co-ordinated and consistent messages are disseminated to all stakeholders and affected/ interested parties;
- raise awareness of water issues and the need for on going water efficiency
- increase understanding of peak demand and drought scenarios
- communicate the positive steps we have taken to enable us to manage any peak demand/ drought scenario

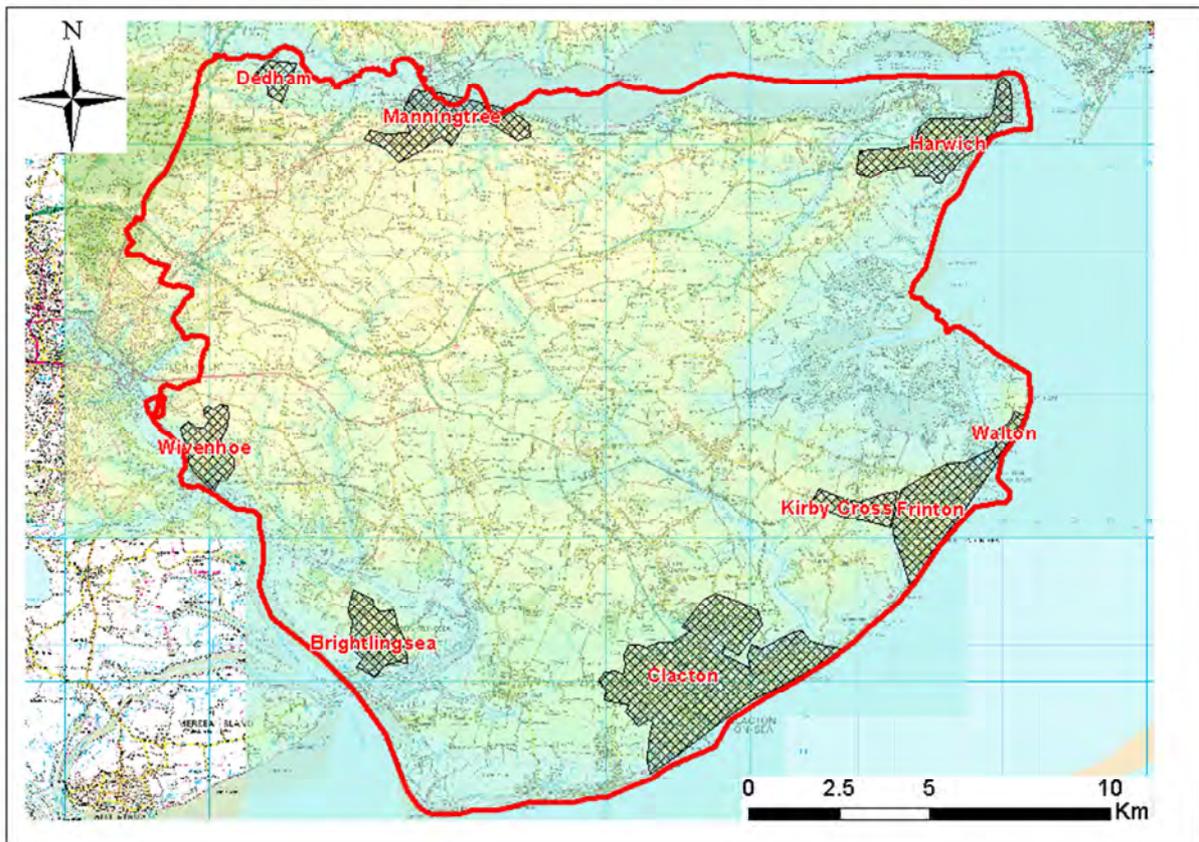
## 1.2 Background Information

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AWE operates in the East of England (see Figure 1 and Figure 2), a very dry region of the UK, with only half the average UK rainfall and provides around 25 million liters of water a day to 156,000 customers.



**Figure 1: Affinity Water East operating area within the east of England**



**Figure 2: Map of AWE Operating Area**

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

All water companies are required to produce a DMP to demonstrate the strategy to be followed and the measures to be taken to ensure that customers have sufficient water should a drought occur. Available data is studied to predict the onset of drought and the DMP outlines the actions to be taken to manage the various drought scenarios that could be encountered. We have developed a Communications Strategy (Section 5) to outline the key communications objectives and actions required in support of its DMP. An Environmental Monitoring Plan (Section 4) has also been developed outlining how the impact of drought and drought activities will be assessed through monitoring.

In the East region water companies source their supplies of raw water prior to treatment 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.

The percentage balance of these varies from company to company, and even within company areas and this causes variability in drought resilience and response.

Unlike unseasonably dry soil that constitutes an agricultural drought and which can arise from only a few weeks of dry and sunny weather over the growing season, 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, water use restrictions are an important measure that water companies can use to reduce demand during drought. They not only enable companies to maintain essential supplies but also help to conserve water resources for later in a drought and reduce the environmental impacts of abstraction during this critical period.

Water companies will only impose water use restrictions upon their customers if they are absolutely necessary, and in accordance with their Levels of Service for water supply. Water companies 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 east. Where your water company has to appeal for restraint or impose restrictions, it 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 East will generally be caused by a regional trend of several months of below average rainfall, sub-regional 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 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). These are defined as the largest possible zone in which all resources, including external transfers, can be shared and hence the zone in which customers experience the same risk of supply failure from a resource shortfall. WRZs can be divided into those dependent upon:

- River abstraction only;
- Groundwater abstraction only;
- Reservoirs filled by abstracting local river water or by impounding river water ;
- Various combinations of the above.

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. That means in similar drought conditions, rivers, groundwater sources and reservoirs across the region can respond differently in terms of risk to supply. 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. This difference in WRZ vulnerability has an impact both at the company level and regional level. A water company may need to introduce water use restrictions preferentially in its more vulnerable WRZs while it may not need to extend the ban to the remaining zones in its area of supply. At the regional level one water company may need to impose water use restrictions earlier in a drought than its neighbours, while another water company is able to withhold the imposition of restrictions until much later or not at all.

The introduction of the new powers in the form of the Temporary Use Ban has provided an opportunity for the water companies in the South East to review their Drought Plans with a view

to finding a clearer, more consistent and more unified approach to introducing water use restrictions across the region than in the past.

The water companies in the East have had formal meetings to discuss the development of their Plans and ensure that they are interpreting the new powers as consistently as possible. However, due to the local differences highlighted above, not all Plans will be the same as each other.

### 1.3 Water Resources and Available Water for Use under Drought Conditions

We have two sources of water; groundwater treated at THXI and surface water from TARD.

We have a good supply-demand balance such that any drought in the future would have to be much more severe in intensity or duration than experienced hitherto to require the implementation of the special measures provided for in this Plan. Our WRMP forecast shows a surplus of supply over demand until beyond 2035, as shown in Figure 3.

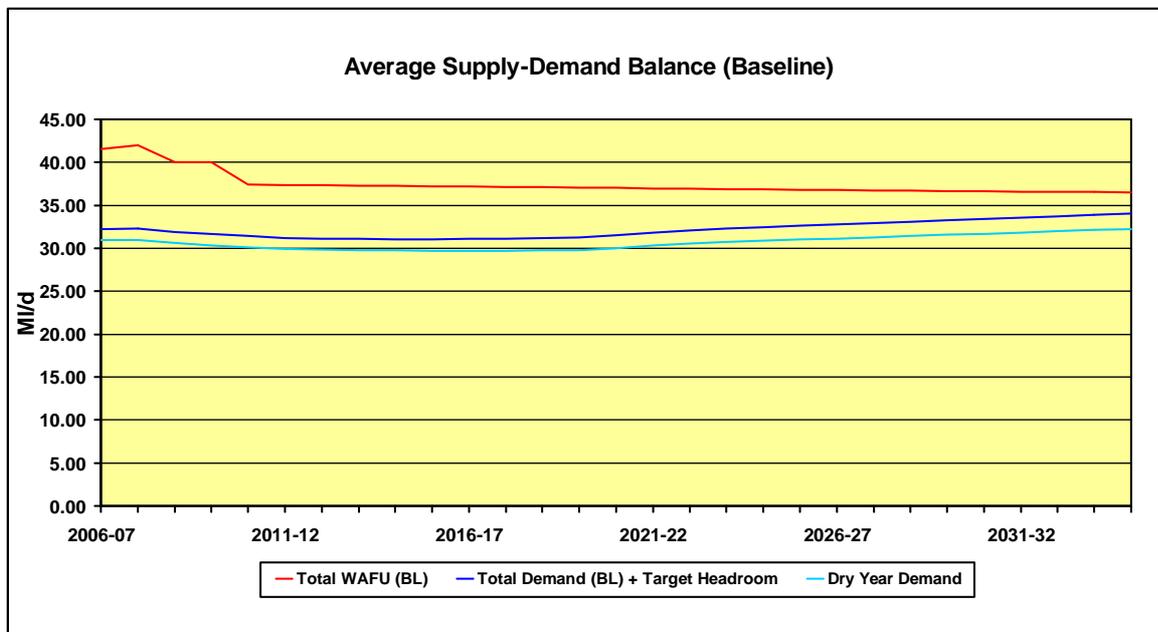


Figure 3: AW East Region Average Demand/Supply Balance

#### 1.3.1 Groundwater

80% of supply comes from groundwater, drawn from confined aquifer chalk boreholes in the River Stour/River Brett valleys in Essex and Suffolk. The boreholes have a long history of good bacteriological quality and have proved robust and reliable during the groundwater drought conditions of 1988-1992, 1995–1998 and more recently in 2006/7. The balance of 20% of supply is sourced from the River Colne and stored in TARD which is owned and operated in equal partnership with Anglian Water. These sources provide sufficient water to meet the needs of our customers.

#### 1.3.2 Surface water

The balance of demand is supplied by surface water from TARD. TARD is a small single season reservoir with a revised safe reliable output totalling 25.6Ml/d for unrestricted (*scenario*

one) demand. TARD can be re-filled each winter even in a dry winter. The revised yield for TARD has increased as the augmentation available from Anglian Water groundwater is now included. We have an Agreement with Anglian Water to vary the water sharing arrangements at TARD from 50:50 to 70:30 Anglian Water: AWE for the period 1<sup>st</sup> April 2010 to 31<sup>st</sup> March 2020, the drought yield assumed available to AWE from TARD is therefore 7.7 MI/d. This represents a small decrease over the 9.4 MI/d previously assumed for 50% of the unsupported drought yield. For normal operation and during a drought either company can take extra water from TARD not required by the other company. In the limit either Anglian Water or AWE could take all of the output available although at present only AWE is able to supply all its east region customers over sustained periods without using TARD.

We are also studying alternative sources to support TARD under exceptional circumstances, using an existing transfer scheme from River Stour.

### 1.3.3 Imports

We have no current imports and there is no requirement for imports in the future as indicated by our supply-demand balance.

### 1.3.4 Distribution System

The two treated source waters are strongly linked in our distribution system such that the East region area is one water resource zone. Groundwater alone can supply all current demand including peak demand in a dry year. This could in certain circumstances allow for drought actions, which would otherwise be triggered by circumstances at TARD being delayed or avoided in the East region area.

### 1.3.5 Improvement and Updates

We have progressively sought to increase the water available for use and manage demand and have achieved leakage levels that are the lowest in the UK as litres per connected property per day. The record high demands which occurred in July and August 1995 did not give rise to any supply, treatment or distribution problems but did help to identify those parts of the system under greatest stress. With the benefit of the 1995 experience further works to improve supply and reduce demand have been successfully completed.

The comparison of Distribution Input (DI) in summer 1995 and 2003 as the closest weather conditions is dramatic (Figure 4). Peak demand in summer 2003 was circa 20% lower than 1995 despite an increase in population supplied of circa 4%. Between 1995 and 2003 household meter penetration increased from less than 7% to 46% and is now circa 72%.

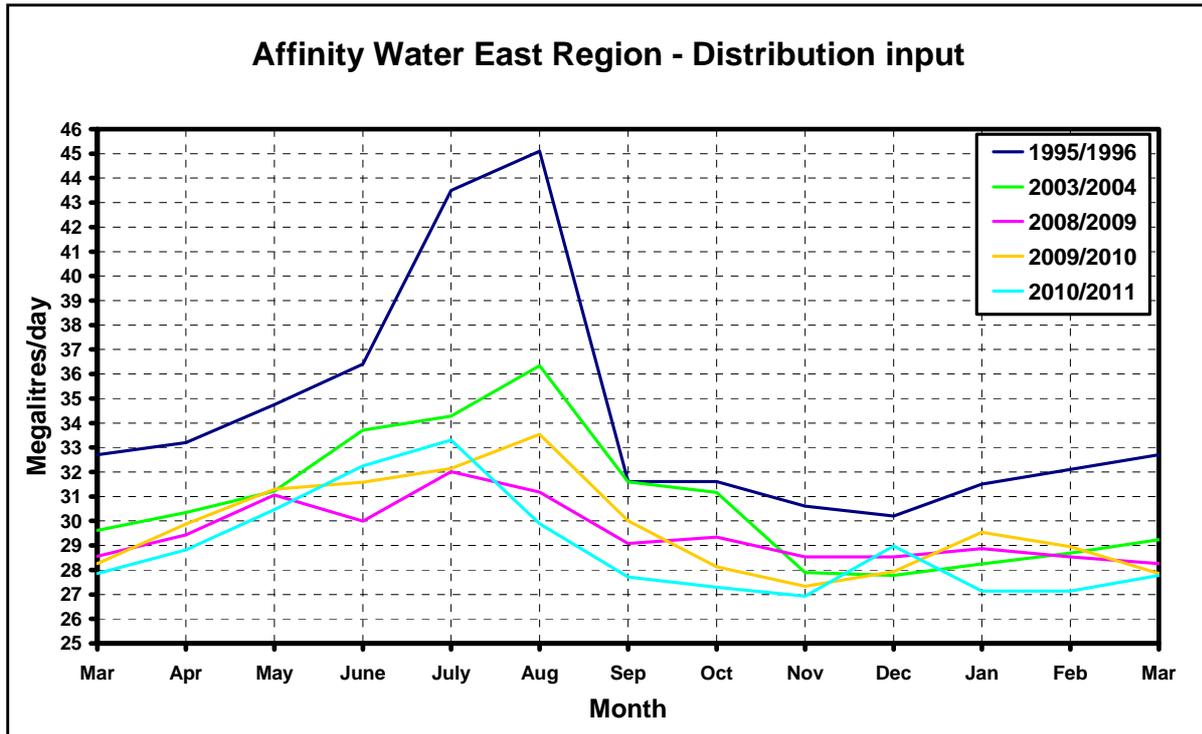


Figure 4: Comparison of Distribution Input

### 1.3.6 Water Resource Zone

A resource zone is the largest possible area in which all water resources, including imports and exports, can be shared and hence the zone in which all customers experiences the same risk of supply failure from a resource shortfall. Both our final WRMP 2009 and our revised draft WRMP 2013 have been prepared on the basis of a single water resource zone for our East region, as shown in Figure 5.



**Figure 5: AWE - Water Resource Zone**

## 1.4 Emergency Storage

We have no significant emergency storage facilities to call on under drought conditions.

## 1.5 Water Resources Plan Levels of Service

This DMP is consistent with our revised draft Water Resources Management Plan (WRMP) 2013. We have not needed to resort to formal restrictions in over 40 years, through several drought periods including 1995/96, and more recently in 2006/07 when many water companies in South East England imposed hosepipe bans. Thus the preferred Levels of Service are supported by historical actual Levels of Service (Table 1).

Water Restriction	Level of Service
Hosepipe Ban	No restrictions
Drought Order/permit	No restrictions
Rota cuts/standpipes	No restrictions

**Table 1: Affinity Water – East Region Levels of Service**

## 1.6 Security of Supply Measures

The two treated source waters are strongly linked in our distribution system such that the whole company area is one water resource zone. Groundwater alone can supply all current demand including peak demand in a dry year. This could in certain circumstances allow for drought actions, which would otherwise be triggered by circumstances at TARD being delayed or avoided in the Company's area.

## 1.7 Responsibility for Drought Management

The Drought Management Group (DMG) is Chaired by the Asset Management Director and consists of senior managers from relevant sectors of our organisation including:

- 1) **Asset Sustainability team** responsible for monitoring the state of available above & below ground water resources, drought severity and environmental impacts.
- 2) **Production & Supply management** with specific responsibility for ensuring that our water abstraction and production capability is at full capacity during months of low rainfall and high demand.
- 3) **Network Operations** to ensure that the network is operating at its most efficient when demand is highest.
- 4) **Corporate Affairs** responsible for implementing the Communications Plan; to design and produce the necessary communication materials and set in motion the agreed communications channels. The Communications Manager is a member of the DMG and directly controls the Creative Marketing / Public Relations / Communication activities to undertake the agreed actions from the DMG.
- 5) **Community Operations** responsible for responding to customers queries regarding the drought and restrictions

Our decisions on Drought Management are made by the DMG under delegated responsibilities from the main Board.

## 1.8 Responsibilities for Key Actions under DMP

Responsibilities for actions under the DMP are detailed in Table 2 below.

Action	Delegation	Timescale
Drought Monitoring	Asset Specialist-Water Resources	On going/Monthly. Enhanced during Drought
Review Drought Management Plan	Asset Sustainability Manager	Annually
Drought Triggers Breached	Asset Specialist-Water Resources	Upon breach of Zone 1
Convene Drought Management Group	Asset Management Director	Upon breach of Zone 2

Convene Drought Working Group	Asset Management Director	Under direction of DMG
Readiness of assets and Chair of the Oasis Group (section 2.8)	Head of Production and Supply	On going
Drought Records/Filing	Asset Scientist	Under direction of DMG
Environmental Monitoring Plan (section 3 of DMP)	Asset Sustainability Manager	Under direction of DMG
Communications Plan (section 4 of DMP)	Communications Manager	Under direction of DMG
Communications  Customers, Group, Board  EA Liaison  OFWAT Liaison DEFRA Liaison DWI Liaison	Communications Manager Managing Director, Director of Community Operations, Director of Community Relations Asset Specialist-Water Resources Asset Sustainability Manager Director of Finance Physical Assets Strategy Manager Head of Water Quality Services	Under direction of DMG
Capex Programme identified	Head of Physical Assets	Under direction of DMG
Opex monitoring	Director of Finance	Cost Centre set up
Capex Delivery	Asset Delivery Manager	Under direction of DMG
Water Quality Plan	Head of Water Quality Services	Under direction of DMG
Drought Order/Permit or Restriction removal	Asset Specialist-Water Resources	Under direction of DMG
Promoting efficient use of water	Communications Manager	Under direction of DMG
Appeals for Restraint Plan	Communications Manager	Under direction of DMG
Restrictions on Supply	Asset Management Director	Under direction of DMG
Emergency Planning	Asset Specialist-Security	Under direction of DMG

Stand down of DMG	Asset Management Director	Return to 'Normal' hydrological conditions
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**Table 2: Key Roles and Responsibilities in Managing Drought**

## 1.9 Environment Agency Liaison

We liaise with the Environment Agency on a regular basis on a variety of water resources, environmental impact and water quality issues. The Asset Sustainability Manager will be the primary point of contact with Environment Agency staff including their Drought Co-ordinators. The Asset Sustainability Manager will be supported by the Physical Assets Department which includes the Asset Sustainability Team.

### 1.10 DMG, Drought Working Group, Oasis Group and Communications Plan

The executive responsibility for managing a drought in accordance with this Plan rests with the Drought Management Group as defined in section 1.7 above. During the 2005-2006 drought our experience showed the value of establishing two key supporting groups that carried out the numerous day-to-day tasks necessary to maintain security of supply and we have retained this operating structure for this Plan. We have now updated this approach with four groups supporting our Drought Management Group: Restrictions, Exceptions and Responses sub-group, Monitoring and Mitigation sub-group, Communications sub-groups, and Operations and Network sub-group. Their purpose of each of the groups is outlined below:

**Drought Management Group:** To manage our operations and response to the threat of drought conditions in order to maintain security of supply whilst minimising environmental effects and maintaining the confidence of our stakeholders.

**Restrictions, Exceptions and Responses sub-group:** To plan the detailed implementation of restrictions on use of water in accordance with the DMP and our legal powers and duties taking account of the affect on our customers.

**Monitoring and Mitigation sub-group:** To monitor the affect of continued abstraction on the local environment with a view to submission of drought permits or orders to increase abstraction.

**Communications sub-groups:** To implement a programme of communications with internal and external stakeholders to ensure they are aware of the drought situation as it develops and to ensure the effectiveness of restrictions to reduce demand should this become necessary.

**Operations and Network sub-group:** To verify the operational status and enhanced monitoring of our assets to ensure their continuing operability, to minimise the loss of capacity due to low water levels. To forecast potential drought scenarios and risk assessment of associated supply/demand conditions to predict the scale and timing of lost output capacity. To evaluate and plan for the implementation of potential further mitigation measures to maintain or substitute capacity or constrain demand including use of additional surface water and imports.

## **1.11 Essex Resilience Forum Liaison**

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AWE, is a Category 2 Responder under the Civil Contingencies Act. The Head of Production and Supply is the primary point of contact with the Essex Resilience Forum for the company and a water company representative liaises with the LRF on behalf of all the water companies serving Essex.

## 2 Drought Triggers and Scenarios

### 2.1 Drought Triggers

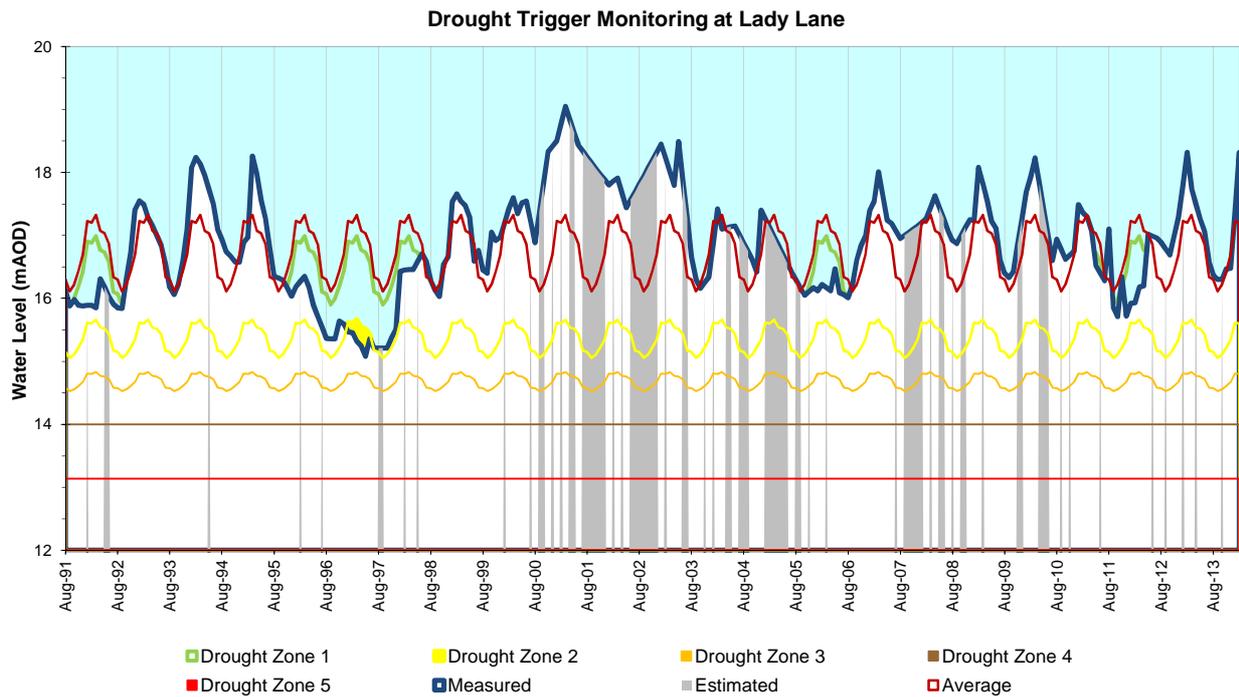
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We are able to use our available groundwater and surface water sources conjunctively. The groundwater supply system is sufficiently robust that all demand (including peak summer) can be supplied by groundwater alone. The surface water supply system is sufficiently robust to be able to maintain supplies during an emergency for a short period without a significant effect on customers. The period will vary depending on Anglian Water ability to assist by allowing us a greater than normal proportion of the shared resource. The period could however be sufficient for essential repairs and/or flushing of the groundwater system to be effected. Under favourable conditions we would be able to maintain near normal supplies from surface water only for several days. Together the groundwater and surface water systems are able to meet all historic and forecast demands throughout all historic droughts. A consideration of the supply/demand balance over time demonstrates the robustness of the resilience to drought. In 1995 the ratio of water available for use (WAFU) to dry year demand was 119% and 109% at average and critical period respectively. In 2010/11 the ratios were 124% and 120% respectively.

No significant problems were encountered during previous groundwater drought periods in the South-East of England including 1988-1992, 1995-1997 and 2002-2006 or during the record peak demand of the hot and dry summer of 1995. As our supply/demand balance has improved there is no likelihood of any problems due to drought in the foreseeable future. There is therefore no credible drought scenario that would require special measures to be triggered. We will however respond prudently to any and all future periods of drought conditions using past experience.

In general terms, when groundwater levels are within the previous operational range for the time of year we can confidently predict that no actions are necessary related to potential drought. When groundwater levels are substantially below average for the time of year we monitor the situation more closely and assesses the significance of below average levels, their rate of recession and the significance of associated data such as rainfall and soil moisture deficit. The supply/demand balance position is reported at every Executive Management Team with increased focus when there is any increased risk from developing drought conditions. We then also liaise more closely with the EA and neighbouring water companies.

We are fortunate to have a good set of historic data against which to benchmark potential droughts. The range of groundwater levels experienced since 1991 are reflected in the drought control curves included in Appendix A and shown in Figure 6 with data from an EA observation borehole at Lady Lane (TM0351 4325). The periods in which the groundwater level data are missing have been represented in with a grey shading. It can be seen that since 2006, water levels have not dropped below the levels recorded in 2006 and thus there is no significant value in updating the control curves, but Drought Zone 5 has been added. Figure 6 also demonstrates that the lowest levels recorded were in 1997. We, had no difficulty in meeting customer demand during this period. This is further supported by our DI in Figure 4, which illustrates that current demands are lower than in the 1990's.



**Figure 6: Lady Lane observation borehole water levels over past 20 years**

## 2.2 Historic Droughts

Rainfall data has been collected daily since 1972 at THXI and has been used to identify drought sequences since that time. Drought sequences have been defined as being two successive recharge periods (September to February inclusive) of below 90% LTA rainfall with a below 90% LTA rainfall summer period (March to August inclusive) in-between. Three such sequences were identified, 1988-1992, 1995-1997 and 2002-2006.

### 2.2.1 1988-1992 drought sequence

The summer of 1988 was wet but was followed by low rainfall during the 1988/89 recharge period. Groundwater levels were already low at TDED BH2. Despite the low rainfall the ground water levels recovered slightly through the drought period. No specific drought related actions were taken by ourselves during this period however an additional source at TSDN came into service in 1989. Abstraction reduced at TDED as TSDN increased, overall abstraction remained on a slightly increasing trend. Data from the Lady Lane OBH starts in 1991 and it shows the groundwater level depressed as a result of the poor recharge and confirms the recovery during the 1992/3 recharge period.

### 2.2.2 1995-1997 drought sequence

Summer 1995 was long and hot and resulted in the highest peak demand experienced by AWE. Abstraction pumping was limited by the capacity of the raw water pumping mains and pinch-points in the distribution system limited the ability to maintain treated water storage levels. We undertook a trunk main reinforcement programme to remove the pinch-points and commission the construction of a raw water booster pumping station at TDED to booster flows to THXI.

In addition a selective metering programme which commenced in 1997 saw the household meter penetration increase to 60% by 2003. No restrictions were imposed on customers during this drought sequence.

### **2.2.3 2002-2006 drought sequence**

As a result of the increase in meter penetration resulting from the selective metering programme the distribution input (DI) had reduced levels similar to those experienced during the mid 1980's. Improvements to the distribution system and the improved availability of raw water sources put in place following the previous drought sequence resulted in the 2002-2006 drought sequence having no impact other than the slight reduction in groundwater levels. The levels recorded at both Lady Lane and TDED boreholes were significantly higher than the lowest recorded providing reassurance that further water would have been available. No restrictions were imposed on customers during this drought sequence.

It should be noted that since 2007 we have continued to install meters at customer's properties when requested. Meter penetration has increased to approximately 73% and DI has reduced further.

## **2.3 Drought Scenarios**

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Drought scenarios of increasing severity have been considered when assessing the robustness of this plan. The three scenarios are Short, Medium and Long duration all of which encompass droughts within our experience. We did not consider that considering a scenario of greater severity than previously experienced would be helpful. However should a more severe drought occur, the Drought Management Action Plan includes responses not previously needed for completeness.

### **2.3.1 Short duration drought**

A short duration drought is regarded as being of between 6 to 12 months of reduced rainfall and includes a winter recharge period. Droughts of this magnitude have been experienced on a number of occasions over the length of our rainfall records and have resulted in no action having to be taken. The most recent example was during the winter recharge period of 2007/8. No actions were taken by the company other than to continue monitoring groundwater levels. The conclusion is that a short duration drought poses no threat to our operations or its customers.

### **2.3.2 Medium duration drought**

A medium duration drought is regarded as being when there are two successive dry winter recharge period interspaced by a dry summer. The drought period 1995-1997 previously described is the best example of a medium duration drought experienced in recent times. The period was characterised by the high peak demand during the summer of 1995 which prompted a number of improvements to be made to both the abstraction and distribution systems. No further measures were required but as a result we are now far better positioned to cope with a similar drought.

### 2.3.3 Long duration drought

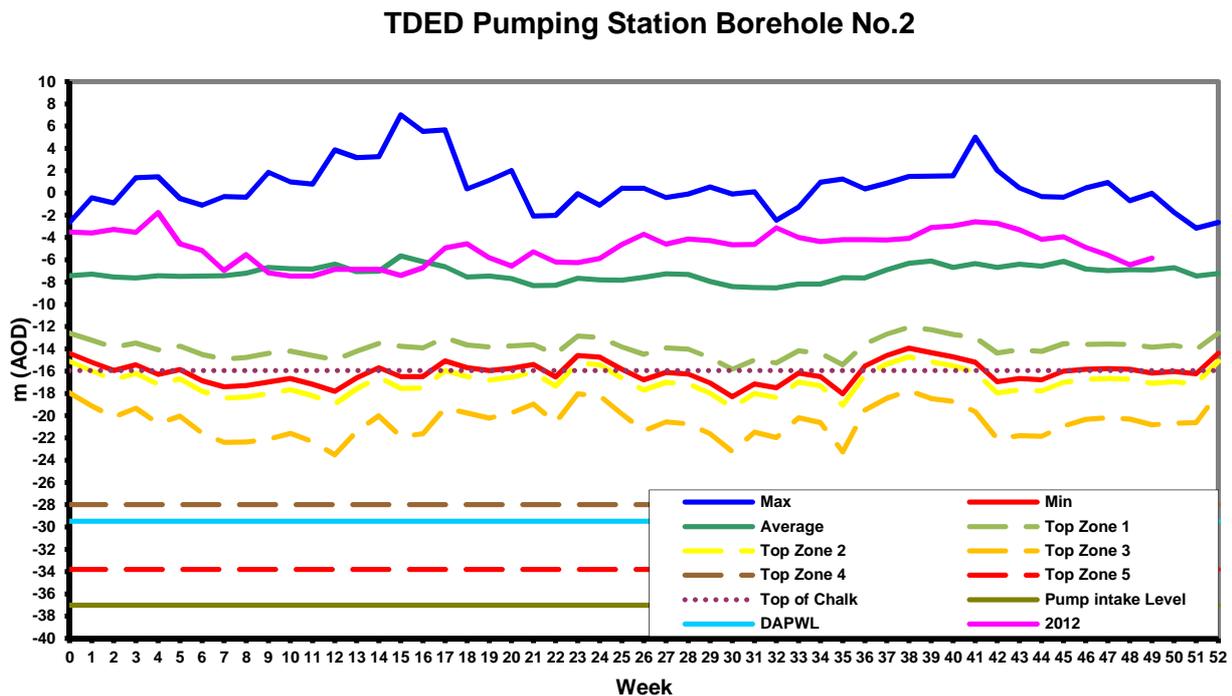
A long term drought is regarded as when there are three successive dry winter recharge periods interspaced with dry summer periods. The 2002-2006 drought fulfils this criteria and as previously described we were able to supply water with no restrictions to our customers and required no special measures to be taken.

### 2.3.4 Control curves

The window between historic average and minimum groundwater level and deepest advisable pumping water level (DAPWL) has been used at the five principal groundwater sources to develop simple control curves to initiate and progress drought management actions.

The DAPWLs are taken from the Source Reliable Output (SRO) report prepared for us by Mott MacDonald in 1997 which utilised data up to 1996. We have not attempted to consider a catastrophic drought worse than that ever experienced, as it is not considered helpful to hypothesis on such an extreme event.

Appendix A contains groundwater control curves for each of the five principal production borehole sites. Each control curve has five drought action zones. An example is shown in Figure 7. Details of the demand and supply options that would be considered are given in Section C. **These will be updated in the full revision of the DMP 2015.**



**Figure 7: Drought control curves at TDED Pumping Station**

## 2.4 Drought Action Zone Framework

**Following work carried out for our revised draft WRMP 2013, detailed in Technical Report 1.2: Levels of Service Hindcasting – Assessment of the Frequency of Drought Restrictions, we have updated our drought management trigger zones. The response curves have been aligned to reflect the experience of when publicity campaigns and hosepipe bans were used in the past in**

the other regions, since the East region never needed the hosepipe bans to be implemented. Although the past may not be a wholly accurate predictor of the future, this methodology correlates with estimated return periods of 1 in 5 years and 1 in 10 years for drought Zones 2 and 3 respectively, in line with the basis of our WRMP. A summary of expected Zone actions include:

#### **Zone 1 – Drought Awareness**

Occurs when groundwater levels are below the Long Term Average (LTA) triggering increased interpretation of existing monitoring. This first trigger is intended to create a state of readiness within the Company to ensure that proper consideration is given to the risk of drought occurring due to forthcoming hydro-geological conditions and the likely severity of that risk. Initial informal liaison with the EA may be set up during this period if rainfall is reduced as part of the preparation for a possible drought.

#### **Zone 2 – Voluntary Demand Reductions**

Has been set with public perception in mind and would trigger an increase in activity both in terms of supply management and public awareness of the situation (demand management). Liaison with the EA and neighbouring water companies will be put on a formal footing with our Drought Management Group being convened. Beginning the planning process would include consideration of whether any additional expenditure would be required to meet the potential drought challenge. Any additional OPEX or CAPEX expenditure would need approval at this stage. The supply/demand balance would be reviewed based on the reduced yield of 1997/98. Enhanced environmental monitoring would be implemented in order to update assessments of effects in preparation for potential drought permits or orders.

#### **Zone 3 – Compulsory Restrictions on Use**

Defined as a 1 in 10 year event and consistent with our hindcasting analysis conducted for our PR14 WRMP. Entering this zone would trigger positive actions to restrain demand. We may choose, dependant upon timing, to implement temporary usage restrictions. Following the drought in 2012 and in light of the representations from customers and trade associations we received and the revision of the industry Code of Practice on Implementation of Restrictions in Drought, we have reviewed the implementation of temporary use restrictions for non-household customers whose livelihoods may be significantly adversely affected by restrictions. As a result, we have introduced a 'new' level of service – 3a - for our economically vulnerable non-household customers, in that we defer the implementation of temporary use restrictions on them. Consequently, our non-household customers benefit from a higher level of service with less frequent restrictions. However, there is a point at which we would need to ask non-household customers to restrict their use, even if it had an impact on their business, as this must precede any application for a drought order. We estimate the return period for temporary use restrictions for our economically vulnerable non-household customers to be no more frequent than 1 in 20 years. Communication activity would also be raised accordingly

#### **Zone 4 – Severe Drought Conditions**

These are defined as a no more frequent than 1 in 40 year event based on our hindcasting analysis conducted for our revised draft WRMP 2013 and described in our WRMP Technical Report 1.2: Levels of Service Hindcasting – Assessment of the Frequency of Drought Restrictions. Water levels in this Zone would be at an extremely serious position. Drought permits to suspend low flow agreements would be introduced. We would then implement drought orders for restrictions on essential use as set out in the Drought Direction 2011. All other available options and actions would then need consideration at this point as the drought starts to become groundbreaking. It is expected that there will also be occasions when we impose restrictions but do not proceed to the next level of drought preparedness as our groundwater stocks recover.

### Zone 5 - Unprecedented Drought Conditions

Water levels within this zone have never been seen before and consequently it is not possible to predict the actual behaviour of the chalk and abstraction at levels lower than this. The trigger level has been calculated in analogy with the Central region trigger curves; this indicates that in certain stations, pump intakes might need to be deepened; appropriate verification will be carried out for the next March 2015 report. In order to estimate a possible level of service for emergency drought orders, a decrease in water level of one metre below the lowest recorded groundwater level, Drought Zone 4 (Drought Orders for Additional Abstraction) was applied. The information available for the Central region allowed to calculate a return period of 1 in 118 years. It must be noted that this return period is highly uncertain and should be considered with a broad confidence range (i.e. 1 in 120 +/- 30 years).

We are of the opinion that the use of standpipes is no longer an appropriate drought response as it is not compatible with regulatory water quality requirements. Our initial customer feedback is also strongly opposed to the use of standpipes; the majority of customers believe that standpipes are unacceptable in a modern civilised society. As a result, the level of service for emergency drought orders for standpipes and rota cuts is that we consider them unacceptable.

Regrettably, in today's world with emerging threats such as terrorism, we feel that it would be inappropriate to state that we are certain in the resilience of our system such that we would never use standpipes. As a result, we consider that standpipes would only ever be deployed as a last resort in the event of a civil emergency and more than likely at a very local level for a short period of time to deal with a significant threat.

Detailed drought actions assigned to Zones are outlined in Section 3.

## 2.5 Drought Forecasting

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The EA are developing a groundwater model which includes our boreholes in East region. When completed this model can be used to assess future drought scenarios and determine regional groundwater level changes under various rainfall scenarios. The outcome is still not available and, where appropriate, it will be included in the next update of our Drought Management Plan.

For surface water the TARD control curve has been revised by Anglian Water as part of their drought Plan submission and is enclosed as Appendix B. Further information on the curve for TARD is available from Anglian Water. Identical control curves have been submitted by us and Anglian Water for TARD even though the supply-demand balance is not identical for each company. Similarly the onset of a drought and its relative effect on each company is likely to be different. AW may choose not to implement certain actions even though these may be indicated by the TARD control curve. Any decision to delay implementation would be based on the prevailing circumstances with particular regard to the groundwater resource position.

Droughts are caused by insufficient rainfall leading to very dry conditions, progressing to low river flows and groundwater levels. This makes the onset and likelihood of a drought relatively easy to predict through regular hydrological analysis work. We continually monitor and record groundwater levels, surface water levels and rainfall within our supply area, so that the risk of drought and its impact on water resources can be effectively assessed and that appropriate drought measures can be implemented in good time to maintain supplies to its customers.

## 2.5.1 Drought records

An extensive archive of local drought activity and important information from previous droughts has been developed. All meeting/action notes have been stored and may be referenced to aid future drought management. Hydrological information dating from 1991 is stored electronically within IT systems. This data is used widely for baseline hydrological monitoring and management reports. Records include relevant drought documents, Drought Management Planning guidelines, drought monitoring data, and other related topics available for reference.

### 3 The Drought Management Action

Please note the following drought actions would only be carried out in the event of a drought very much more severe than any previously experienced. Demand would have to increase to exceed levels experienced in 1995 and rainfall would have to fail for longer or be significantly less in order for the groundwater levels to fall significantly below the historic minimum levels.

As we can foresee no drought event when this is likely to occur the statement made in the Draft Water Resources Plan where we foresee no restrictions within the 25 year planning horizon is valid. The actions and temporary restrictions covered in this section would only need to be applied during an extreme and unprecedented drought.

#### 3.1 Introduction

Specific drought actions will be carried out under the supervision and management of the Drought Management Group. Details of internal roles and responsibilities concerning drought are contained within Sections 1.7 and 1.8 and the Communications Plan in Section 5. We plan to follow a twin track approach using both Demand Management and Supply Side options as tools to manage the drought based on risk assessment of severity. Options to be considered are summarised in Section 3.2 and 3.3.

#### 3.2 Demand Side Management Actions

A summary of each chosen demand-side drought management action is presented in the table in Appendix C4. This table demonstrates:

- How we have outlined the priority, order, timing and combination of demand side actions it will take in a drought
- An overview of the key demand measures undertaken within each Zone when the triggers have been activated.

A number of different actions have been assessed and planned for during a drought in order to ensure security of supply. An overview of the demand side and the supply side actions is given in the Table 3. A re-alignment of the actions across Drought Zones 3, 4 and 5 will be undertaken in the full revision of our DMP in 2015.

<b>Drought Zone Level 1</b>	
<b>Water efficiency campaign</b>	
<b>Inform the EA that Drought Zone 1 has been breached</b>	

<b>Drought Zone Level 2</b>				
<b>Demand side actions</b>	<b>Internal discussion on approach to restrictions and concessions</b>	<b>Appoint customer support advisers re restrictions, Q&amp;As produced, website updated</b>	<b>Prepare for temporary use bans. Send notifications to papers and radio stations</b>	<b>Allow customers to request exceptions to a ban</b>

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
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### Table 3: Overview Drought Actions

The detailed actions are outlined in the rest of Section 3.

## 3.2.1 Zone 1

### 3.2.1.1 Water Efficiency

Water efficiency measures remain a key element in our water resource strategy since it plays an essential role as part of the demand management matrix contributing to maintaining the overall supply/demand balance. Water efficiency is therefore taken extremely seriously both as it impacts on the operational side of the business and amongst the diverse customer base. In particular we consider it important to maintain a pro-active position with customers regarding water conservation to help in periods of stress.

Water efficiency is however complex as it involves both technological and behavioural impacts on customers. Customers are encouraged to use water more efficiently in the home by promoting the availability and use of water-efficient devices. For commercial customers, leakage detection, private network management and water efficiency auditing are available and we assist them in identifying and correcting water wastage. Over time, we would like all its customers to become more conscious of their water usage. Our drought response Plan has been amended to reflect the correlation of these issues.

AW water efficiency initiatives include:

- Limiting the average per capita consumption of domestic customers to not more than the government target of 130l/h/d by 2030. This will be achieved by supporting measured customers to save water, and increasing the number of measured customers.
- Household metering; 79% of homes to have a meter by 2015 and 82% by 2020
- Advising/educating customers and consumers on a number of specific water efficiency initiatives
- Maintaining leakage at or below the sustainable economic level
- Reducing our own use of water and promotion of water efficiency within the Company

Extra promotion of water efficiency activity is considered under drought conditions as part of specific drought communication activities and any subsequent appeals for restraint. It is also quite likely that extra promotion in the context of drought would be more successful than under normal conditions particularly with the remaining unmeasured customers who normally have little incentive to reduce water use. As with most water efficiency campaigns the emphasis would be on reducing component volumes and include showering instead of baths, reducing WC flushes and water re-use in the garden. There would also be strong messages about water efficiency in the garden particularly if the onset of drought could be linked with the purchase of summer bedding plants.

### 3.2.1.2 Water Operations

- Leakage – We will continue to monitor leakage and ensure it is maintained at a sustainable and cost efficient level.
- Pressure – We will continue to maintain pressure management as a tool for minimising leakage

- Water use at operational sites – We will carry out water audits at operational sites and set targets for water use
- Developing water efficient culture – We will develop water awareness programmes for our employees and expect them to become water efficiency ambassadors for AW.
- Procurement – We will procure in a sustainable manner and take advantage of the Enhanced Capital Allowance (ECA) scheme which supports businesses investing in water saving equipment or water saving technologies.

### 3.2.1.3 Metering

Our target for the East region is to see circa 79% of households fitted with a meter by 2015. A measured bill raises customer awareness and is the fairest way to pay, providing a financial incentive for customers to reduce their water usage. Importantly, most customers that pay for water using a meter use less water than those that don't, thus reducing the average per capita consumption

### 3.2.1.4 Water Saving initiatives

- Water audits – Free water efficiency audits will be offered to domestic and commercial customers.
- Water efficiency products – A range of free and charged water efficiency products will be offered/promoted by our customer service technicians to customers.
- Water efficiency initiatives – We will run a number of water efficient programs.

### 3.2.1.5 Education and Promotion

- Education – Focus will be on measured customers and future customers by working with schools and children. We will provide information to all our customers on the benefits of switching to, or retaining more water efficient household appliances
- Website – Water efficiency will be made more readily available.
- We will structure advisory campaigns to deliver specific efficiency advice within an annual program.

### 3.2.1.6 Future Strategy

The Company plans to carry out a variety of water efficiency activities with both commercial and domestic customers, which are estimated to save 0.07Ml/d per year, thus allowing us to achieve the Water Efficiency target set by Ofwat. We will continue to develop its water efficiency programme, including innovations based on industry Best Practice. A key strand in the programme will be the provision of advice to customers who change to meters. At the point of change, an advice pack is provided to help customers save water without any major impact on their lifestyles. Additional support to customers with large families or on a low income, helping them to minimise any adverse impacts of paying for their water by volume, is also part of our strategy.

## 3.2.2 Zone 2 – Raised Awareness

- Public Relations Campaign – Customer awareness focussing on drought implications.
- Enhanced Leakage Reduction – Unlikely to yield a significant increase in savings, but important to fix visible leaks and supply pipes to maintain customer support.
- Increased contact with the Environment Agency and neighbouring water companies to ensure alignment of messages and mutual understanding of one another's positions.

### 3.2.3 Zones 3, 4 and 5

From the 1<sup>st</sup> October 2010 Section 36 of the Flood and Water Act 2010 allows water companies a wider range of temporary water use restrictions that they can implement during a drought without requiring a drought order. This updates the legislation on temporary water use restrictions, substitutes the previous section 76 of the Water Industry Act 1991 and therefore supersedes the previous hosepipe ban powers.

The Water Use (Temporary Bans) Order 2010 provides detailed definitions of uses, exemptions and conditions in relation to these new powers. The Drought Direction 2011 sets out those uses that still require an ordinary drought order to restrict in a drought. These three pieces of legislation supplement each other and together they set out the categories of water use that can be restricted by a company and additionally with a Drought Order.

The background to the Order arises from the 2004-2006 drought experienced in the South East of England. The limited scope of hosepipe bans which applied only to the watering of private gardens and the washing of cars gave rise to public criticism. The focus of the powers was seen as unfair in preventing garden watering whilst filling private swimming pools could continue.

Climate change scenarios and historic information suggests a multi-year drought could occur once in every 20 years. Such prolonged shortages of rain will require the implementation of restrictions on water use to conserve water supplies and protect the environment.

The changes introduced to the legislation have made the powers clearer and have enabled more effective and equitable restrictions during times of drought. It is hoped that through introducing these new powers it will lead to better conservation of water earlier on in a drought and ensure supplies are protected for essential domestic use.

As stated above, we do not consider these restrictions to be required in this region; however they are highlighted here to inform actions we would take should the water resources position become very severe.

### 3.2.4 Representations and actions prior to implementation of restrictions

Before any restriction is implemented under these new provisions, we will provide the opportunity for representations to be made.

#### 3.2.4.1 *Publicity Requirements*

Section 76B of the Water Industry Act 1991 has enhanced previous publicity requirements with regard to imposing restrictions. Before any prohibitions can be applied, we will:

- Publish notice on the website at the same time as we publish notice in two newspapers circulating in the affected areas.
- Provide details in the notice of how to make representations about proposed prohibition and exceptions.
- Give notice each time the scope of any prohibition imposed under section 76 of the WIA 1991 is altered in any way; and
- Give notice in relation to the lifting of any prohibitions on the website and in two newspapers circulating in the affected areas.

An estimate of one week for preparation for the notices and the publicity should be allowed for. Whilst there will be a lead in time for the implementation of restrictions to allow for representations, there is no such lead in time necessary for the revocation of restrictions; the lifting of a ban will take effect as soon as notice is given by one of the required means.

### 3.2.4.2 Making representations

Before a restriction is implemented under these new provisions, we will provide the opportunity for representations to be made. The time allowed for representations will depend on the scale of the proposed restrictions. For the Temporary Use Ban measures we will allow for 2 weeks for representations to be made in the first instance and one week for any subsequent notices or changes in the restrictions or the exceptions. Our proposed timescales are outlined in Appendix C.1. Those seeking to make a representation will be able to do so by completing and returning a representation form (Appendix C3.3). The following forms of media will be available:

- Website
  - E-copy of the form will be available to be completed and returned directly online
  - Paper copy will be available for downloaded to be printed off, then returned to head office
- E-mail
  - Email representation to a dedicated email address
- Telephone
  - A contact service advisor will be able to post a copy of the form to a customer address
  - A contact service advisor will be able to complete an e-copy of the form by taking customer details on the phone

### 3.2.4.3 Handling Representations

Representations received into the business will be collected and reviewed on a weekly basis. A panel of three members from the Drought Management Group will convene to discuss the outcome of representations with responses proposed for approval of the DMG. A final decision will be made by all three representatives on any action to be taken as a result of the representation within 3 weeks. Representations will be considered on an individual basis and as a whole. Exceptions from restrictions will not be granted on a case by case basis unless provision is made in the public notice. There will be no appeal process if the application for a concession or exception is denied.

## 3.2.5 Implementation of Restrictions

Our proposed policy for implementation of the Water Use (Temporary Use Bans) Order 2010 (WUO 2010) and Drought Direction 2011 (DD11) measures are summarised in Table 44. Appendix C.4 and Appendix C.5 comprise a series of figures of each of these activities summarising key information associated with each restriction. These appendixes have been adapted from the figures listed in the UKWIR Model Code of Practice. These and the following text will be updated for Drought Zone 5 in the next full revision of the Drought Plan.

Zone 3 – All 11 Temporary Ban measures (WUO 2010) introduced in single phase	Zone 4 – All 10 Drought Order (DD11) measures introduced in single phase
<ul style="list-style-type: none"> <li>• Watering a garden using a hosepipe</li> <li>• Cleaning a private-motor-vehicle using a hosepipe</li> </ul>	<ul style="list-style-type: none"> <li>• Watering outdoor plants on commercial premises</li> <li>• Filling or maintaining a non-domestic</li> </ul>

<ul style="list-style-type: none"> <li>• Watering plants on domestic or other non-commercial premises using a hosepipe</li> <li>• Cleaning a private leisure boat using a hosepipe</li> <li>• Filling or maintaining a domestic swimming or paddling pool</li> <li>• Drawing water, using a hosepipe, for domestic recreational use</li> <li>• Filling or maintaining a domestic pond using a hosepipe; and</li> <li>• Filling or maintaining an ornamental fountain</li> <li>• Cleaning walls, or windows, of domestic premises using a hosepipe</li> <li>• Cleaning paths or patios using a hosepipe</li> <li>• Cleaning other artificial outdoor surfaces using a hosepipe</li> </ul>	<ul style="list-style-type: none"> <li>• swimming or paddling pool</li> <li>• Filling or maintaining a pond</li> <li>• Cleaning non-domestic premises</li> <li>• Cleaning a window of a non-domestic building</li> <li>• Operating a mechanical vehicle-washer</li> <li>• Cleaning any vehicle, boat, aircraft or railway rolling stock</li> <li>• Cleaning industrial plant</li> <li>• Suppressing dust</li> <li>• Operating cisterns</li> </ul>
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**Table 4: Summary of Implementation Policy for WUO and DD11**

A single phase in which all eleven activities are simultaneously banned at the start of the Temporary Ban is felt to be the **clearest** implementation policy. **We are aware that the complexity of the new restrictions has the potential to be confusing and we will endeavour to minimise confusion by informing our customers on what the restrictions are, what they mean and how we have responded to representations on our website.**

Levels of decline in groundwater are dominated by natural discharge from the aquifer, and will far outweigh any differences on a yearly basis made from demand management savings. Our priority is to ensure we have sufficient groundwater supplies to meet demand, whilst minimising the impact of these abstractions on the environment. By imposing the full use of powers immediately we maximise the benefit of the restrictions and ensure resources remain within our ability to supply the customer base. This also sends out a strong and clear message to our customer base that the situation is deteriorating. Customers would not normally experience an abrupt start to restrictions. Water savings are made gradually throughout Zone 2 following an initial media and **communications campaign raising the awareness of the situation.**

Where the groundwater level was tracking the drought curve, but not likely to cross deeply into the Zone for some time, we may delay the imposition of restrictions to an appropriate time. For example, if the Zone 3 trigger level was not crossed until the Autumn and then tracked the trigger level, either slightly above or below, we would not aim to impose restrictions until the Spring of the following year, when the pattern and amount of recharge was understood. We would review the situation in January, when the first half of the recharge season was completed and the DMG would then, in consultation with the Environment Agency and neighbouring water companies, review the situation again in April.

We would not be introducing the measures given in the Drought Direction 2011 legislation if the water situation was not becoming demonstrably very serious. We consider that a straightforward total ban without exemptions not only sends a clear message underlining the severity but also maximises water savings and is easier to communicate and administer. In the unlikely event of the need to apply for an Emergency Drought Order, such an approach would stand us in good stead for an application.

### 3.2.5.1 Concessions and Exceptions

Our DMP only includes formal statutory exceptions outlined in the Water Use Temporary Bans Order 2010. In order to conserve water and ensure a safe and secure supply during a drought, no other exceptions will be normally granted by us. Where other exceptions are proposed, we will state this in our public notice. Please refer to each figure within Appendix C.4 and Appendix C.5 for a more detailed outline of the activities covered by each restriction and whether a statutory exemption is associated with each. A summary of the statutory exemptions is listed below:

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.*

### 3.2.5.2 Vulnerable Customers

Information relating to the support for vulnerable Customers is available on our website

<http://www.Affinitywater.co.uk>

### 3.2.5.3 Application for Concessions

We will consider applications based on the grounds of health and safety and bio-security. Customers must do so by completing and returning a representation form (Appendix C.3). This form can either be completed by hand and sent back to the head office (it can be downloaded off our website or can be sent out by post), completed and sent back directly online or filled in by phone with details taken and captured by one of our contact centre agents. A description of how we will handle representations received has been outlined in section 3.2.4.3.

### 3.2.5.4 Compensation

We will not consider any applications for compensation in the event that temporary bans on water usage are introduced except as required by legislation. We have to plan on the basis that it may have to impose restrictions during long periods of very dry weather or drought. If you require further clarification on this please refer to the following link available through the Ofwat website -

<http://www.ofwat.gov.uk/sustainability/waterresources/restrictions/>.

We do not anticipate that our suggested Drought Permit options (Section 3.4) would have any impact on private abstractors. We have no provisions for compensations under these circumstances. If a claim was received this would be passed to insurance who would review

and if necessary appoint a loss adjuster. The loss adjuster would negotiate and hopefully come to a settlement with the complainant.

### 3.3 Supply Side Options

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A summary of each chosen resource side drought management action is presented in the table in Appendix C.2. This table demonstrates:

- How we have outlined the priority, order, timing and combination of supply side actions it will take in a drought

An overview of the measures used is highlighted below.

#### 3.3.1 Re-commissioning of Abandoned/Disused Sources

We have no sources which have been abandoned and which could be fully re-commissioned in East region. There is however one source currently not in use, which can be brought back into service under existing abstraction licences.

##### 3.3.1.1 TLAW chalk Source

The TLAW well source has not been used for public supply since 1992. The TLAW source could be brought back into use quickly if required due to drought either with EA consent or depending on the licence position, unilaterally and can contribute up to about 5MI/d.

#### 3.3.2 Engineering Works

Our supply side has been progressively improved since the record peak demands occurred in July and August of 1995. The improvements are shown below:

- Surplus Anglian Water groundwater can be used for R. Colne augmentation. This increases raw water availability to TARD and is allowed for in the TARD Control/Trigger Curve given in Appendix 2. During 2011 Anglian Water carried out tests and other work to allow 2 more groundwater sites to support the River Colne. A full explanation of the background to this is available from Anglian Water.
- TARD was raised in 1997 providing an additional 180MI of useable storage, which equates to circa 1MI/d yield increase in a design drought.
- Several borehole pumps lowered and some more powerful pumps fitted. Further pump lowering may be necessary during a future more severe drought and would be actioned in Zone 2.
- Twin 160kW booster pumps fitted to borehole raw water mains to boost peak flow capacity from circa 39MI/d to circa 48MI/d
- Two additional boreholes in the Stutton Brook valley are now available for normal and drought conditions. The additional increase the spread of borehole abstraction. Licensed quantities have increased “permanently” by 2MI/d and 4MI/d for annual average and peak respectively

Given the success of the above measures and the success of demand management improvements we are unlikely to need further engineering works options in the foreseeable future.

### 3.3.3 Distribution Improvements

AWE has a well-integrated trunk and distribution main system with more than adequate capacity to meet peak summer demands. We have not experienced any difficulty in getting sufficient water to our customers since significant improvements were completed between 1990 and 1993. We have been implementing a strategy of increasing and improving treated water storage. More than 24 hours treated water storage is available to balance variation in diurnal and weekly demand allowing sources and treatment facilities to operate at average weekly flows. There is therefore no need for consideration of distribution improvements such as construction of temporary pipelines.

### 3.3.4 Inter company Bulk Transfers

AWE, has a short boundary with Anglian Water. As joint owners and operators of the TARD scheme AW and AWS already have an effective mechanism for bulk transfer which works well.

The legal basis of TARD could result in strict sharing of resources in a drought. In practice the companies enjoy a close and effective working relationship and can vary operational practice to the benefit of both parties. The willingness of AWS to operate their chalk boreholes to benefit the availability of water in the River Colne is a good example. Similarly our robust borehole and integrated distribution system can and has been operated to temporarily assist Anglian Water.

In addition to the AWE/Anglian Water arrangements facilities also exist for Essex and Suffolk Water (ESW) to release raw water to either TARD or direct into the TARD treatment works. ESW have confirmed that supply would be provided to AW/Anglian Water via TARD provided the water was available. It is possible that all three companies could suffer equally in a future drought. There is however a greater probability that the progress of a drought would affect companies differently giving the opportunity for assistance to the worst affected area.

### 3.3.5 Supply Balancing

The Company's ground and surface sources are managed conjunctively to optimise the total supply. In normal operation and during a progressive drought, demand can be transferred from one source to the other in proportion to the ability to supply. This is a normal operating function but would come under greater scrutiny with decreasing regard to cost during a developing drought.

As explained above AW has a well-integrated supply and distribution system. Our East region is treated as one Water Resource Zone and therefore water, which is available, can be moved to meet demand in any part of the distribution system.

### 3.3.6 Use of Alternative/Existing Sources

Our groundwater licences already allow for varying abstraction between individual sites to mitigate any adverse impacts at any site. Similarly the TARD abstraction licence for the River Colne intake has no minimum residual flow constraints and the ability to re-fill the reservoir is solely constrained by whether or not water is available in the river.

Apart from the possible re-use of currently dormant sources there are therefore no drought permits or orders relevant to increasing supply side capacity.

### 3.3.7 Other Options

No other options exist except resorting to desalination of sea water using temporary treatment facilities which could be implemented in extreme and unprecedented drought conditions. The company's area is bounded by the North Sea and the tidal estuaries of the Rivers Colne and Stour with high demand and high capacity trunk mains adjacent to the coast. This option is included for completeness but is extremely unlikely to ever be needed.

### **3.4 Drought Orders & Permits to remove existing low flow constraints**

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Due to the robustness of the resource available and having never had to impose restrictions on customers, we do not believe the use of drought permits is required in the East region and therefore cannot envisage a situation where they would be required.

## 4 Environmental Monitoring Plan

We carry out routine collection of hydrometric and water quality data, irrespective of drought throughout our operating area.

The supply side options included as drought management actions will not involve any environment damage as all options are available within the operational limits of existing abstraction licences. In addition studies such as that for the River Brett AMP3 NEP Scheme did not demonstrate any connectivity of groundwater abstraction from the confined aquifer with no discernible environmental impacts on surface water features due to abstraction from our sources. Similarly the abstraction from the River Colne was reviewed for possible impacts on the downstream estuary but no further action was considered necessary and the existing licence allowing all fresh water to be abstracted at the tidal limit (within overall licence volumes) remains in place.

Historical data demonstrates that we can rely on abstracting the full yield of existing sources under drought conditions. Our groundwater boreholes have also been shown to be sufficiently robust that it is feasible to support low flows in the River Brett from groundwater. Facilities for the augmentation of the River Brett are in place and can be used when instructed by the Environment Agency. During 2004 we installed a new permanent pipeline between TSHE borehole and the River Brett. The existing arrangement is summarised in Table 5.

Site Location (grouped by type or location)	Monitoring Proposals	Potential Abstraction Impact during Drought	Proposed Mitigation Action
River Brett	By EA	Low flow in River Brett	Augmentation of River Brett at TSHE

**Table 5: Opportunities to mitigate environmental impact of drought**

## Communications Plan

Affinity Water East Region is a small portion of a water company and is close to its customers. Direct contact and local media are used to communicate with the public and other stakeholders.

Our communications plan for a drought is shown in Appendix D. This Communications Plan is a skeleton which would be expanded according to the severity and timing of a drought.

AWE is a resource zone with a very robust supply-demand balance and undoubtedly would benefit from “drought” publicity initiated by others or from generally heightened public awareness during dry periods.

## 5 Post Drought Actions

### 5.1 Identifying end of Drought

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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. The hydrological conditions as a drought recedes can be complex and identifying the end of a drought can be difficult to determine. AWE will confirm first and foremost with the Environment Agency that the water resource situation has returned to normal before taking any action. The following stakeholders would also be notified before any actions are taken: DEFRA, OFWAT, Water UK, Consumer Council for Water, DWI, Environmental Groups.

The end of a drought will be determined using our triggers, with all restrictions able to be removed when groundwater levels have moved out of Zone 3. The lifting of the ban will first require notice in relation to the lifting of prohibitions to be published on our website and in two local newspapers. Unlike the imposition of restrictions however, there is no such lead in time necessary; restrictions will be revoked instantly after the notice is given.

### 5.2 Post-drought actions

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Directly after a drought event, a “lessons identified” report that will enable future processes to be improved will be produced. This report will be produced within 3-6 months of a drought ending and will be followed up within a year with evidence that recommendations were acted upon. The report will include:

- A review of the environmental impact of the drought by analysing baseline, in-drought and post-drought data.
- Determining if the appropriate environmental monitoring of baseline, during and after a drought was carried out to measure the impact of any drought permits or drought orders.
- A review of the effectiveness of any mitigation measures implemented.
- A review of the success of any drought permit and drought order applications
- An assessment of how well individual sources delivered additional water and determine where any re-assessments of yields may be needed or invested to maintain yields of sources.
- An assessment of the estimates of demand reduction from the implementation of demand side drought management actions.
- An investigation into whether or not the company would need to make any changes to its demand forecast or longer term demand forecast

Additionally a drought workshop would be held to assess the efficacy of the management process and review whether any improvements or changes to the drought Plan were required.

# Appendices